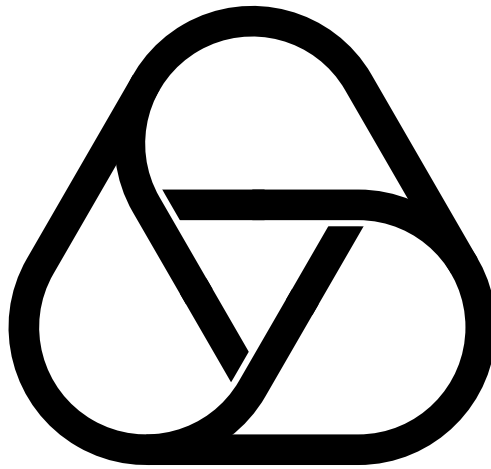




Oberwolfach

**Jahresbericht
Annual Report
2010**





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INHALTSVERZEICHNIS / TABLE OF CONTENTS

Vorwort des Direktors / Director's Foreword	6
1. Besondere Beiträge / Special contributions	
1.1. Generalsanierung abgeschlossen / Overall refurbishment completed	9
1.2. IMAGINARY 2010	17
1.3. MiMa - Museum für Mineralien und Mathematik Oberwolfach / MiMa - Museum for Minerals and Mathematics Oberwolfach	21
1.4. Oberwolfach Vorlesung 2010	27
2. Wissenschaftliches Programm /Scientific programme	
2.1. Übersicht der Programme / Overview on the programme.....	43
2.2. Jahresprogramm 2010 / Annual schedule 2010	46
2.3. Workshops.....	49
2.4. Miniworkshops.....	92
2.5. Arbeitsgemeinschaften	104
2.6. Oberwolfach Seminare.....	106
2.7. Fortbildungsveranstaltung / Training Week	112
2.8. Research in Pairs	114
2.9. Oberwolfach Leibniz Fellows	119
2.10. Publikationen / Publications	122
3. Sachlicher und Finanzieller Teil / General and financial statements	
3.1. Übersicht der Bereiche / Overview on the divisions.....	124
3.2. Bibliothek / Library	124
3.3. IT-Bereich mit ORMS / IT Division including ORMS.....	127
3.4. Verwaltung und Hauswirtschaft / Administration and housekeeping	131
3.5. Finanzielle Übersicht 2010 / Financial overview 2010	132
3.6. Dank / Acknowledgement	133
3.7. Organigramm.....	134

Die männliche Form wurde lediglich aus Gründen der Vereinfachung gewählt und dient der besseren Lesbarkeit. Entsprechende Begriffe gelten im Sinne der Gleichbehandlung grundsätzlich für Frauen und Männer.

Vorwort des Direktors

Es ist mir eine Freude, Ihnen den Jahresbericht 2010 des Mathematischen Forschungsinstituts Oberwolfach vorzulegen. Er gibt Ihnen einen Überblick über aktuelle Geschehnisse des letzten Jahres, insbesondere über das wissenschaftliche Programm, aber auch über die sachlichen und finanziellen Rahmenbedingungen, sowie über besondere Ereignisse.

Mitte 2010 konnten wir alle, Mitarbeiter und Gäste des Instituts, tief durchatmen. Die großen Baumaßnahmen, die 2003 mit der Betonsanierung des Gästehauses begonnen hatten und die dann mit der Erweiterung der Bibliothek 2006/2007 weitergeführt wurden, konnten mit der Generalsanierung des Gästehauses erfolgreich abgeschlossen werden. Alle Baumaßnahmen wurden während des laufenden Betriebs durchgeführt und bedeuteten für alle Mitarbeiter zum Teil erheblichen Mehraufwand. Umso mehr freuen wir uns, dass das Ergebnis nach übereinstimmendem Urteil aller Gäste hervorragend gelungen ist.

Die Baumaßnahmen wurden seit 2003 mit etwas mehr als 5 Mio. Euro zusätzlichen Mitteln unterstützt. Besonderer Dank gilt dem Land Baden-Württemberg, dem Bundesministerium für Bildung und Forschung (BMBF), der Klaus Tschira Stiftung und der VolkswagenStiftung, dem Förderverein und der Oberwolfach Stiftung, sowie der Gesellschaft für Mathematische Forschung. Einen ausführlichen Bericht finden Sie im Innenteil des Jahresberichts.

Die Ausstellung IMAGINARY, die das MFO zum Jahr der Mathematik 2008 konzipiert und in Deutschland in mehr als 13 Orten gezeigt hatte, gewinnt immer mehr Freunde, insbesondere auch im Ausland. Darüber und über die feierliche Eröffnung des Museums für Mineralien und Mathematik MiMa in Oberwolfach berichten wir ausführlich.

Die wissenschaftliche Arbeit des MFO mit den sechs Komponenten Workshops, Miniworkshops, Research in Pairs, Arbeitsgemeinschaft Deninger-Faltings, Oberwolfach Seminare und Oberwolfach Leibniz Fellows ist weiterhin sehr erfolgreich. In allen Programmen übersteigt die Nachfrage unsere Kapazität deutlich, und

Director's Foreword

It is with great pleasure that I present to you the Annual Report 2010 of the Mathematisches Forschungsinstitut Oberwolfach. It will give you an overview of the events of the last year, especially of the scientific programme but also of the factual and financial framework as well as special events.

In mid 2010, all of us, staff and guests of the Institute, breathed deeply. The immense renovation measures, which started in 2003 with the concrete refurbishment of the guest house, followed by the extension of the library building in 2006/2007 were successfully completed with the overall refurbishment of the guest house. All measures were carried out alongside the daily routine and implied a lot of extra work for all staff members. We are all the more happy that our guests unanimously confirm that an excellent result has been achieved.

The renovation measures required additional support of more than 5 million Euro since 2003. Our special thanks go to the Federal State of Baden-Württemberg, the Federal Ministry of Education and Research (BMBF), the Klaus Tschira Foundation, the VolkswagenStiftung, the Oberwolfach Förderverein, the Oberwolfach Foundation, and the Gesellschaft für Mathematische Forschung. You will find a detailed report inside this Annual Report.

The exhibition IMAGINARY, which was created by the MFO for the Year of Mathematics 2008 was shown in more than 13 cities and is winning more and more friends, particularly abroad. More details can be found in the inner part of this Annual Report, where we will also provide information about the official opening of the Museum for Minerals and Mathematics MiMa in Oberwolfach.

The scientific work of the MFO with its six components: Workshops, Mini-Workshops, Research in Pairs, Arbeitsgemeinschaft Deninger-Faltings, Oberwolfach Seminars, and Oberwolfach Leibniz Fellows is still very successful. The demand in all these programmes clearly exceeds our capacity, and its scientific

die wissenschaftliche Qualität ist hervorragend. Ausführliche Informationen finden Sie im Abschnitt 2, dem Hauptteil des Jahresberichts.

Die öffentliche Oberwolfach Vorlesung fand wie üblich während der Jahresversammlung der Gesellschaft für Mathematische Forschung im Oktober statt. Sie lautete ‚Mathematical Challenges from Climate Research‘ und wurde von Professor Rupert Klein gehalten. Ich danke Herrn Klein sehr herzlich für seinen Vortrag und für die Ausarbeitung für diesen Jahresbericht.

Etwa alle drei Jahre vergibt das MFO zusammen mit der Oberwolfach Stiftung Preise für herausragende Nachwuchswissenschaftler. Der Oberwolfach Preis für hervorragende Leistungen in Analysis und Angewandter Mathematik wurde gemeinsam an Nicola Gigli (Nizza) und László Székelyhidi (Bonn) vergeben, der John Todd Award für Numerische Analysis ging an Daniel Kressner (Zürich). Über die feierlichen Preisverleihungen im Jahr 2011 werden wir im nächsten Jahresbericht berichten.

Im Jahr 2010/2011 sind zwei große Förderprogramme ausgelaufen. Einmal die Förderung zur Anschaffung von Spezialliteratur durch die DFG im Zeitraum 2004-2010 in Höhe von insgesamt 240.000 Euro. Zum anderen die Förderung von ‚US Oberwolfach Junior Fellows‘ durch die NSF von 2002 bis Frühjahr 2011, wodurch jährlich etwa 100 Nachwuchswissenschaftlern aus den USA die Teilnahme an Oberwolfach Workshops ermöglicht wurde. Die Förderung durch die NSF belief sich auf insgesamt mehr als 700.000 US Dollar. Erfreulicherweise wurde unser Folgeantrag von 2011-2016 wieder bewilligt. Auch bei der DFG waren wir erfolgreich mit einem Antrag zur Förderung der Einrichtung eines Bibliotheksportals für die Literaturrecherche in Höhe von etwa 277.000 Euro über drei Jahre. Mein Dank geht an die Deutsche Forschungsgemeinschaft und an die National Science Foundation für diese großzügige Unterstützung.

Zum Abschluss ein Dank an alle, die das Institut mit Rat und Tat und mit finanziellen Mitteln unterstützt haben. Eine detaillierte Darstellung dieser Unterstützung finden Sie in Abschnitt 3.6 (133) dieses Jahresberichts. Der Erfolg des Mathematischen Forschungsinstituts Oberwolfach beruht in besonderem Maße auf dem Engagement der beteiligten Personen. Hierzu gehören in erster Linie der Wissenschaftliche Beirat und die Wissenschaftliche Kommission, die durch ihre Expertise und Urteilskraft das wissenschaftliche Programm des Instituts bestimmen, aber auch allen Tagungsleitern

quality is excellent. Detailed information is provided in Paragraph 2 of this Annual Report.

As every year, the public Oberwolfach Lecture took place on the occasion of the annual meeting of the Gesellschaft für Mathematische Forschung in October. The lecture ‚Mathematical Challenges from Climate Research‘ was given by Professor Rupert Klein. I would like to express my sincerest thanks to Professor Klein for his lecture and for preparing an article for this annual report.

Together with the Oberwolfach Stiftung, in a cycle of about every three years, the MFO grants two different prizes to outstanding young scientists. In 2010 the Oberwolfach Prize for outstanding achievements in Analysis and Applied Mathematics goes in equal parts to Nicola Gigli (Nice) and László Székelyhidi (Bonn). The John Todd Award for Numerical Analysis goes to Daniel Kressner (Zurich). A detailed report on the award ceremonies will follow in the Annual Report 2011.

In the years 2010/2011 two major grant programmes, which have provided great support for the Institute, expired. Firstly, the DFG grant for the acquisition of special literature with a total of 240,000 Euro granted for the years 2004 until 2010, ended. And secondly, the support of the NSF for „US Oberwolfach Junior Fellows“ which from 2002 until spring 2011 enabled annually about 100 young scientists to come from the US and join an Oberwolfach Workshop. This support from the NSF totalled about US\$ 700,000. Fortunately, our follow-up application has been approved for the period of 2011 until 2016. And we have also been successful with our application to the DFG for the support of a library portal for literature research to the amount of 277,000 Euro, granted over the span of three years. Therefore, my special thanks go to the Deutsche Forschungsgemeinschaft and the National Science Foundation for their generous support.

Finally, my special thanks go to all those who have supported the Institute in word and deed and also by financial means. A detailed overview of this support can be found in Part 3.6 of this Annual Report. The success of the Mathematisches Forschungsinstitut Oberwolfach is based on the commitment of the people involved. This includes the Scientific Advisory Board and the Scientific Committee which decide with much expertise and power of judgment on the scientific programme of the Institute; but also the organisers and participants of the scientific programme, whose scientific

und Teilnehmern an den wissenschaftlichen Programmen, deren wissenschaftliche Beiträge das Renommee des Instituts ausmachen. Nicht zuletzt möchte ich allen Mitarbeiterinnen und Mitarbeitern des Instituts herzlich danken, deren Kompetenz, Hingabe und Freundlichkeit den Aufenthalt für alle Gäste so angenehm gestalten.

contributions account for the reputation of the Institute. And last but not least I would like to thank the employees of the Institute who, with much expertise and friendliness, make the stay of all our guests as pleasant as possible.

A handwritten signature in black ink, appearing to read 'Gert-Martin Greuel', written in a cursive style.

Gert-Martin Greuel

1. Besondere Beiträge

1.1. Generalsanierung abgeschlossen

Erfreulicherweise konnte die Generalsanierung des Mathematischen Forschungsinstituts, ein langjähriges und wichtiges Projekt, im Frühjahr 2010 abgeschlossen werden.

Unter der fachlichen Leitung des Architekturbüros Harter & Kanzler begannen die ersten Maßnahmen bereits im Jahr 2003 mit der Betonsanierung des Gästehauses. In den Jahren 2004 bis 2007 folgten dann die schrittweise Erneuerung der Regenwasserabläufe und Terrassenbeläge, sowie der Austausch der Fenster im Gästehaus. In diesem Zusammenhang wurde hier auch die Außenfassade gedämmt.

Parallel dazu wurde 2006/2007 die Bibliothek um einen Erweiterungsbau von ca. 200 qm ergänzt. Dazu war es zunächst erforderlich, das an das Institut angrenzende Grundstück zu erwerben. Nach den Plänen des Architekturbüros Harter & Kanzler entstand ein sehr gelungener Anbau, der inzwischen auch von der Architektenkammer Baden-Württemberg mit dem Architekturpreis 2010 „Neues Bauen im Schwarzwald“ ausgezeichnet wurde. Zum Abschluss wurden die Außenanlagen zwischen Gästehaus und Bibliothek neu angelegt und gestaltet. Ein ausführlicher Bericht über den Ausbau der Bibliothek findet sich auch im Jahresbericht 2007.

2008 ging es dann weiter mit der Sanierung der Bungalows. Der gesamte Innenbereich erhielt eine neue Aufteilung. Insgesamt entstanden 9 zusätzliche Gästezimmer. Im Gegensatz zu der Zeit vor der Sanierung hat nun auch jedes Zimmer ein eigenes Bad/WC. Die Bungalows 1 und 2 verfügen jeweils über eine kleine Teeküche, die nicht zuletzt als Raum für Diskussionen genutzt werden kann. Außerdem wurden zwei barrierefreie Zimmer mit Bad eingerichtet. Die Fassaden und die Dächer wurden entsprechend den Standards zur Energieeinsparung gedämmt, auf dem Dach befinden sich nun Solarkollektoren zur Brauchwassererwärmung. Zum Abschluss mussten auch hier die Außenanlagen neu gestaltet werden.

2009 begann die Sanierung des Gästehauses. Eine Überprüfung des Baubestandes hatte ergeben, dass die erforderlichen Maßnahmen weitaus umfangreicher waren als zu Beginn angenommen. Insbesondere zeitgemäße brandschutztechnische Anforderungen mussten bei der Sanierung beachtet und umgesetzt

1. Special contributions

1.1. Overall refurbishment completed

Much to our pleasure, the overall refurbishment of the MFO, which has been a very important and long-standing project, was completed in Spring 2010.

Under supervision of the Architektenbüro Harter & Kanzler, the first measures, which were the concrete refurbishment of our guest house, already took place in 2003. In the years from 2004 to 2007 the step-by-step renovation of the rainwater drains and the terrace floors took place, as well as the exchange of the old windows in the guest house. Also, the insulation of the facade of the guest house was accomplished.

At the same time, the enlargement of the library building by a further 200qm took place in 2006/2007. For this, the Institute first had to buy the adjoining land property. The architecturally well done extension of the library building according to the plans of Harter & Kanzler has in the meantime been awarded by the Architektenkammer Baden-Württemberg. The extension of the library building was followed by the redesigning of the outside facilities located between the guest house and the library. Detailed information on the extension of the library building can also be found in our Annual Report 2007.

In 2008 we started with the renovation of the bungalows. The interior of the bungalows has been completely restructured so that 9 additional guest rooms are now available. Each room is now equipped with its own bathroom. Two bathrooms are barrier-free. Small tea kitchens in bungalow 1 and 2 give also the possibility for a get-together. The insulation of the facades and roofs of the buildings has been carried out according to energy saving standards. Finally the outside facilities had to be redesigned.

In 2009 the refurbishment of the guest house started. After having inspected the building, it turned out that the measures to be taken had to be much more far reaching than originally planned. In particular, up-to-date fire protection requirements had to be observed. All electrical and sanitary lines as well as the ventilation

werden. Sämtliche sanitären und elektrischen Leitungen wurden erneuert, die Lüftungsanlage wurde neu konzipiert, Brandschotte wurden eingebaut.

Die Bäder und Gästetoiletten wurden komplett erneuert. Durch die notwendige Sanierung der elektrischen und sanitären Leitungen, wurden die Gästezimmer vollständig renoviert und im Anschluss daran neu ausgestattet. Sämtliche Decken in den Gästezimmern, im Flur und im Speisesaal mussten ausgetauscht werden. Auch im Küchen- und Personalbereich wurden in Abstimmung mit dem Wirtschaftskontrolldienst einige Änderungen vorgenommen. So wurde auch in der Küche ein neues Abluftsystem installiert. Die Vorratsräume wurden umgestaltet, eine neue und größere Kühlzelle wurde eingebaut, die den Anforderungen an eine moderne Gemeinschaftsverpflegung entspricht. Im Personalbereich wurden die Toiletten erneuert und eine Duschköglichkeit geschaffen. Wie die Bungalows, wurde auch das Gästehaus mit einer Solaranlage zur Brauchwassererwärmung ausgestattet.

Die Sanierung des Gästehauses konnte im Frühjahr 2010 abgeschlossen werden. Das Architekturbüro Harter und Kanzler hat für die Sanierung der Bungalows und des Gästehauses die Hugo-Häring-Auszeichnung des BDA (Bund Deutscher Architekten) erhalten.

Im Jahr 2009 wurde parallel zur Sanierung des Gästehauses der ursprüngliche Teil der Bibliothek energetisch saniert. Das Flachdach wurde nach neuesten Vorgaben gedämmt und die alten Fenster wurden gegen eine 3-fach Isolierverglasung ausgetauscht. 2010 wurde dann auch hier die dringend notwendige Betonsanierung durchgeführt.

Insgesamt wurde die Generalsanierung in den Jahren 2003 bis 2010 mit insgesamt 5,1 Mio. Euro zusätzlichen Mitteln unterstützt. Herzlichen Dank an alle, die sich an der Finanzierung beteiligt haben.

Parallel zur Generalsanierung wurden weitere Instandhaltungsmaßnahmen aus dem laufenden Haushalt des MFO finanziert.

system had to be brought to the state-of-the-art, including the installation of new fire walls.

All bathrooms and toilets had to be completely modernised. The necessary renovation of the electrical and sanitarian installations led to a complete renovation and modernization of the guest rooms. All the ceilings in the guest rooms, in the hall and the cafeteria had to be replaced. In the kitchen and personnel area also some changes had been undertaken, these all in accordance with the WKD. A new exhaust system had also been installed in the kitchen, stockrooms were renovated and a new cooling storeroom was installed, now meeting the requirements of modern catering. The area for the personnell received new toilets and new shower facilities. Like in the bungalows, the guesthouse also received solar appliances for the heating of the domestic water.

Renovation of the guesthouse was completed in Spring 2010. For their work, the Architekturbüro Harter und Kanzler was awarded the Hugo-Häring-Auszeichnung of the BDA (Bund Deutscher Architekten).

In 2009, the original part of the library building had also been renovated energetically, parallel to the measures at the guest house. The flat roof was insulated in accordance with the latest standards and all the old windows were replaced by new triple-glazed windows. In 2010, the long-needed concrete refurbishment was also completed here.

All-in-all, the refurbishment in the years from 2003 to 2010 were supported with a total of 5.1 million Euro in extra funds. A special thank you goes to all those, who have supported us in this matter financially.

Parallel to the overall-refurbishment further maintenance measures were financed out of the current budget of the MFO.

Übersicht Sonderfinanzierung 2003 bis 2010 (in Euro):
Overview Special Financing from 2003 to 2010 (in Euro):

Bund insgesamt	Federal State	1.754.700,20
Land Baden-Württemberg	Land of Baden-Württemberg	2.111.350,73
Umwidmung von laufenden Haushaltsmitteln 2006	Re-dedication of budgetary funds 2006	220.000,00
Klaus Tschira Stiftung	Klaus Tschira Stiftung	408.000,00
VolkswagenStiftung	VolkswagenStiftung	408.000,00
Oberwolfach Stiftung/ Förderverein	Oberwolfach Stiftung/ Förderverein	201.419,06
KfW (Energieeinsparprogramm)	KfW (Energy Saving Programme)	25.000,00
Gesellschaft für mathematische Forschung e.V.	Gesellschaft für Mathematische Forschung e.V.	20.000,00
Insgesamt:	Total:	5.148.469,99

Sämtliche Sanierungs- und Anbaumaßnahmen wurden im laufenden Betrieb durchgeführt, was für die Gastforscher nicht immer einfach war. Daher an dieser Stelle auch ein herzliches Danke schön an alle Gäste des MFO für ihr Verständnis.

All renovation measures took place during the regular day-to-day business which was not always easy for our guest researchers. Therefore our special thank you for their understanding goes to all our guests.

Bilder zur Generalsanierung



MFO, overall view



Guest house



Guest house, dining room

*



Guest house, 1st floor

*



Guest house, guest room

*



Guest house, guest bath room





Bungalows



Bungalows, guest room

*



Library



Library, extension

*

1.2. IMAGINARY 2010

1.2.1. Die IMAGINARY-Ausstellung

IMAGINARY ist eine interaktive Wanderausstellung, die auf attraktive und verständliche Weise Visualisierungen, interaktive Installationen, virtuelle Welten, 3D-Objekte und ihre theoretischen Hintergründe aus der algebraischen Geometrie und Singularitätentheorie präsentiert. Die Ausstellung wurde vom Mathematischen Forschungsinstitut Oberwolfach für das Jahr der Mathematik 2008 in Deutschland entwickelt und 2008-2009 durch das Bundesministerium für Bildung und Forschung gefördert.

Die Ausstellung wurde seit dem Jahr der Mathematik in über 40 Städten in Deutschland und im Ausland gezeigt.

Mehr als 170.000 Personen besuchten IMAGINARY, darunter über 700 Schulen mit Schulklassen, die eine eigene Führung bekommen haben. Zusätzlich besuchten ca. 100.000 Personen Sonderausstellungen und spezielle IMAGINARY-Veranstaltungen.

Im Jahr 2010 besuchte IMAGINARY nach einer großen Ausstellung an der Leibniz Universität Hannover wichtige Mathematikinstitute außerhalb Deutschlands, wie das Newton Institute for Mathematical Sciences in Cambridge, die ETH in Zürich und die Universität Jussieu in Paris. Neben den Ausstellungen fanden Workshops und Veranstaltungen mit IMAGINARY-Inhalten in Österreich, Portugal, der Schweiz und Indien statt. Vorträge zur Ausstellung gab es in Frankreich, Portugal, Israel, Indien und Kolumbien.

Das Centro Internacional de Matemática (CIM) in Portugal produzierte in Zusammenarbeit mit Casa da Animação und dem MFO einen freien mathematischen Animationsfilm zum Thema Kryptographie und Elliptische Kurven mit dem Programm SURFER der Ausstellung.

Die erfolgreichen Wettbewerbe zu Bildern algebraischer Flächen, die mit dem Programm SURFER erstellt werden, wurden auch 2010 fortgesetzt: in Hannover, Cambridge, Zürich und Paris begleitend zur Ausstellung; ein Wettbewerb wurde in Griechenland von der Zeitung ToVima selbst organisiert.

Das Interesse an der Ausstellung und den Inhalten stieg im Jahr 2010 weiter an. Mit der Real Sociedad Matemática Española (RSME) wurde eine Ausstellungsreihe für das Jahr 2011 geplant. Inhalte dafür wurden im Jahr 2010 übersetzt, angepasst und erneuert.

1.2. IMAGINARY 2010

1.2.1. The IMAGINARY exhibition

IMAGINARY is an interactive, travelling exhibition. It contains mathematical visualizations, interactive installations, virtual realities, 3D objects, and their theoretical background in algebraic geometry and singularity theory, in an attractive and understandable manner. The exhibition was developed by the Mathematisches Forschungsinstitut Oberwolfach for the German Year of Mathematics 2008 and funded by the German Federal Ministry of Education and Science in 2008 and 2009.

Since the year of mathematics, the exhibition has been travelling to more than 40 cities in Germany and abroad.

More than 170,000 people visited the exhibition, among them over 700 school classes with guided tours. Additionally about 100,000 people visited the special exhibitions and IMAGINARY events.

In 2010 IMAGINARY visited important math institutes outside Germany, as the Newton Institute for Mathematical Sciences in Cambridge, the ETH in Zurich and the Jussieu University in Paris after a major exhibition at the Leibniz Universität Hannover. In addition to the exhibitions, workshops with IMAGINARY contents were held in Austria, Portugal, Switzerland, and India. Talks on the exhibition were held in France, Portugal, Israel, India, and Colombia.

The Centro Internacional de Matemática (CIM) in Portugal produced a free mathematical animation film to the topic of cryptography and elliptic curves using the IMAGINARY programme SURFER. It was produced in collaboration with Casa da Animação and the MFO.

The successful picture competitions of algebraic surfaces made with SURFER were continued in 2010: in Hannover, Cambridge, Zurich and Paris accompanying the exhibition; a special competition in Greece was organized by the newspaper ToVima.

Interest in the exhibition and its contents further increased in 2010. Together with the Real Sociedad Matemática Española (RSME), an exhibition series was planned for the year 2011. Contents for this tour were translated, adapted and renewed in 2010.

1.2.2. Ausstellungsorte 2010

Im Jahr 2010 besuchten ca. 32.000 Menschen IMAGINARY-Ausstellungen und Veranstaltungen. Darunter waren 230 Schulklassen, die eine Führung erhalten haben.

Liste der Ausstellungen 2010

Paris, Jussieu Library, Frankreich
09.11.2010 - 17.12.2010

Zürich, ETH, Schweiz
21.09.2010 - 07.10.2010

Cambridge, Newton Institute, Großbritannien
08.03.2010 - 17.03.2010

Hannover, Universität, Deutschland
19.01.2010 - 26.02.2010

Liste der Veranstaltungen 2010

Vortrag, Baranquilla, Universität, Kolumbien
04.12 - 05.12. 2010

8. Aktionstag Junge Uni, Innsbruck, Österreich
05.11.2010

Workshop zu Mathematikexponaten in Wissenschaftsmuseen, Homi Babha Institute, Mumbai, Indien
25.10.2010 - 30.10.2010

Workshop Raising Awareness in Mathematics, Óbidos, Portugal
26.09.2010 - 29.09.2010

Vorträge und Workshop, MathCamp, Lissabon/Porto/Braga, Portugal
19.07.2010 - 24.07.2010

Vortrag, Konferenz Kunst&Mathematik, Paris, Frankreich
19.07.2010 - 22.07.2010

Paris, Institut Henri Poincaré, Frankreich
07.06.2010 - 25.07.2010

Workshop KinderuniKunst, Wien
05.07.2010 - 08.07.2010

SURFER-Wettbewerb, Griechenland
12.05.2010 - 30.09.2010

Jubiläum der Universität, Basel, Schweiz
17.04.2010 - 29.05.2010

Vorträge in Tel Aviv und Jerusalem, Israel
17.02.2010 - 24.02.2010

1.2.2. Exhibition venues 2010

In 2010, approx. 32,000 people visited IMAGINARY exhibitions and events. Among them were approx. 230 school classes, which received a guided tour.

List of exhibitions 2010

Paris, Jussieu Library, France
09.11.2010 - 17.12.2010

Zurich, ETH, Switzerland
21.09.2010 - 07.10.2010

Cambridge, Newton Institute, UK
08.03.2010 - 17.03.2010

Hannover, University, Germany
19.01.2010 - 26.02.2010

List of events 2010

Presentation, Baranquilla, University, Colombia
04.12 - 05.12. 2010

8th Action Day Junge Uni, Innsbruck, Austria
05.11.2010

Workshop of mathematical exhibits in science museums, Homi Babha Institute, Mumbai, India
25.10.2010 - 30.10.2010

Workshop Raising Awareness in Mathematics, Óbidos, Portugal
26.09.2010 - 29.09.2010

Talks and Workshop, MathCamp, Lissabon/Porto/Braga, Portugal
19.07.2010 - 24.07.2010

Talk, Conference Art & Mathematics, Paris, France
19.07.2010 - 22.07.2010

Paris, Institut Henri Poincaré, France
07.06.2010 - 25.07.2010

Workshop KinderuniKunst, Vienna
05.07.2010 - 08.07.2010

SURFER competition, Greece
12.05.2010 - 30.09.2010

Anniversary of the University, Basel, Switzerland
17.04.2010 - 29.05.2010

Talks in Tel Aviv and Jerusalem, Israel
17.02.2010 - 24.02.2010



Ausstellung in der Leibniz Universität Hannover
Exhibition at Leibniz Universität Hannover



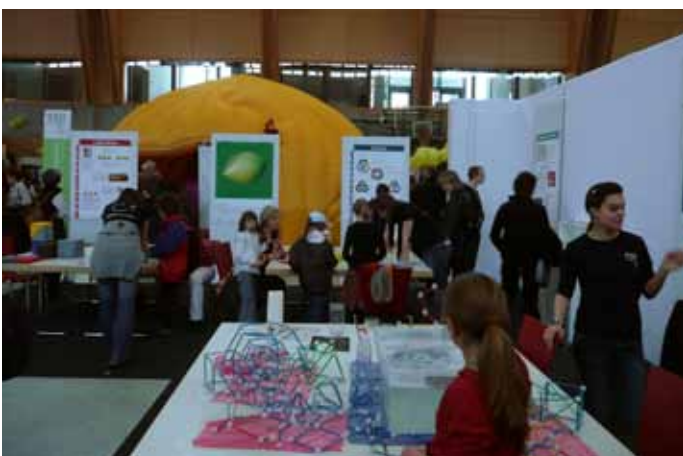
Ausstellung im Newton Institute, Cambridge
Exhibition at the Newton Institute, Cambridge



Ausstellung in der ETH, Zürich
Exhibition at the ETH, Zurich



Eröffnung der Ausstellung in Paris mit Cédric Villani
Opening of the exhibition in Paris with Cédric Villani



Veranstaltung zum 550. Jubiläum der Universität Basel
Event for the 550th Anniversary of the University Basel



SURFER-Wettbewerb mit ToVima in Griechenland
SURFER competition with ToVima in Greece



KinderuniKunst-Workshop, Wien
 KinderuniKunst Workshop, Vienna



Ausstellung im Institut Henri Poincaré, Paris
 Exhibition at the Institut Henri Poincaré, Paris



Konferenz und Vorträge, Óbidos
 Conference and Talks, Óbidos



Workshop und Vorträge, Mumbai
 Workshop and Talks, Mumbai



Aktionstag in Innsbruck
 Action Day in Innsbruck



Animationsfilm: <http://www.cim.pt/?q=LPD-UHW>
 Animation film: <http://www.cim.pt/?q=LPD-UHW>

1.3. MiMa - Museum für Mineralien und Mathematik Oberwolfach

Nach zweijähriger Planungs- und Bauphase eröffnete am 30.1.2010 das MiMa, Museum für Mineralien und Mathematik Oberwolfach, ein Gemeinschaftsprojekt der Gemeinde Oberwolfach, des Vereins der Freunde von Mineralien und Bergbau Oberwolfach und des Mathematischen Forschungsinstituts Oberwolfach. Das ehemalige Mineralienmuseum Oberwolfach wurde dafür umgebaut und erweitert.

Unterstützt und gefördert wurde das MiMa vom Land Baden-Württemberg über das Tourismusinfrastrukturprogramm und den Ausgleichstock für finanzschwache Gemeinden, dem Bundesministerium für Bildung und Forschung, sowie zahlreichen lokalen Firmen und Organisationen, wie z.B. Duravit oder der WRO.

Hintergrund und Ziele von MiMa

Das MiMa, Museum für Mineralien und Mathematik Oberwolfach, vereint zwei Alleinstellungsmerkmale der Region in einem neuen interaktiven Museum: die einzigartigen Exponate des Mineralienmuseums Oberwolfach und das Wissen des Mathematischen Forschungsinstituts Oberwolfach.

In der mineralogischen Abteilung sind Mineralien und Bergbauerzeugnisse aus dem gesamten Schwarzwald ausgestellt. Aus der Mathematik sehen Sie Multi-Media-Installationen zu den Themen Kristallographie und Symmetrien, virtuelle 3D- Flüge, Filme und Skulpturen, darunter auch die Highlights der mathematischen Wanderausstellung IMAGINARY, die mit dem Preis „Land der Ideen“ unter der Schirmherrschaft des Bundespräsidenten ausgezeichnet wurde.

Die Schnittstellen und Besonderheiten der beiden Bereiche Mineralien und Mathematik werden ästhetisch, wissenschaftlich und interaktiv präsentiert und richten sich an ein breites Publikum. Speziell angesprochen sind auch die Schulen der Umgebung, für die ein umfangreiches Angebot an Sonderführungen und didaktischem Begleitmaterial zur Verfügung steht.

Die Eröffnungsfeier

Am 30.1.2010 fand ab 11.00 Uhr die Eröffnungsfeier des MiMa statt. PressevertreterInnen waren herzlich dazu eingeladen. Helmut Rau, Minister für Kultus, Jugend und Sport Baden-Württemberg, MdL und Siegfried Kauder, MdB, sprachen neben anderen ein Grusswort. Prof. Beutelspacher vom Mathematikum Giessen hielt den Festvortrag. Die Vertreter der Gemeinde, des Mineralienvereins und des Mathematischen

1.3. MiMa - Museum for Minerals and Mathematics Oberwolfach

After two years of planning and construction the MiMa, Museum for Minerals and Mathematics, opened its doors on 30 January 2010. It is a joint project by the municipality Oberwolfach, the Association of the friends of mining and minerals and the Mathematisches Forschungsinstitut Oberwolfach. For the museum the former mineral museum was renovated and extended.

The MiMa was supported and funded by the state of Baden-Württemberg through the tourism infrastructure programme, the adjustment stock for financially weak municipalities, the Federal Ministry of Education and Research as well as many local companies and organizations, for example Duravit or the WRO.

Background and Objectives of the MiMa

The MiMa, Museum for Minerals and Mathematics Oberwolfach, combines two unique features of the region in a new interactive museum: the one-of-a-kind collection of the minerals museum Oberwolfach and the knowledge of the Mathematisches Forschungsinstitut Oberwolfach.

In the mineralogical section minerals and historical mining objects are exhibited. In the mathematical section you can find multi-media installations of crystallography and symmetries, virtual 3D-flights, films and sculptures, among them the highlights of the IMAGINARY exhibition, which was awarded the prize 'Land der Ideen' under the patronage of the German president.

The connections and characteristics of minerals and mathematics are presented in an aesthetical, scientific and interactive way. The exhibits are directed to a broad public. There is a special focus on schools of the region, for which special guided tours and didactical material are provided.

The Opening Ceremony

On 30 January 2010 at 11.00 am, the opening ceremony of the MiMa was held. Representatives of the media were invited. Helmut Rau, Minister for Education, Youth and Sport Baden-Württemberg, Member of the State Assembly, and Siegfried Kauder, Member of the German Bundestag spoke greeting words, among others. Prof. Beutelspacher of the Mathematikum Giessen gave an invited lecture. Representatives of

Forschungsinstituts Oberwolfach stellten das Projekt vor und auch die beteiligten Ingenieure und Handwerker kamen zu Wort. Ehrengäste aus der Politik, Wirtschaft und Wissenschaft waren geladen. Die Veranstaltung wurde musikalisch vom Bläserquintett der Trachtenkapelle Oberwolfach umrahmt. Anschließend gab es einen Stehempfang mit Imbiss.

the municipality, of the Mineral Association and the Mathematisches Forschungsinstitut Oberwolfach presented the project and the involved engineers and craftsmen held a speech. Special guests from politics, economy and science attended the ceremony. The event was accompanied by the brass quintet of the traditional music ensemble Oberwolfach. After the event there was a reception.

Mehr Informationen zum MiMa, den Exponaten und aktuellen Veranstaltungen finden Sie auf der Webseite www.mima.museum.

More information on the MiMa, its exhibits and special events can be found on the web site www.mima.museum.

Programm der Eröffnungsfeier/Programme of the opening ceremony

Beginn/Start 11.00 Uhr/ 11:00 am

Musikalische Eröffnung/Musical Opening, Bläserquintett der Trachtenkapelle Oberwolfach/Brass quintet of the traditional music ensemble

Begrüßung/Address of Welcome, Jürgen Nowak, Bürgermeister/Mayor Oberwolfach

Grußworte/Greeting, Helmut Rau, Minister für Kultus, Jugend und Sport Baden-Württemberg/ Minister for Education, Youth and Sport Baden-Württemberg, MdL/ Member of the State Assembly

Grußworte/Greeting, Siegfried Kauder, MdB/ Member of the German Bundestag

Grußworte/Greeting, Dr. Franz Hahn, Vorsitzender des Vereins der Freunde von Bergbau und Mineralien/Chairman of the Association of the friends of mining and minerals

Grußworte/Greeting, Professor Dr.Dr.h.c. Gert-Martin Greuel, MFO

Musikalisches Zwischenspiel/Musical Intermezzo, Bläserquintett der Trachtenkapelle Oberwolfach

Grußworte/Greeting, Franz Kook, Firma/company Duravit, WRO

Grußworte/Greeting, Gerhard Schmider, Planung und Bauleitung/Planning and construction supervision

Festvortrag/Invited Lecture, Professor Dr. Albrecht Beutelspacher, Justus-Liebig-Universität Gießen

Musikalischer Schluss/Musical Closure, Bläserquintett der Trachtenkapelle Oberwolfach/Brass quintet of the traditional music ensemble

Schlussworte und Ehrungen/Final Words and Honours, Jürgen Nowak, Bürgermeister/Mayor Oberwolfach

Stehempfang mit Imbiss/Reception

Bautagebuch/Builder's diary



Arbeit der Zimmerer im Dachgeschoß
Carpenters at work in the rooftop



Abriss einer Museumsseite
Demolition of one side of the museum



Außenarbeiten
Outdoor works



Treffen des Bauausschusses
Meeting of the building committee



Installation der Vitrinen im Mineralienteil, Obergeschoß
Installation of vitrines in the mineral part, upper floor



Fertigstellung des Museums
Completion of the museum

Eröffnungsfeier/Opening Ceremony



Bläserquintett der Trachtenkapelle
Brass Quintet of the traditional music ensemble



Die TeilnehmerInnen der Eröffnungsfeier
Participants of the opening ceremony



Festvortrag von Prof. Dr. Albrecht Beutelspacher
Invited lecture by Prof. Dr. Albrecht Beutelspacher



Ehrungen und Danksagungen
Honours and Acknowledgment



Besucher am Exponat Cinderella
Visitors at the Cinderella exhibit



Der Mineralienteil im Obergeschoß
The minerals part, upper floor

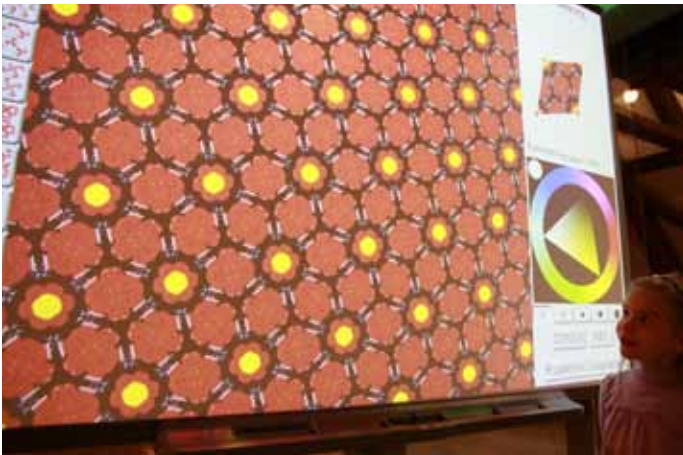
MiMa-Mathematikexponate/MiMa math exhibits



Exponate Doppelpendel, MFO-Geschichte, Kristallflug
Exhibits Double Pendulum, MFO-History, Crystal Flight



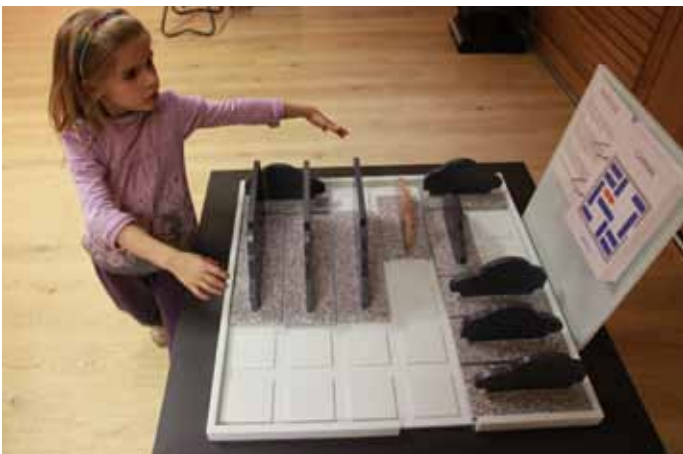
Exponat jReality: Minimalflächen virtuell erleben
Exhibit jReality: virtual experience of minimal surfaces



Exponat Morenaments: Malen in Symmetriegruppen
Exhibit Morenaments: painting in symmetry groups



Exponat 3D-Skulpturen: platonische Körper und Sterne
Exhibit 3D sculptures: platonic solids and stars



Exponat CarPark: Logikspiel
Exhibit CarPark: logic game



Exponat SURFER und Galerie algebraischer Flächen
Exhibit SURFER and gallery of algebraic surfaces

MiMa Architekturpreis 2010/MiMa Architectural Award 2010

Das MiMa erhielt den Architekturpreis 2010 - Neues Bauen im Schwarzwald. Der gelungene und behutsame Umbau des historischen Bauernhofs für eine öffentliche Nutzung wurde speziell gelobt. Bauherr und Planer hätten besonderen Wert auf eine funktionstüchtige Gestaltung, ein energie- und ressourcenbewusstes Konzept, sowie den Einsatz innovativer Techniken und die Sichtbarkeit der alten Baukonstruktion gelegt.

The MiMa received the Architectural Award 2010 - New Constructions in the Black Forest. The successful and careful reconstruction of the historical farm house for public use was praised. The builders and planners emphasized the practical design and an energy and resources friendly concept, as well as innovative engineering and the visibility of the old building structure.



TOURISMUS

3.07 Umbau und Sanierung Mineralien- und Mathematikmuseum, Oberwolfach

Würdigung

Mineralien- und Mathematikmuseum
Schulstraße 5
77109 Oberwolfach

Bauherrschaft:
Gemeinde Oberwolfach
Rathausstraße 1
77109 Oberwolfach

Planung und Konzept:
Schmider Planungsbüro
Rosestraße 7
77109 Oberwolfach

Nutzer:
Verein der Freunde von Mineralien und
Bergbau Oberwolfach e.V.
MFO Mathematisches Forschungsinstitut
Oberwolfach

Jahr der Fertigstellung:
2010

Fotos:
außen:
Gerhard Schmider, Oberwolfach
innen:
Norbert Springmann Fotostudio,
Oberwolfach

Interview:
Christine Speckner



Zum Museum:

Im MiMa Museum stellen der Verein der Freunde von Mineralien und Bergbau und das Mathematische Forschungsinstitut Oberwolfach gemeinsam aus. Zu sehen sind Mineralien aus dem ganzen Schwarzwald. In mathematischen Teil werden Gebiete der Kristallographie und Symmetrien durch interaktive Programme erklärt.

Interview mit Jürgen Nowak, Bürgermeister der Gemeinde Oberwolfach

Was war der Anlass für die Sanierung?
Nowak: Unser Mathematisches Forschungsinstitut wollte das Thema Mathematik noch mehr in der Öffentlichkeit präsentieren. Da kam uns die Idee, beide Fachgebiete unter ein Dach zu bringen. Die Darstellung des historischen Bergbaus und die Mineralienausstellung waren bereits im Erdgeschoss untergebracht. Wir entschieden uns, das Dachgeschoss auch für die Mathematik umzubauen. Ein Abriss kam nicht in Frage, da das Haus einst der bedeutendste Schwarzwaldbauernhof im Dorf war und zentral liegt. Der Hof hat eine lange Geschichte. Um die Jahrhundertwende erwarb die Gemeinde Oberwolfach das Anwesen. Nach dem 2. Weltkrieg wurden dort viele Wohnungen für Flüchtlinge eingebaut - und leider wurde dadurch die Struktur des Hauses ziemlich verschandelt.

Verschandelt bis unter das Dach?
Nowak: Das kann man so sagen. Vor allem das Dachgeschoss war total verbaut. Jetzt ist daraus ein Schmuckstück geworden.

Was sagt das Denkmalamt dazu?
Nowak: Das Haus war eh schon demnächst verbaut, dass es keine besonderen Einmaleinde gab. Im Gegenteil. Alle waren gespannt, wie wir das Thema lösen würden.

Hat Ihr Projekt eine besondere Bedeutung für zukünftiges Bauen im Schwarzwald?

Nowak: Ja. Es ist ein Beispiel dafür, wie ein historisches Schwarzwälder Hofgebäude, das über Jahrzehnte verschandelt war, seinen Holzcharakter zurück gewonnen hat. Und gleichzeitig konnten wir moderne Museumsräume integrieren. Mir gefällt, dass wir die wertvolle Holzkonstruktion als öffentlichen Raum nutzbar machen konnten.



Architektenkammer
Baden-Württemberg



Baden-Württemberg

Oberwolfach Lecture 2010

Mathematical Challenges from Climate Research

held on October 2nd, 2010

Mathematics in climate research is often thought to be mainly a provider of techniques for solving the continuum mechanical equations for the flows of the atmosphere and oceans, for the motion and evolution of Earth's ice masses, and the like. The three examples will elucidate below that there is a much wider range of opportunities.

Climate modellers often employ reduced forms of “the continuum mechanical equations” to efficiently address their research questions of interest. The first example discusses how mathematical analysis can provide systematic guidelines for the regime of applicability of such reduced model equations.

Meteorologists define “climate”, in a narrow sense, as “the statistical description in terms of the mean and variability of relevant quantities over a period of time” (World Meteorological Society, <http://www.wmo.int>; see the website for a broader sense definition). Now, climate researchers are most interested in *changes* of the climate over time, and yet there is no unique, well-defined notion of “time dependent statistics”. In fact, there are restrictive conditions which data from time series need to satisfy for classical statistical methods to be applicable. The second example describes recent developments of analysis techniques for time series with non-trivial temporal trends.

Modern climate research has joined forces with economy and the social sciences to generate a scientific basis for informed political decisions in the face of global climate change. One major type of problems hampering progress of the related interdisciplinary research consists of often subtle language barriers. The third example describes how mathematical formalization of the notion of “vulnerability” has helped structuring related interdisciplinary research efforts.

1. MULTI-SCALE ATMOSPHERIC FLOWS AND REDUCED-COMPLEXITY MODEL EQUATIONS

1.1. Multi-scale atmospheric flows. Figure 1 displays graphical representations of atmospheric flow patterns that cover a range of characteristic length and time scales of several decades. The typical development of cumulus clouds (left-most picture in Fig. 1) involves cloud diameters of one to several kilometers, and the entire life cycle of such a cloud from its formation to its decay due to precipitation involves tens of minutes to a few hours. In contrast, a typical mid-latitude cyclone, respectively a typical high or low-pressure system (middle picture in Fig. 1), covers a few hundred to thousands of kilometers and several hours to many days in time. Finally, the third, right-most picture shows the change of

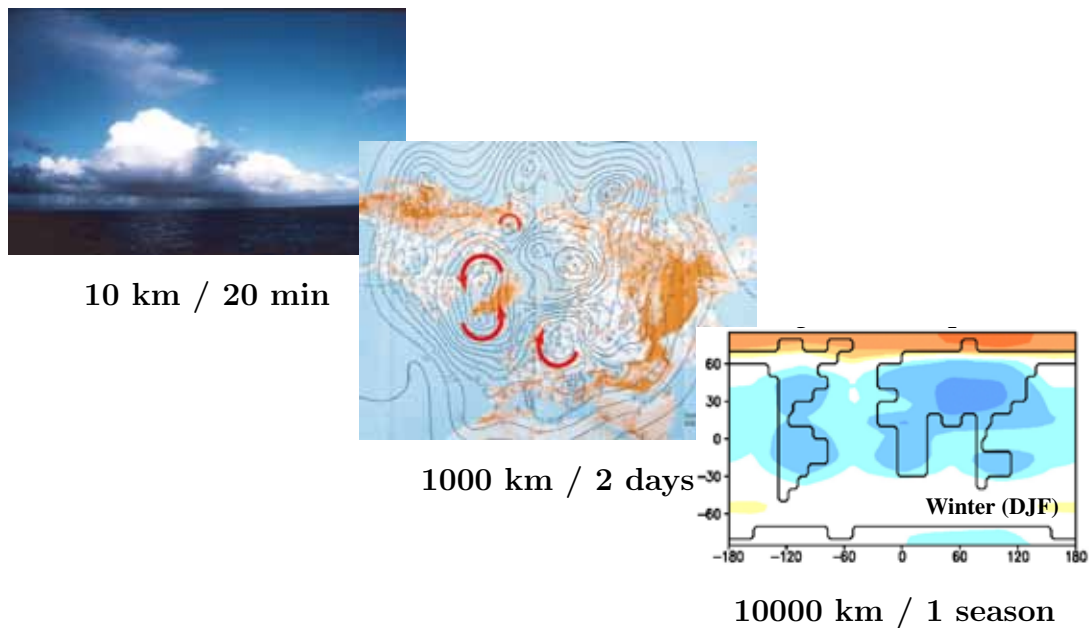


FIGURE 1. Atmospheric flow patterns covering a wide range of scales (courtesy of Peter K. Taylor, Southampton Oceanographic Centre, Peter Névir, Meteorologisches Institut der Freien Universität Berlin, and Stephan Rahmstorf, Potsdam-Institut für Klimafolgenforschung).

the large-scale planetary temperature distribution between about 8 000 years ago and today, as simulated by CLIMBER-2, a particular type of reduced-complexity climate model developed at the Potsdam-Institute for Climate Impact Research.

Even though there is quite common agreement that the multi-phase compressible flow of air is well described by the “compressible Navier-Stokes equations” (see, e.g., Pedlosky 1987), Meteorologists employ very different sets of model equations to describe these phenomena in their scientific practice. To just give a visual impression, figure Fig. 2 shows, in direct correspondence with the three parts of Fig. 1, the formulae for the anelastic Boussinesque equations, the quasi-geostrophic model, and the atmospheric flow model from the CLIMBER-2 model.

Interesting non-standard mathematical questions arise in the context of deriving and formally or rigorously justifying the use of such simplified model equations. Here we consider in more detail a set of approximate models used to simulate flows on the “cloud scale” discussed in the context of Fig. 1. To focus on the essence of the mathematical problem, we follow Klein (2010), Klein et al. (2010) and neglect here the influences of Earth rotation and of molecular diffusion, and we consider an ideal gas with constant specific heat capacities for simplicity of exposition. Then the “compressible Euler equations with gravity”

$$\begin{aligned}
 (1a) \quad & \rho_t + \nabla \cdot (\rho \mathbf{v}) = 0 \\
 (1b) \quad & (\rho \mathbf{v})_t + \nabla \cdot (\rho \mathbf{v} \circ \mathbf{v}) + P \nabla \pi = -\rho \mathbf{k} \\
 (1c) \quad & P_t + \nabla \cdot (P \mathbf{v}) = 0
 \end{aligned}$$

constitute the starting point of the analysis. Here (ρ, \mathbf{v}) are the density and flow velocity, $P = p^{1/\gamma} = \rho \theta$ with p the thermodynamic pressure and θ the potential temperature (or

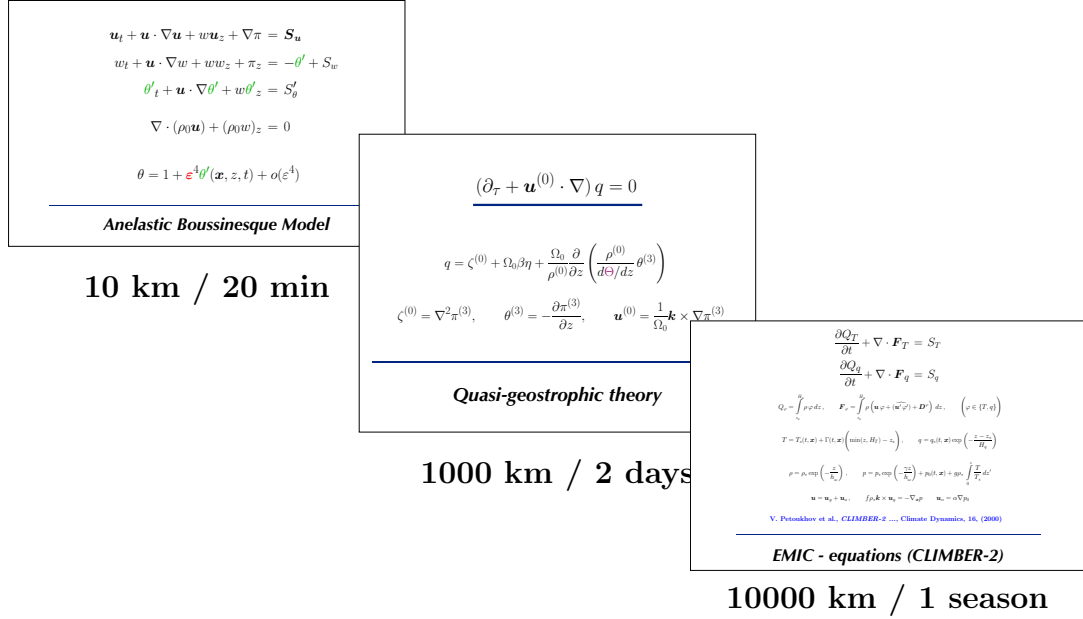


FIGURE 2. Sets of governing equations used in practice to model the scale-dependent phenomena pictured in Fig. 1

entropy), and $\gamma = c_p/c_v$ the ratio of the specific heat capacities, i.e., the isentropic exponent. Let an asterisk, for the moment, denote dimensional variables, then the dimensionless quantities appearing in (1) are defined as

$$(2) \quad t = \frac{t^* c_{\text{ref}}}{h_{\text{sc}}}, \quad \mathbf{x} = \frac{\mathbf{x}^*}{h_{\text{sc}}}, \quad \rho = \frac{\rho^*}{\rho_{\text{ref}}}, \quad p = \frac{p^*}{p_{\text{ref}}}, \quad \mathbf{v} = \frac{\mathbf{v}^*}{c_{\text{ref}}}, \quad \rho \theta = p^{1/\gamma},$$

where $c_{\text{ref}} = \sqrt{p_{\text{ref}}/\rho_{\text{ref}}}$ and $h_{\text{sc}} = p_{\text{ref}}/\rho_{\text{ref}} g$, and where p_{ref} , ρ_{ref} , and g denote the sea-level pressure, the corresponding density at a temperature of 300 K, say, and the acceleration of gravity, respectively.

Durran (1989) suggested the so-called pseudo-incompressible model for flows in the atmosphere that feature very weak pressure variations. In one of its various equivalent forms, this model is thus obtained from (1) by simply dropping the pressure time derivative – since pressure variations are assumed to be small – and assuming P to match a prescribed, time independent background distribution $P \equiv \overline{P}(z)$. That is, one has

$$(3a) \quad \rho_t + \nabla \cdot (\rho \mathbf{v}) = 0$$

$$(3b) \quad (\rho \mathbf{v})_t + \nabla \cdot (\rho \mathbf{v} \circ \mathbf{v}) + \overline{P} \nabla \pi = -\rho \mathbf{k}$$

$$(3c) \quad \nabla \cdot (\overline{P} \mathbf{v}) = 0$$

Given the intuitive, but also only qualitative, argument for the validity of the model in the presence of “weak pressure variations”, one may wonder whether a more specific, mathematically sound characterization of the regime of validity of this flow model is possible.

A valid first guess is to consult the well-established literature on rigorous justifications of the incompressible limit of the Euler and Navier-Stokes equations, (see, e.g., Schochet 2005, and references therein). In this setting one identifies a single small singular parameter, the Mach number, $\varepsilon \sim u_{\text{ref}}/c_{\text{ref}} \ll 1$, where u_{ref} and c_{ref} are typical values for the flow velocity and for the sound speed, respectively. The Mach number essentially characterizes the ratio of a characteristic sound wave travel time and of the time scale of advection of material

by the fluid flow. Given a single relevant length scale over which sound propagation and advection take place, low Mach number flow thus represents a two time scale problem. The mathematical task then is to show that in the limit of vanishing Mach number solutions of the compressible flow equations over a typical advection time scale are well characterized by the formal zero Mach number limit equations, which constitute the well-known incompressible flow model.

The problem of clarifying the regime of validity of the pseudo-incompressible model in (3) is more involved because the compressible Euler equations with gravity from (1) feature three instead of merely two characteristic time scales. Besides advection and sound propagation they also describe internal gravity waves, that is, adjustments of the fluid in response to horizontally non-homogeneous density distributions. This is revealed by first rewriting (1) in a perturbational form with the primary unknowns

$$(4) \quad \theta' = \theta - \bar{\theta}(z), \quad \mathbf{v}, \quad \pi' = \pi - \bar{\pi}(z) \quad \text{where} \quad \pi = p^\kappa \quad \text{and} \quad \kappa = \frac{\gamma - 1}{\gamma}.$$

For future reference we note that π is called the ‘‘Exner pressure’’. The hydrostatic background variables, which depend only on the height coordinate, z , are required to satisfy

$$(5) \quad d\bar{\pi}/dz = 1/\bar{\theta} \quad \text{with} \quad \bar{\pi}(0) = 1/\kappa.$$

This yields the following equivalent form of the compressible Euler equations

$$(6a) \quad \theta'_t + \mathbf{v} \cdot \nabla \theta' + w \frac{d\bar{\theta}}{dz} = 0$$

$$(6b) \quad \mathbf{v}_t + \mathbf{v} \cdot \nabla \mathbf{v} + (\bar{\theta} + \theta') \nabla \pi' = \frac{\theta'}{\bar{\theta}} \mathbf{k}$$

$$(6c) \quad \pi'_t + \mathbf{v} \cdot \nabla \pi' + w \frac{d\bar{\pi}}{dz} + \gamma \kappa (\bar{\pi} + \pi') \nabla \cdot \mathbf{v} = 0$$

A further transformation of variables reveals the asymptotic scalings in terms of the Mach number, ε . We nondimensionalize time by a characteristic advection time scale, so that

$$(7) \quad \tau = \varepsilon t$$

and let

$$(8a) \quad \theta(t, \mathbf{x}, z; \varepsilon) = 1 + \varepsilon^\mu \bar{\Theta}(z) + \varepsilon^{\mu+\nu} \tilde{\theta}(\tau, \mathbf{x}, z; \varepsilon) \quad (\nu = 1 - \mu/2)$$

$$(8b) \quad \pi(t, \mathbf{x}, z; \varepsilon) = \bar{\pi}(z) + \varepsilon \tilde{\pi}(\tau, \mathbf{x}, z; \varepsilon)$$

$$(8c) \quad \mathbf{v}(t, \mathbf{x}, z; \varepsilon) = \varepsilon \tilde{\mathbf{v}}(\tau, \mathbf{x}, z; \varepsilon)$$

The velocity, \mathbf{v} , was nondimensionalized by $\sqrt{p_{\text{ref}}/\rho_{\text{ref}}}$, which is comparable to the sound speed, c_{ref} ; as a consequence the scaling in (8c) implies that $\tilde{\mathbf{v}}$ measures the velocity in units of a typical reference value, u_{ref} , instead of in terms of c_{ref} . We consider regimes where $\varepsilon = c_{\text{ref}}/u_{\text{ref}} \ll 1$ and $\tilde{\mathbf{v}} = O(1)$ as $\varepsilon \rightarrow 0$. The representation of the background potential temperature (or entropy) stratification,

$$(9) \quad \bar{\theta}(z) = 1 + \varepsilon^\mu \bar{\Theta}(z),$$

allows us to represent a range of background potential temperature stratifications by adjusting the exponent μ , where $0 < \mu < 2$. The exponent ν determines the scaling of the dynamic potential temperature perturbations. Its specific value as given in (8a) implies the correct scaling for internal gravity waves as we will see shortly. Furthermore, $\bar{\pi}(z)$ denotes the background Exner pressure distribution given the stratification from (9).

For compressible flows, the new variables $\tilde{\theta}, \tilde{\pi}, \tilde{\mathbf{v}}$ satisfy

$$(10a) \quad \tilde{\theta}_\tau + \frac{1}{\varepsilon^\nu} \tilde{w} \frac{d\bar{\Theta}}{dz} = -\tilde{\mathbf{v}} \cdot \nabla \tilde{\theta}$$

$$(10b) \quad \tilde{\mathbf{v}}_\tau - \frac{1}{\varepsilon^\nu} \frac{\tilde{\theta}}{\bar{\theta}} \mathbf{k} + \frac{1}{\varepsilon} (1 + \varepsilon^\mu \bar{\Theta}) \nabla \tilde{\pi} = -\tilde{\mathbf{v}} \cdot \nabla \tilde{\mathbf{v}} - \varepsilon^{1-\nu} \tilde{\theta} \nabla \tilde{\pi}$$

$$(10c) \quad \tilde{\pi}_\tau + \frac{1}{\varepsilon} \left(\gamma \kappa \tilde{\pi} \nabla \cdot \tilde{\mathbf{v}} + \tilde{w} \frac{d\tilde{\pi}}{dz} \right) = -\tilde{\mathbf{v}} \cdot \nabla \tilde{\pi} - \gamma \kappa \tilde{\pi} \nabla \cdot \tilde{\mathbf{v}}$$

These equations are obtained from a straightforward *equivalent* transformation of the compressible flow equations in (1) or (6) without any asymptotic simplifications.

Besides the partial time derivatives, there are three groups of terms in (10): the terms multiplied by $\varepsilon^{-\nu}$ induce internal waves, the terms multiplied by ε^{-1} represent the acoustic modes, and the terms on the right hand side cover all nonlinearities. In fact, all terms on the left hand sides are linear in the unknowns. Notice that all terms on the right are non-singular as $\varepsilon \rightarrow 0$, i.e., they are $O(\varepsilon^\alpha)$ with $\alpha \geq 0$. This clean Mach number scaling of acoustic, internal wave, and nonlinear (advective) terms justifies in hindsight the choice $\nu = 1 - \mu/2$ introduced earlier.

The compressible flow equations from (10) feature three distinct time scales which are $\tau = O(\varepsilon)$ for sound propagation, $\tau = O(\varepsilon^\nu)$ for internal waves, and $\tau = O(1)$ for advection. Now we compare these equations with the pseudo-incompressible mode from (3) subject to the same transformations that led us from (1) to (10), i.e., we compare with

$$(11a) \quad \tilde{\theta}_\tau + \frac{1}{\varepsilon^\nu} \tilde{w} \frac{d\bar{\Theta}}{dz} = -\tilde{\mathbf{v}} \cdot \nabla \tilde{\theta}$$

$$(11b) \quad \tilde{\mathbf{v}}_\tau - \frac{1}{\varepsilon^\nu} \frac{\tilde{\theta}}{\bar{\theta}} \mathbf{k} + \frac{1}{\varepsilon^\nu} (1 + \varepsilon^\mu \bar{\Theta}) \nabla \pi^* = -\tilde{\mathbf{v}} \cdot \nabla \tilde{\mathbf{v}} - \varepsilon^\mu \tilde{\theta} \nabla \pi^*$$

$$(11c) \quad \left(\gamma \kappa \tilde{\pi} \nabla \cdot \tilde{\mathbf{v}} + \tilde{w} \frac{d\tilde{\pi}}{dz} \right) = 0$$

where we have replaced $\tilde{\pi} = \varepsilon^{1-\nu} \pi^*$. Since in the pseudo-incompressible model $\tilde{\pi}$ plays the role of a Lagrange multiplier that guarantees compliance with the divergence constraint in (11c), this latter replacement reveals the appropriate scaling in ε of $\tilde{\pi}$ and does not affect the subsequent discussion of the pertinent time scales represented by the equations in (11).

The comparison of (10) and (11) reveals that the task of rigorously justifying the validity of the pseudo-incompressible model equations is quite different from the “classical” task of justifying the incompressible flow model as the zero Mach number limit of the compressible Euler equations without gravity: As discussed by Klein et al. (2010), realistic atmospheric flow regimes are characterized by values $\nu > 0$. Thus, even if the sound modes are neglected, these flow regimes still feature two asymptotically distinct time scales, namely those of advection ($\tau = O(1)$) and of internal gravity waves ($\tau = O(\varepsilon^\nu)$). We cannot, therefore, ask first what is the set of limit equations for $\varepsilon = 0$ and then prove that solutions of the compressible system in (10) approach those of the limit equations. Rather, we need to prove that there is a class of solutions of the three time scale system in (10) which are close in terms of ε and in a suitable, yet to be determined, norm to solutions of the two time scale system in (11) as $\varepsilon \rightarrow 0$.

To summarize, systematic model reduction from n to $n - m > 1$ scales remains a key challenge: Given a set of (partial) differential equations featuring n asymptotically distinct time scales characterized by a singular perturbation parameter, ε , and a reduced set of equations supporting only the $n - m > 1$ longest of these time scales, show that there is

a class of solutions of the full system that remains asymptotically close to the solutions of the reduced system over their common longest time scale as $\varepsilon \rightarrow 0$.

For recent work on the particular atmospheric flow modelling problem discussed in this section see (Klein 2011, Klein et al. 2010).

2. CHARACTERIZATION OF TIME SERIES WITH NON-STATIONARY TRENDS

On their website the World Meteorological Organization (WMO) provides a natural language definition of “climate” as follows

On the simplest level, the *weather* is what is happening in the atmosphere at any given time. The *climate, in a narrow sense*, can be considered as the “average weather”, or in a more scientifically accurate way, it can be defined as “the statistical description of weather in terms of the mean and variability of relevant quantities over a period of time”.

In a broader sense, climate is the status of the climate system which comprises the atmosphere, the hydrosphere, the cryosphere, the surface lithosphere and the biosphere. These elements all determine the state and dynamics of the Earths climate.

For the present discussion it suffices to consider the first “narrow” description. This description refers explicitly to statistics as providing the means to capture the essence of climate in a scientifically accurate way.

2.1. Motivation: floods of the Elbe River. The following example elucidates the necessity for developments of advanced methods of time series analysis that go beyond traditional statistical measures and clustering techniques in that they explicitly include non-stationarity of the observed signals. Two papers published in “Nature” in 2003 (Mudelsee et al. 2003, Schiermeier 2003) declared that, in contrast to mainstream opinions at the time, observational data did not support the hypothesis that climate change was leading to increased probability or frequency of occurrence of high-level floods in central Europe. Figure 3 shows a corresponding data series of occurrences and levels of floods of the Elbe river in Dresden over the past 750-odd years. No significant trend can be detected – the data are inconclusive with respect to the question of systematic changes of occurrence frequency and flood levels.

Consider, however, Fig. 4 which is the same graph supplied with information regarding the month of occurrence of the respective floods within the relevant calendar year. Here, a clear pattern emerges: around the “medieval climate optimum” (spanning roughly the period from AD 950–1250), the recorded intense floods occurred in the course of the summer months. In contrast, during the “little ice age” (AD 1600–1900) these floods were observed in the winter time. Since shortly before AD 1900 all high-level floods in Dresden again took place during the summer.

This example shows one important feature of many phenomena in atmosphere-ocean dynamics, namely the presence of well-distinguished and temporally well separated “regimes” of processes. The raw flood occurrence data from Fig. 3 do not reveal that the physical mechanisms from which they originate differ entirely between the early and late several hundred years on the one hand, and the middle range from AD 1550 to 1850 on the other hand: high floods during the summer months typically follow continuous rainfalls over extended periods of time which cumulatively saturate the natural and artificial water reservoirs. Subsequent further excess rainfalls will then lead to the observed floods. In contrast, winter floods are mostly associated with heavy ice covering of rivers breaking up

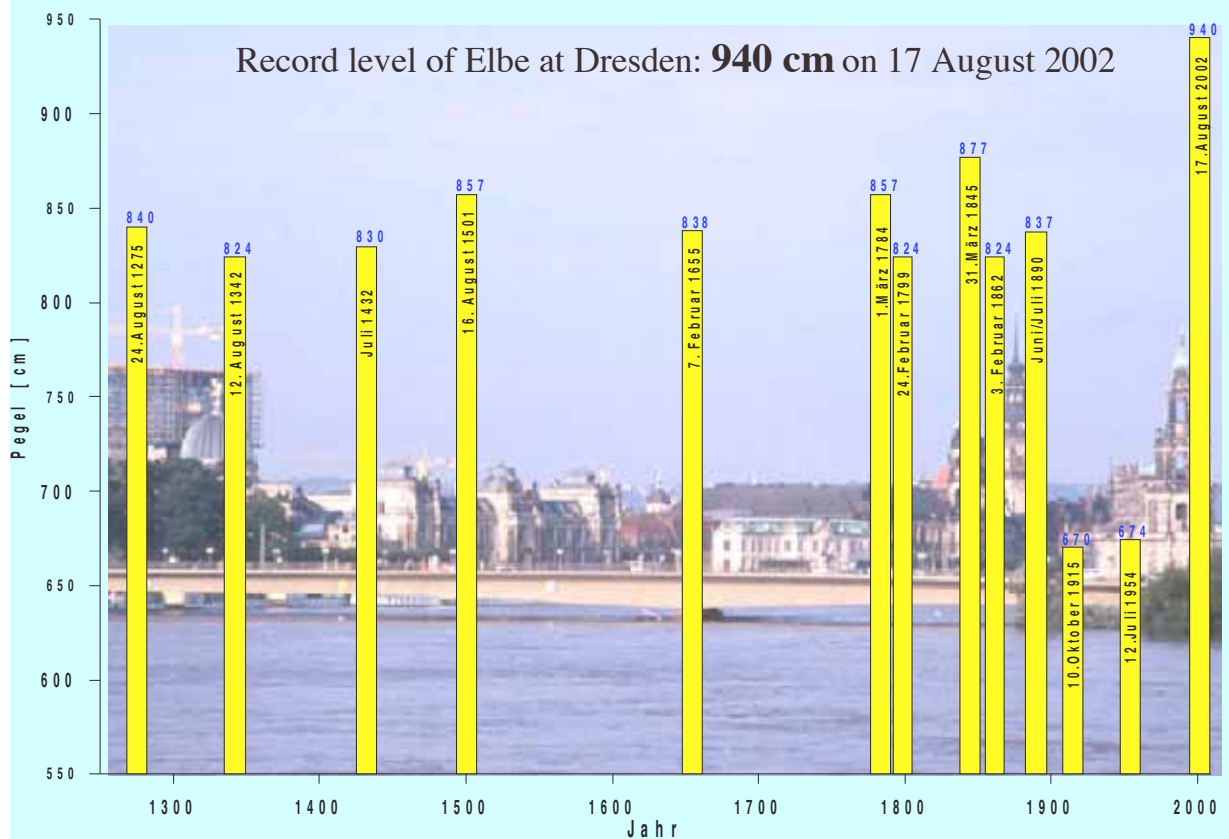


FIGURE 3. Time series of observed extreme water levels of the Elbe in Dresden over the past 750 years. Courtesy of Sbgigniew Kundzewicz, Polish Academy of Sciences, Poznań, and Potsdam Institut für Klimafolgenforschung.

and compiling into barriers that clog the river flow and thus induce floods upstream of the barriers. (Thanks to Prof. Sbgigniew Kundzewicz for the example and the explanations!)

2.2. Non-stationary stochastic factor models for mid-latitude weather patterns.

Of course, for the relatively simple data set consisting of the flood level data from Fig. 3 together with the month-of-occurrence data included in Fig. 4, any well-designed data clustering technique would reveal the existence of regimes as discussed above. The following example, however, is considerably more subtle and has been one of the motivations behind the research on advanced time series analysis in (Horenko 2010).

We all know of the much-desired week-long periods of perfect summer weather in middle and southern Europe. These are associated with so-called blocking states of the atmosphere as depicted in Fig. 5. The triplet (configuration c in the figure) of two low-pressure systems and one (larger) high pressure system produces a nearly vanishing total self-induced velocity of motion and thus allows the system to stay in place over relatively long times – provided the conditions for maintaining the strength of the individual vortices are met. The arrows on the flow lines indicate the flow direction, and from these one observes that the low-pressure pair essentially induces a westward motion to the north of its own latitude, whereas the counter-rotating high-pressure vortex induces westward motion to the south of its latitude. This combination of induced velocities can overcome the mean eastward motion normally observed.

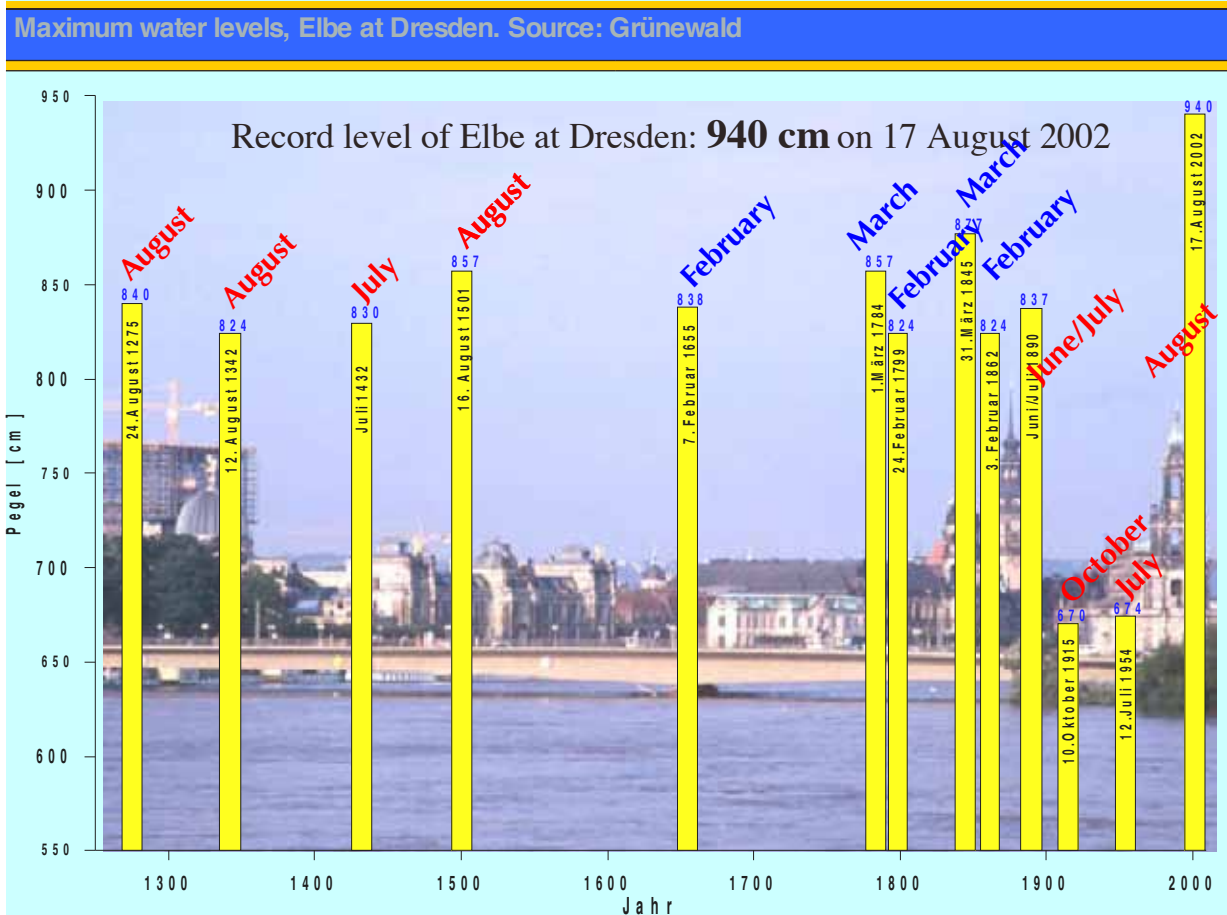


FIGURE 4. Same time series as in Fig. 3, but with labels indicating the month of occurrence of the respective floods according to Prof. Kundzewicz,

Whereas what constitutes a blocking situation is easily described in words, quantifying these rather intuitive notions and detecting blockings automatically and reliably in time series of observational atmospheric data without the necessity of including human expertise on a case-by-case basis constituted the first a major scientific challenge that motivated the development of an advanced time series analysis technique in (Horenko 2010). Another important motivation came from the attribution problem in climate change research. Given that one observes long-term temporal trends in the weather patterns constituting “the climate”, one would like to obtain indications from all available data as to which potentially influential factors do or do not play a role in triggering the observed changes. Thus, the desired time series analysis tool should be able to automatically detect temporal regimes as explained above, it should allow for the incorporation of potentially important external factors that may have affected the climate observations, and it should reveal which of these factors likely did and which did not have a sizeable effect.

The main data set considered by Horenko (2010) in an effort to meet the challenge was extracted from the so-called “ERA-40 global re-analysis data set”. The first primary objective of the ERA-40 project (see <http://www.ecmwf.int>), which was funded under the 5th European Framework Programme, reads:

Produce and promote use of a comprehensive set of global analyses describing the state of the atmosphere and land and ocean-wave conditions from mid-1957 to 2001.

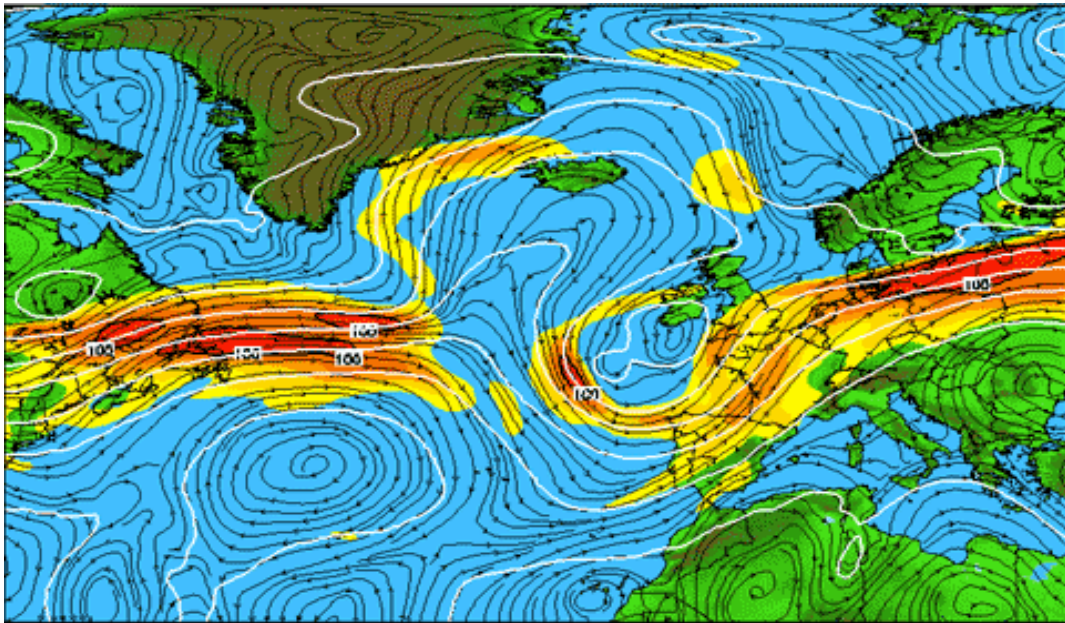
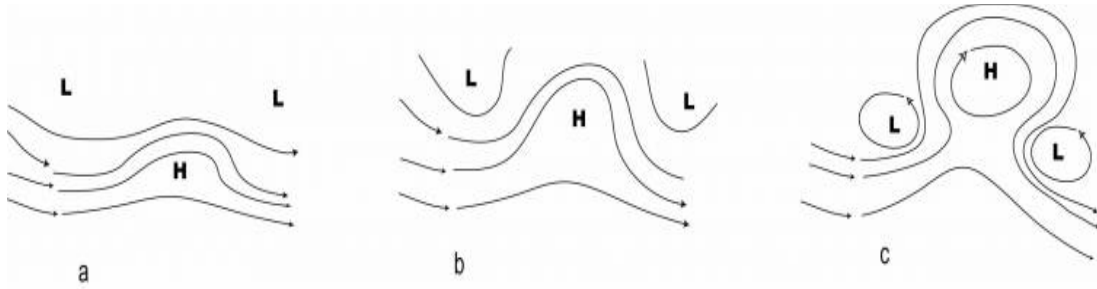


FIGURE 5. Atmospheric vortex arrangements leading to the effective blocking of the eastward motion of mid-latitude cyclones and anti-cyclones, i.e., of low and high-pressure systems, respectively. Courtesy of Illia Horenko, USI, Lugano.

Here “global analysis” denotes a well-established process by which observational data from all over the world are combined with computational simulations in such a way as to produce a global data set of meteorological data at high spatio-temporal resolutions. Horenko (2010) considered the spacial subsection of these global data covering Europe and part of the Atlantic (see Fig. 6) and spanning the full time period from 1957 to 2001.

The goal of the development was to characterize these re-analysis data quantitatively and to assess the potential influences on temporal trends exerted by (i) the yearly seasons, (ii) the atmospheric variability of CO_2 , and (iii) the activity of sunspots. Both of the latter are often claimed to have a major effect on our climate. The observed variability of external factors (ii) and (iii) throughout the relevant period of time is shown in Fig. 7.

To proceed, Horenko developed the FEM-VARX technique, where FEM stand for “Finite Element Method” and VARX for “Vector-valued Auto-Regressive models with eXternal factors”. This method combines K parameter-fitted stochastic dynamical systems (VARX-models) with a mechanism of identifying the time periods over which each of the models best represents the observational data.

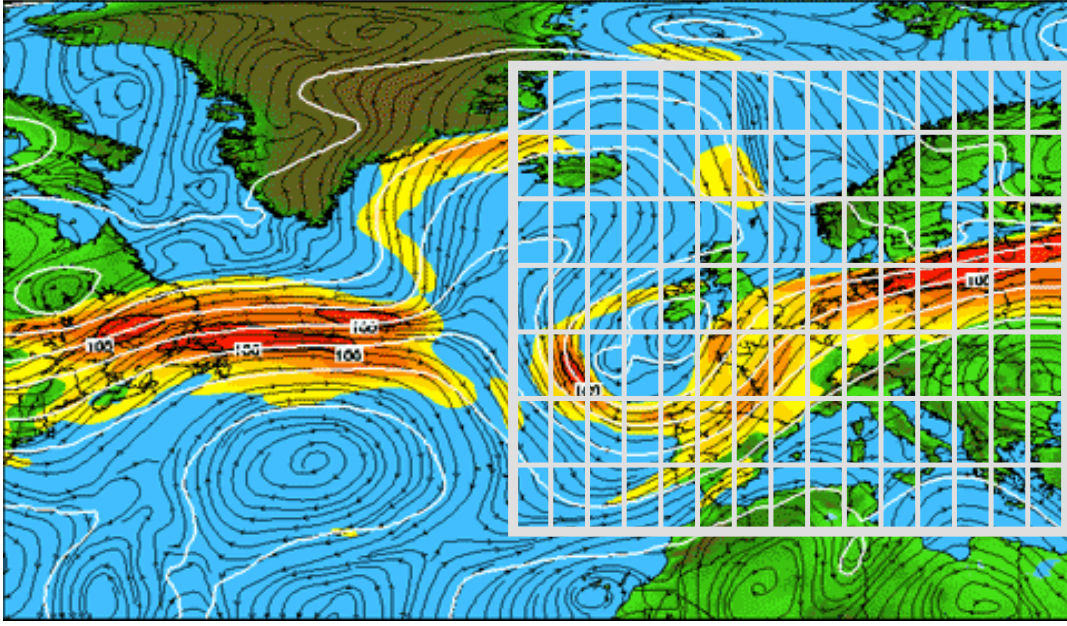


FIGURE 6. Sketch of the spacial grid used in (Horenko 2010) for sampling the ERA-40 global data to extract the meteorological fields for relevant Europe (16314 days, 16×8 grid nodes, corresponding to $\sim 5^\circ$ resolution).

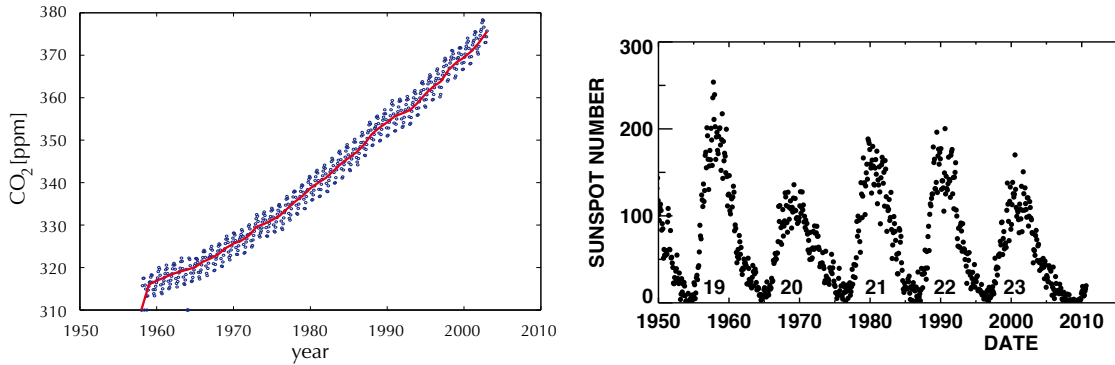


FIGURE 7. Variability of the atmosphere's CO_2 -content measured at Mauna Loa (left), see <http://cdiac.esd.ornl.gov>, and of the sunspot activity expressed through the number of sunspots (right) during the period of 1950–2000, see <http://solarscience.msfc.nasa.gov>.

More specifically, let X_t^* and u_t denote the vector of observational data and the values of the potential external influencing factors at time t , respectively. Then the evolution of the time series is approximated by a weighted superposition of K individual evolutions belonging to different regimes in that

$$(12) \quad X_t^{(i)} = \mu^{(i)} + \sum_{q=1}^Q A_q^{(i)} X_{t-q}^{(i)} + B^{(i)} \phi(u_t) + C^{(i)} \epsilon_t \quad (i = 1, \dots, K).$$

Here $\mu^{(i)}$ are the regime averages, $A_q^{(i)}$ are matrices of auto-regression coupling strengths with q -step time lag, and the $B^{(i)}$ are sensitivities of the dynamics with respect to the effective external forcing, $\phi(u_t)$. The functions $\phi(\cdot)$ are suitable, possibly nonlinear, functions

and the $C^{(i)}$ are matrices of noise amplifications with the noise represented by ϵ_t . The latter is assumed to be an i.i.d. (independent, identically distributed) zero mean vector Gaussian random process. In the sequel we let

$$(13) \quad \{\mu^{(i)}, A_q^{(i)}, B^{(i)}, C^{(i)}\}_{i=1}^K \equiv \{\Theta^{(i)}\}_{i=1}^K.$$

The key remaining issue then is to determine at which point in time which of the K regimes is active or relevant. This is achieved by minimizing a convex linear combination of distance functions, $g(X_t^*, X_t^{(i)}; \Theta^{(i)})$, so that for affiliation weights $\gamma_t^{(i)}$ satisfying $0 \leq \gamma_t^{(i)} \leq 1$ one has

$$(14a) \quad \sum_{i=1}^K \sum_{t=1}^T \gamma_t^{(i)} g(X_t^*, X_t^{(i)}; \Theta^{(i)}) + \lambda^2 \sum_{i=1}^K \sum_{t=1}^T |\gamma_{t+1}^{(i)} - \gamma_t^{(i)}|^2 \longrightarrow \min_{\gamma_t^{(i)}, \Theta^{(i)}} \quad (\text{Tikh.})$$

$$(14b) \quad \sum_{i=1}^K \sum_{t=1}^T \gamma_t^{(i)} g(X_t^*, X_t^{(i)}; \Theta^{(i)}) \longrightarrow \min_{\gamma_t^{(i)}, \Theta^{(i)}} \quad \wedge \quad \sum_t |\gamma_{t+1}^{(i)} - \gamma_t^{(i)}| < C \quad (\text{BV})$$

The optimization problems would be far under-determined if the affiliation weights $\gamma_t^{(i)}$ were left free to vary arbitrarily between one value of t and the next. Therefore the optimization problem of minimizing the combined distance functions (double-sums in (14)) needs to be regularized. The two alternatives followed thus far are classical Tikhonov regularization (see (14a)) and BV-regularization, which consists of constraining the total variation of the affiliation functions (see (14b)).

Once the constrained optimization problem in (14) is solved, the following interpretations are available: the affiliation weights $\gamma_t^{(i)}$ determine which of the K regimes is (most) active at which time, the $\mu^{(i)}$ and $A_q^{(i)}$ define the internal dynamics of the time series in the i th regime that would be observed if external influences were absent, and – importantly – the $B^{(i)}$ show which external factor within the vector-valued $\phi(u)$ does or does not affect the dynamics of the time series substantially. In this latter sense the $B^{(i)}$ solve the attribution problem (*Which external factor does or does not influence the evolution within which period of time?*).

To numerically represent the affiliations $\gamma_t^{(i)}$ as functions of time, t , Horenko uses a finite element discretization, which allows one to employ advanced adaptive discretization techniques — hence the acronym FEM-VARX.

Also, in choosing the number of regimes, K , allowed for, Horenko employs techniques from information theory and uses them so as to implement the Occam’s razor principle, which – loosely speaking – reads: *the best model is one that achieves high prediction quality with the least amount of free parameters*. In particular, Akaike’s *Bayesian information criterion* (BIC) (see, e.g., McQuarrie & Tsai 1998) is used in practice.

Horenko (2010) applies this time series analysis technique to the problem of detecting blocking situations as described in the context of Fig. 5. Key research questions in that paper were (a) “*Does the technique reproduce estimations from heuristic, empirical criteria for blocking detection developed in the meteorological community?*”, (b) “*Are there any temporal trends detectable in the frequency of occurrence or in the actual blocking patterns?*”, and if so, (c) “*Which of the considered external factors has a significant influence on this development?*”. The external factors were (i) the yearly season, (ii) the steady increase of mean CO₂ levels in the atmosphere, and (iii) the sunspot activity.

Figure 8 shows the quite convincing comparison of the classical meteorological “Lejenas-Oakland blocking index”, which measures essentially a large-scale north-south pressure difference, and the sum of the affiliation indices $\gamma_t^{(3)} + \gamma_t^{(4)}$ in a FEM-VARX model. The

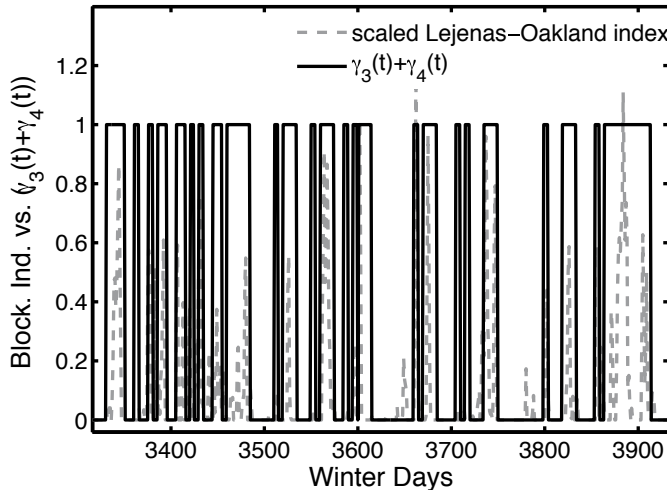


FIGURE 8. Comparison of the negative Lejenas-Oakland blocking index (dashed line) and the sum of cluster affiliations of locally-linear states 3 and 4 (solid line, calculated with FEM-VARX (BV) for $K = 4$, $T = 4000$, $C = 3000$, $Q = 2$). Courtesy of Illia Horenko, USI, Lugano.

latter allows for $K = 4$ different regimes, and accounts for the abovementioned three potential external influences. The time series has been restricted to 4000 winter days (Dec., Jan., Feb.) out of the entire ERA-40 time series. Also, the dimension of the state vector X has been restricted to just 20 by projecting the complete state on the european grid from Fig. 6 to the 20 dominant empirical orthogonal functions (EOFs). (Note that EOF-decomposition is equivalent to Karhunen-Loeve-decomposition as well as to principal component analysis (PCA)). In this example, regimes 3 and 4 represent quite similar atmospheric flow situations, both resembling a blocked state, and this is why the sum of the two affiliation weights was used in the comparison with the meteorological index. It is worth noting, however, that the FEM-VARX-analysis did detect a difference between regimes 3 and 4 in terms of their individual evolution, while the Lejenas-Oakland index does not.

Figure 9 shows results indicating the importance of the considered external factors. The long and the short of this investigation is that for this data set, the new data analysis technique assigned comparable importance to the seasonal cycle and to the increase of CO_2 in the atmosphere, whereas it found the influence of sunspot activity on the observed flow patterns close to negligible.

To summarize, new types of analysis tools for time series with long-term trends have been proposed in recent years. In the author's opinion there remains a strong need for further developments, however. In particular, besides distinct regime transitions as discussed here, one needs to capture smooth temporal evolutions of the regimes themselves. The asymptotic techniques as given in section 1 and the multi-regime time series analysis techniques from the present section would constitute a promising combination.

3. MATHEMATICAL FORMALIZATION OF THE SOCIO-ECONOMIC NOTION OF "VULNERABILITY"

The natural language term "vulnerability" plays a quite significant role in today's research on the impacts of climate on ecological and socio-economic systems. For good

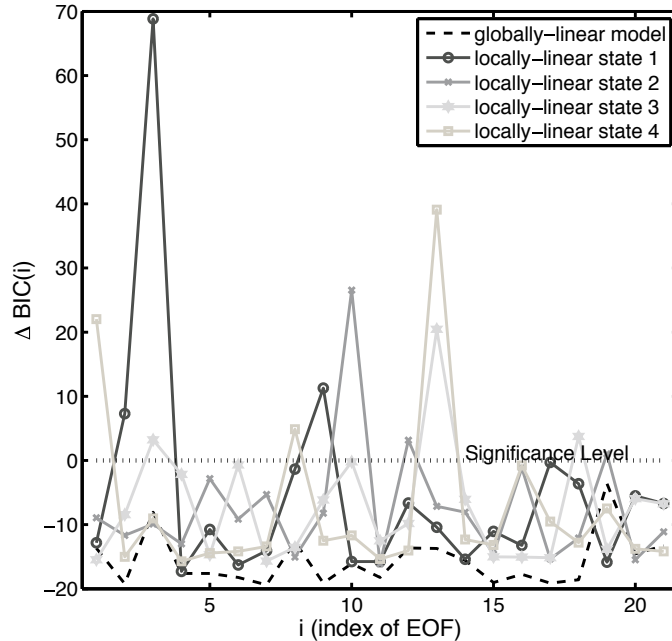


FIGURE 9. Differences between Bayesian Information Criterion (BIC) (39) as calculated for different EOF dimensions of the VARX models with and without the factors u^1 (season) and u^2 (CO_2 level). Negative values indicate EOF dimensions for which the influence of both factors is statistically insignificant. Results given for the global stationary linear VARX model (dashed) and for the locally stationary linear FEM-VARX factor models (calculated with $K = 4$, $T = 4000$, $C = 3000$, $Q = 2$) (solid lines). The dotted zero-line marks the statistical significance level (for components with ΔBIC above this line the external factors u^1 , u^2 are significant in the sense of the BIC-criterion). Courtesy of Illia Horenko, USI, Lugano.

reasons, politicians would welcome concise definition which would allow them to draw quantitative conclusions from, say, the “degree of vulnerability to climate change” because this would eliminate a range of uncertainties from their decision-making.

Yet, the term turns out to be quite elusive. Thus, Thywissen (2006) lists no less than 35 different “definitions” of “vulnerability” in his survey paper, and these are by no means almost equivalent. To exemplify the prevailing confusion, consider the following three examples of quite different usages of the term:

- (1) “some rural district of country X is vulnerable to poverty”
- (2) “some coastal district of country Y is vulnerable to hurricanes”
- (3) “the government found itself in a vulnerable state”

In example (1), a district of a country is the vulnerable entity, and it is said to be vulnerable to some unpreferable state it could find itself in in the near future. In example (2), the vulnerability of some other district is *not* to some state but rather to the possible cause that could be found behind the district’s getting into an unpreferable state. In example (3), it is now not some kind of (human) entity that is vulnerable, but it is rather its state itself that is said to be vulnerable. There is obviously much room for misunderstandings.

In the context of climate and climate impact research, the *Intergovernmental Panel on Climate Change (IPCC)* (see <http://www.ipcc.ch>) lists a working definition of vulnerability (to climate change) in their fourth assessment report:

Vulnerability is the degree to which a system is susceptible to and unable to cope with, adverse effects of climate change, including climate variability and extremes.

The panel also suggests what factors affect vulnerability by stating that

Vulnerability is a function of the character, magnitude, and rate of climate variation to which a system is exposed, its sensitivity, and its adaptive capacity.

In what I consider seminal work, C. Ionescu, together with a number of fellow investigators – notably Sarah Wolf, Richard Klein, and Jochen Hinkel – have developed a mathematical formalization of this and a range of similar but not equivalent “definitions” of vulnerability in order to pave the way for increased precision in scientific debates about the issue (Ionescu 2008, Ionescu et al. 2009, Wolf 2010). In its most basic version, their suggested formal mathematical expression of “vulnerability” reads

$$(15) \quad \textit{vulnerability} = \textit{measure} \cdot \textit{Fmap} \textit{harm} \cdot \textit{possible}.$$

Without further explanation, this gives almost the impression of a tautological repetition of the IPCC-definition above. The subsequent discussion of the individual terms in this expression should show that there is much more to it.

To exemplify the line of thought, let us consider the above “IPCC-Definition” of vulnerability. The defining sentence speaks of a “system”. This concept of a system must involve a future, since otherwise speaking of its being “susceptible to” or “unable to cope with” something would be meaningless. It is thus plausible to interpret the term “system” mathematically in the sense of the theory of dynamical systems: A collection of values of state variables, $X_0 \in S$, defines the state of a system at time $t = 0$. Restricting for simplicity here to discrete time evolutions, a tuple $[X_t]_{t=0}^T \subset S$ defines a trajectory of the dynamical system over the time horizon $0 \leq t \leq T \in \mathbb{N}$. We may thus consider trajectories as mappings from the time domain to states, or

$$(16) \quad \textit{trajectories} : ([0, T] \rightarrow \textit{states}).$$

In words: *trajectories* are of the *type* “functions of time with values in *states*”. Given some “present” time, $t_0 = 0$, all states X_t from the system’s trajectory for $t > t_0$ represent its future in an obvious fashion.

Now the mapping

$$(17) \quad \textit{possible} : \textit{states} \rightarrow F \textit{trajectories}$$

takes a state, s , or – in a different interpretation – the considered system in state s , and yields an uncertainty-related characterization of a set of trajectories that could result from the future evolution of the system after state s has been reached. For example, complete certainty in a deterministic setting implies that *possible* simply produces the unique future evolution the system takes starting from s . Then *possible* is of type *possible* : *states* \rightarrow *trajectories*, and $F = \textit{Id}$. In contrast, in a statistical setting, only probabilities for the system to take on any given future are available. Then *possible* : *states* \rightarrow *Prob trajectories*, i.e., $F = \textit{Prob}$ is the probability functor which maps sets of trajectories to sets of probabilities over sets of trajectories. Uncertainty characterizations via fuzzy set membership etc. are also conceivable.

The vulnerability definition also includes a notion of “bad outcomes” as it refers to “adverse effects of climate change”. This aspect finds a formal representation in the mapping $Fmap\ harm$. Here

$$(18) \quad harm : trajectories \rightarrow H ,$$

where H is an ordered set of values of harm. In the simplest case, $H = \{0, 1\}$, and $harm\ \tau$ may be interpreted as a boolean variable that determines whether or not any harm was done on trajectory τ . In more refined settings where degrees of harm are measured, e.g., by estimated equivalent monetary costs to society, H is a less trivial ordered set. Given the function $harm$, which associates with each trajectory a harm value, one can then proceed to provide an uncertainty qualification of the future harm by applying the functorial map $Fmap$ corresponding to the uncertainty functor F discussed above. In fact, in, say, the stochastic setting, the outcome of *possible* is a probability distribution over future trajectories. We cannot apply $harm$ to probability distributions, but we can apply $harm$ to each thinkable trajectory, and – using the outcome of *possible* – accumulate the resulting probability distribution for future values of $harm$. This is exactly the outcome of $Fmap\ harm$. Analogously, one proceeds in the deterministic and fuzzy settings.

Finally, vulnerability is supposed to be a “degree to which ...”, that is, vulnerability captures the characterization of possible future harm in terms of a single qualifying number. In the deterministic setting, one immediately obtains *the* harm value for *the* future evolution as an appropriate degree of vulnerability. In the statistical setting, the necessary aggregation could consist of extracting the expected value of harm from the probability distribution of harm values, or determining any percentile of harm values, or the like. Analogous aggregations can be constructed in the fuzzy setting.

It is beyond the scope of this paper to provide more detail and insight into this intriguing, mathematically deep and scientifically far-reaching development around the notion of “vulnerability”. In conclusion I would like to merely state the following remarkable aspects of this work:

- The formalization suggest by Ionescu (2008) provides a unified mathematical framework for deterministic, stochastic, fuzzy and other classes of dynamical systems and, importantly, of coupled systems whose components are subject to different uncertainty characterizations.
- This formal framework is built on the notion of “monadic dynamical systems”, a concept which to the best of my knowledge was invented by C. Ionescu in the course of his Ph. D. thesis work.
- S. Wolf’s thesis (Wolf 2010) not only provides a very accessible introduction to this “vulnerability framework” but shows in addition – up to a few remaining open questions – that the socio-economically important concept of finitely additive probabilities can also be cast in terms of category theory suitable to build the monadic structures needed in the vulnerability framework.
- In formalizing the notion of vulnerability, Ionescu (2008) and Wolf (2010) provided formal interpretations of a range of further natural language terms including those of “adaptive capacity” – a term that is as elusive and as important in practice as that of “vulnerability”.
- The mathematical formalization by Ionescu (2008) has been formulated entirely in the HASKELL functional programming language, such that each of the mathematical constructs in his work has a direct computational implementation. This is particularly important because climate impact researchers need to massively use computational simulation and data analysis tools in order to handle the complexity

of the systems they are dealing with. Employing the mathematically involved concepts from the vulnerability formalization effort within their working environments is thus a realistic option.

In conclusion of this section, there is a tremendously important role for mathematics to play in providing common formal frameworks for interdisciplinary science and thus helping to remove potentially hampering conceptual ambiguities.

4. CONCLUSIONS

Climate and climate impact research generate intriguing mathematical tasks and challenges the scope of which far exceeds the standard issues of analysis and numerical modelling and simulation that represent the immediately visible mathematical “front end” of this branch of science. Non-standard questions arise, in particular, in the theory of partial differential equations, the mathematical representation of complex time series, and the mathematical formalization of advanced socio-economic concepts as exemplified in a rudimentary fashion in sections 1 to 3 of this paper.

ACKNOWLEDGEMENTS

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2. Wissenschaftliches Programm

Die wissenschaftlichen Programme werden vom Direktor in Zusammenarbeit mit der wissenschaftlichen Kommission der Gesellschaft für Mathematische Forschung e.V. entschieden. Dieses für das Programm wichtigste wissenschaftliche Gremium des Instituts basiert auf der ehrenamtlichen Arbeit von ca. 20 - 25 hochkarätigen Mathematikerinnen und Mathematikern, die die gesamte Breite der Mathematik vertreten. Die wissenschaftliche Kommission begutachtet vor ihrer Genehmigung alle wissenschaftlichen Veranstaltungen des Instituts. Das Programm wird in einem wettbewerblichen Verfahren nach streng wissenschaftlichen Kriterien gestaltet. Wie in den vergangenen Jahren erhielt das MFO wesentlich mehr Anträge für Veranstaltungen, als genehmigt werden konnten.

2.1. Übersicht der Programme

Das Mathematische Forschungsinstitut Oberwolfach (MFO) hat sechs große zentrale Aufgaben: Das Workshop-Programm, das Miniworkshop-Programm, die Oberwolfach Arbeitsgemeinschaft, die Oberwolfach Seminare, das Research in Pairs Programm, sowie die Oberwolfach Leibniz Fellows. Daneben gibt es zusätzliche Serviceleistungen des MFO.

Das Workshop Programm

Das wissenschaftliche Hauptprogramm besteht in der jährlichen Durchführung von etwa 40 einwöchigen Workshops mit je etwa 50 Teilnehmern. Alternativ können auch parallel zwei Workshops halber Größe (ca. 25 Teilnehmer) stattfinden. Die Workshops werden von international führenden Experten der jeweiligen Fachgebiete organisiert und die Teilnehmer werden nach Empfehlung durch die Organisatoren vom Direktor persönlich eingeladen. Ein besonderes Charakteristikum der Oberwolfacher Workshops ist die Forschungsorientierung. Immer wieder wird von den Gastforschern darauf hingewiesen, wie stimulierend die Atmosphäre ist. Viele bedeutende Forschungsprojekte haben ihre Entstehung der Durchführung eines Workshops in Oberwolfach zu verdanken.

Das Miniworkshop Programm

Im Rahmen dieses Programms können jährlich 12 einwöchige Miniworkshops mit je etwa 15 Teilnehmern veranstaltet werden. Diese Miniworkshops wenden sich besonders an junge Forscher und ermöglichen es, auf aktuelle Entwicklungen schnell zu reagieren, da über die Themen der Miniworkshops erst ein halbes Jahr vor der Veranstaltung entschieden wird.

2. Scientific programme

The director of the institute decides on the scientific programme in cooperation with the scientific board of the Gesellschaft für Mathematische Forschung e.V. For the scientific programme, this is the most important panel of the institute. It is based on the honorary work of about 20 to 25 top-class mathematicians, covering all areas of mathematics. The scientific board examines all scientific events at the institute prior to their approval. The programme is fixed in a competitive procedure according to strictly scientific criteria. As in the preceding years, the MFO received many more proposals than could be approved.

2.1. Overview on the programme

The Mathematisches Forschungsinstitut Oberwolfach (MFO) focuses its main scientific activities on six central programmes: The Workshop Programme, the Mini-Workshop Programme, the Oberwolfach Arbeitsgemeinschaft, the Oberwolfach Seminars, the Research in Pairs Programme, and the Oberwolfach Leibniz Fellows. In addition there are some further services provided by the MFO.

The Workshop Programme

The main scientific programme consists of about 40 week-long workshops per year, each with about 50 participants. Alternatively, there can be two parallel workshops of half size (about 25 participants). The workshops are organised by internationally leading experts in the relevant fields. The participants are personally invited by the Director after recommendation by the organisers. A special characteristic feature of the Oberwolfach Workshops is the research orientation. Very often the guest researchers appreciate the stimulating atmosphere. Many significant research projects owe their origin to the realisation of a workshop in Oberwolfach.

The Mini-Workshop Programme

This programme offers 12 week-long mini-workshops per year, each with about 15 participants. These mini-workshops are aimed especially at junior researchers, and allow proposals to react to recent developments, since the subjects are fixed only half a year before the mini-workshops take place.

Die Oberwolfach Arbeitsgemeinschaft

Die Idee der Arbeitsgemeinschaft für junge, aber auch für bereits etablierte Forscher ist, sich unter Anleitung international anerkannter Spezialisten durch eigene Vorträge in ein neues, aktuelles Gebiet einzuarbeiten. Die Arbeitsgemeinschaft findet zweimal jährlich für jeweils eine Woche statt und wird von Prof. Christopher Deninger und Prof. Gerd Faltings organisiert.

Die Oberwolfach Seminare

Die Oberwolfach Seminare sind einwöchige Veranstaltungen, die sechsmal im Jahr stattfinden. Sie werden von führenden Experten der jeweiligen Fachgebiete organisiert und wenden sich an Doktoranden und Postdoktoranden aus aller Welt. Das Ziel ist, 25 Teilnehmer mit einem besonders aktuellen Arbeitsgebiet bekannt zu machen.

Wir freuen uns, dass die Carl Friedrich von Siemens Stiftung die Oberwolfach Seminare von Sommer 2008 bis Sommer 2013 substanziell unterstützt.

Das Research in Pairs Programm

Ein weiterer Forschungsschwerpunkt ist das Programm „Research in Pairs“ (RiP). Dieses Programm ermöglicht es jeweils 2 bis 4 Forschern, die von verschiedenen Institutionen kommen, 2 Wochen bis 3 Monate am Mathematischen Forschungsinstitut Oberwolfach für die Arbeit an einem vorher festzulegenden Projekt zu verbringen.

Oberwolfach Leibniz Fellows

In diesem Postdoktoranden-Programm werden seit Januar 2007 besonders qualifizierte Nachwuchswissenschaftler in einer entscheidenden Phase ihrer wissenschaftlichen Laufbahn durch Bereitstellung idealer Arbeitsbedingungen in einem internationalen Umfeld gefördert. Exzellente junge Forscher und Forscherinnen können sich allein oder in Kleingruppen zur Durchführung eines Forschungsprojekts in Oberwolfach von zwei bis zu sechs Monaten bewerben. Wichtig ist die Einbindung der Oberwolfach Leibniz Fellows in eine aktive Arbeitsgruppe mit einem etablierten Wissenschaftler einer Universität oder einer Forschungseinrichtung. Es besteht eine Kooperation mit dem europäischen Postdoktorandennetzwerk EPDI, an dem bekannte mathematische Institute teilnehmen (IHES, Newton-Institut, Max-Planck-Institute in Bonn und Leipzig, Mittag-Leffler-Institut, Erwin Schrödinger Institut in Wien, Banach Center in Warschau, Centre de Recerca Matematica in Barcelona, Forschungsinstitut der ETH Zürich).

Oberwolfach Leibniz Graduate Students

Seit Beginn des Jahres 2009 unterstützt das MFO die Teilnahme von im Durchschnitt fünf Doktoranden an den Oberwolfach Workshops. Dieses neue Programm wurde von der Leibniz-Gemeinschaft

The Oberwolfach Arbeitsgemeinschaft

The idea of the Arbeitsgemeinschaft ('Research Group') for young as well as for senior researchers is to learn about a new active topic by giving a lecture on it, guided by leading international specialists. The Arbeitsgemeinschaft meets twice per year for one week each time and is organised by Prof. Christopher Deninger and Prof. Gerd Faltings.

The Oberwolfach Seminars

The Oberwolfach Seminars are week-long events taking place six times per year. They are organised by leading experts in the field and address postdocs and Ph.D. students from all over the world. The aim is to introduce 25 participants to a particularly hot development.

We are pleased that the Carl Friedrich von Siemens Foundation substantially supports the Oberwolfach Seminars from summer 2008 to summer 2013.

The Research in Pairs Programme

A further main activity of the Institute is the 'Research in Pairs Programme' (RiP). This programme is aimed at small groups of 2-4 researchers from different places working together at the Mathematisches Forschungsinstitut Oberwolfach for 2 weeks up to 3 months on a specific project.

Oberwolfach Leibniz Fellows

The focus of this postdoctoral programme which has started in January 2007, is to support excellent young researchers in an important period of their scientific career by providing ideal working conditions in an international atmosphere. Outstanding young researchers can apply to carry out a research project, individually or in small groups, for a period from two to six months. Oberwolfach Leibniz Fellows should be involved in an active research group with an established senior researcher at a university or another research institute. This is part of a cooperation with the European Post-Doctoral Institute (EPDI) in which well-known mathematical Institutes are already participating (IHES, Newton-Institute, Max-Planck-Institute in Bonn and Leipzig, Mittag-Leffler-Institute, Erwin Schrödinger Institute in Vienna, Banach Center in Warsaw, Centre de Recerca Matematica in Barcelona, Research Institute of ETH Zürich).

Oberwolfach Leibniz Graduate Students

Since the beginning of 2009, the MFO has been supporting the participation of an average of 5 young doctoral students per Oberwolfach Workshop. This new programme has been approved by the Leibniz-

innerhalb des „Pakt für Forschung und Innovation“ für eine erste Periode von 2009 bis 2011 gewährt. Gefördert werden exzellente Doktoranden oder frisch Promovierte bis zu zwei Jahren nach der Promotion, insbesondere durch Reisekostenunterstützung. Es handelt sich um fünf zusätzliche Plätze pro Workshop, die nicht durch etablierte Forscher besetzt werden dürfen.

Die Oberwolfach Reports

Um die Ergebnisse der Workshops auch einem international weiten Kreis zugänglich zu machen, wurde 2004 als neue regelmäßige Publikation die Buchserie „Oberwolfach Reports“ (OWR) in Zusammenarbeit mit dem Publishing House der European Mathematical Society gegründet. Sie erscheint jährlich mit 4 Ausgaben von insgesamt mehr als 3.000 Seiten in einer Auflage von 300 Stück. Die OWR beinhalten erweiterte Kurzfassungen aller Vorträge im Umfang von jeweils ein bis drei Seiten, einschließlich Literaturhinweisen, und belegen das ausgezeichnete Niveau der Veranstaltungen. Viele neue Entdeckungen und Entwicklungen wurden im Institut zum ersten Mal einem ausgesuchten Kreis von Forschern vorgestellt und sind in den Oberwolfach Reports dokumentiert. Die OWR sind international auf großes Interesse gestoßen, was sich in der grossen Zahl von Abonnenten und Tauschpartnern zeigt.

Oberwolfach Preis und John Todd Award

Der Oberwolfach Preis wird etwa alle drei Jahre von der Gesellschaft für mathematische Forschung e.V. und der Oberwolfach Stiftung an junge europäische Forscher verliehen. Der Preis ist für ausgezeichnete Errungenschaften in jeweils wechselnden Gebieten der Mathematik ausgelobt. Das MFO verleiht ebenfalls etwa alle drei Jahre zusammen mit der Oberwolfach Stiftung den John Todd Award für junge Forscher auf dem Gebiet der numerischen Analysis. Der Oberwolfach Preis ist mit 10.000 Euro und der John Todd Award mit 1.000 Euro dotiert.

Weitere Aktivitäten

In zweijährlichem Wechsel finden Fortbildungsveranstaltungen für Lehrer bzw. Bibliothekare des Landes Baden-Württemberg statt. Im Jahr 2010 fand eine Statistik-Fortbildung für Mathematik-Lehrer an Gymnasien statt. Das Institut beherbergt auch die abschliessende Trainingswoche für besonders begabte Schüler zur Vorbereitung auf die Internationale Mathematik-Olympiade. Als Dienst für die Öffentlichkeit sind besonders die Oberwolfach Foto-Datenbank, die Oberwolfach References for Mathematical Software (ORMS) und die Wanderausstellung IMAGINARY zu nennen.

Gemeinschaft within the 'Pakt für Forschung und Innovation' for a first period from 2009 to 2011. It addresses to excellent graduate students and recent post docs (the Ph.D./Dr. degree must be received not more than 2 years ago, counted from the date of the workshop), and gives support by the reimbursement of travel costs. For this programme, each Oberwolfach Workshop is given an extra capacity of 5 workshop places which is reserved for these young candidates and may not be taken by senior researchers.

The Oberwolfach Reports

The 'Oberwolfach Reports' (OWR) were initiated in 2004 as a new series of publications of the institute in collaboration with the Publishing House of the European Mathematical Society. They appear quarterly in an edition of 300 copies. The 4 issues comprise more than 3,000 pages per year. The OWR are comprised of official reports of every workshop, containing extended abstracts of the given talks, of one up to three pages per talk, including references. The aim is to report periodically upon the state of mathematical research, and to make these reports available to the mathematical community. The OWR provide proof of the excellent level of the events at the MFO. Many new discoveries and developments have been introduced at the institute to a selected group of researchers and are documented in the Oberwolfach Reports. The OWR have been warmly welcomed worldwide, with numerous subscribers and partners participating in exchange arrangements.

Oberwolfach Prize and John Todd Award

The Oberwolfach Prize is awarded by the Gesellschaft für mathematische Forschung e.V. and by the Oberwolfach Stiftung to young European mathematicians. The prize is awarded for excellent achievements in changing fields of mathematics. The Oberwolfach foundation awards in cooperation with the MFO approximately every three years the John Todd Award to young scientists in numerical analysis. The Oberwolfach Prize amounts to 10,000 Euro and the John Todd Award to 1,000 Euro.

Further activities

On a two-year rotation, a training week for school teachers (respectively librarians) of the State of Baden-Württemberg takes place. In 2010, a training week for school teachers with the subject statistics was held. The Institute also hosts the final training week for especially gifted pupils to prepare for the International Mathematical Olympiad. As further services provided for the general public the Oberwolfach Photo Collection, the Oberwolfach References for Mathematical Software (ORMS) and the travelling exhibition IMAGINARY are to be mentioned.

2.2. Jahresprogramm 2010

Im Jahr 2010 wurden während 41 Wochen Workshops durchgeführt, sowie 12 Miniworkshops während vier Wochen, 6 Oberwolfach Seminare während drei Wochen und zwei Arbeitsgemeinschaften während zwei Wochen. Insgesamt nahmen mehr als 2500 Forscher aus aller Welt an allen Programmen teil, davon ca. 30% aus Deutschland, 40% aus Resteuropa und 30% aus dem nichteuropäischen Ausland. Das Institut legt großen Wert darauf, dass alle Gebiete der Mathematik und ihre Grenzgebiete, auch im Hinblick auf Anwendungen, vertreten sind. Das folgende Tagungsprogramm belegt diese Politik.

Workshops:

03.01. – 09.01.2010 **Model Theory: Around Valued Fields and Dependent Theories**

Organisers: Andreas Baudisch, Berlin
Anand Pillay, Leeds
Katrin Tent, Münster
Martin Ziegler, Freiburg

10.01. – 16.01.2010 **Moduli Spaces in Algebraic Geometry**

Organisers: Dan Abramovich, Providence
Gavril Farkas, Berlin
Stefan Kebekus, Freiburg

24.01. – 30.01.2010 **Statistical Issues in Prediction: What can be learned for individualized predictive medicine?**

Organisers: Leonhard Held, Zürich
Robin Henderson, Newcastle upon Tyne
Ulrich Mansmann, München

31.01. – 06.02.2010 **New Directions in Simulation, Control and Analysis for Interfaces and Free Boundaries**

Organisers: Charles M. Elliott, Coventry
Yoshikazu Giga, Tokyo
Michael Hinze, Hamburg
Vanessa Styles, Brighton

07.02. – 13.02.2010 **Optimal Constants in the Theory of Sobolev Spaces and PDEs**

Organisers: Andrea Cianchi, Firenze
Maria J. Esteban, Paris
Bernd Kawohl, Köln

07.02. – 13.02.2010 **Noncommutative Geometry and Loop Quantum Gravity: Loops, Algebras and Spectral Triples**

Organisers: Christian Fleischhack, Hamburg
Matilde Marcolli, Bonn
Ryszard Nest, Copenhagen

14.02. – 20.02.2010 **Computational Electromagnetism and Acoustics**

Organisers: Ralf Hiptmair, Zürich
Ronald H. W. Hoppe, Augsburg
Patrick Joly, Le Chesnay
Ulrich Langer, Linz

21.02. – 27.02.2010 **Graph Theory**

Organisers: Reinhard Diestel, Hamburg
Lex Schrijver, Amsterdam
Paul Seymour, Princeton

28.02. – 06.03.2010 **Disciplines and Styles in Pure Mathematics, 1800-2000**

Organisers: David Rowe, Mainz
Klaus Volkert, Köln
Philippe Nabonnand, Nancy
Volker Remmert, Mainz

2.2. Annual schedule 2010

In the year 2010 workshops have taken place during 41 weeks, as well as 12 mini-workshops during four weeks, 6 Oberwolfach Seminars during three weeks and two Arbeitsgemeinschaften during two weeks. In total, more than 2,500 researchers from all over the world attended the Oberwolfach research programme, about 30% from Germany, 40% from the rest of Europe, and 30% from non-European countries. The Institute emphasizes that all fields of mathematics and related areas are represented, including applications. The following scientific programme gives proof of this policy.

07.03. – 13.03.2010 **C*-Algebren**

Organisers: Claire Anantharaman-Delaroche, Orleans
Siegfried Echterhoff, Münster
Mikael Rordam, Copenhagen
Dan-Virgil Voiculescu, Berkeley

14.03. – 20.03.2010 **Microstructures in Solids: From Quantum Models to Continua**

Organisers: Alexander Mielke, Berlin
Michael Ortiz, Pasadena

21.03. – 27.03.2010 **Combinatorial Representation Theory**

Organisers: Christine Bessenrodt, Hannover
Francesco Brenti, Roma
Alexander Kleshchev, Eugene
Arun Ram, Parkville

28.03. – 03.04.2010 **Modern Nonparametric Statistics: Going Beyond Asymptotic Minimax**

Organisers: Lucien Birge, Paris
Iain M. Johnstone, Stanford
Vladimir Spokoiny, Berlin

11.04. – 17.04.2010 **Mathematics and Algorithms in Tomography**

Organisers: Martin Burger, Münster
Alfred Louis, Saarbrücken
Todd Quinto, Medford

18.04. – 24.04.2010 **Algebraic Groups**

Organisers: Michel Brion, Grenoble
Jens Carsten Jantzen, Aarhus

25.04. – 01.05.2010 **Non-positive Curvature and Geometric Structures in Group Theory**

Organisers: Martin Bridson, Oxford
Linus Kramer, Münster
Bertrand Remy, Lyon
Karen Vogtmann, Ithaca

02.05. – 08.05.2010 **Progress in Surface Theory**

Organisers: Uwe Abresch, Bochum
Josef Dorfmeister, München
Masaaki Umehara, Osaka

09.05. – 15.05.2010 **Interactions between Algebraic Geometry and Noncommutative Algebra**

Organisers: Dieter Happel, Chemnitz
Lance W. Small, La Jolla
J. Toby Stafford, Manchester
Michel Van den Bergh, Diepenbeek

16.05. – 22.05.2010 **Motives and Homotopy Theory of Schemes**

Organisers: Bruno Kahn, Paris
Marc Levine, Boston
Michael Spiess, Bielefeld

- 30.05. – 05.06.2010 Phase Transitions**
Organisers: Kaushik Bhattacharya, Pasadena
Dmitri Ioffe, Haifa
Stephan Luckhaus, Leipzig
Felix Otto, Bonn
- 06.06. – 12.06.2010 Geometry, Quantum Fields, and Strings: Categorical Aspects**
Organisers: Peter Bouwknegt, Canberra
Dan Freed, Austin
Christoph Schweigert, Hamburg
- 13.06. – 19.06.2010 Geometrie**
Organisers: John Lott, Berkeley
Iskander Taimanov, Novosibirsk
Burkhard Wilking, Münster
- 20.06. – 26.06.2010 Classical Algebraic Geometry**
Organisers: David Eisenbud, Berkeley
Frank-Olaf Schreyer, Saarbrücken
Ravi Vakil, Stanford
Claire Voisin, Paris
- 27.06. – 03.07.2010 Analysis and Geometric Singularities**
Organisers: Jochen Brüning, Berlin
Rafe Mazzeo, Stanford
Paolo Piazza, Roma
- 04.07. – 10.07.2010 Flows on Homogeneous Spaces and Arithmetic**
Organisers: Manfred Einsiedler, Columbus
Dmitry Kleinbock, Waltham
Elon Lindenstrauss, Jerusalem
Hee Oh, Providence/Seoul
- 11.07. – 17.07.2010 Geometric Group Theory, Hyperbolic Dynamics and Symplectic Geometry**
Organisers: Gerhard Knieper, Bochum
Leonid Polterovich, Tel Aviv
Leonid Potyagailo, Lille
- 18.07. – 24.07.2010 Calculus of Variations**
Organisers: Camillo De Lellis, Zürich
Gerhard Huisken, Golm
Robert J. McCann, Toronto
- 25.07. – 31.07.2010 Cohomology of Finite Groups: Interactions and Applications**
Organisers: Alejandro Adem, Vancouver
Jon F. Carlson, Athens
Henning Krause, Paderborn
- 01.08. – 07.08.2010 Wavelet and Multiscale Methods**
Organisers: Albert Cohen, Paris
Wolfgang Dahmen, Aachen
Ronald A. DeVore, College Station
Angela Kunoth, Paderborn
- 08.08. – 14.08.2010 Mathematical Theory and Modelling in Atmosphere-Ocean-Science**
Organisers: Andrew J. Majda, New York
Bjorn Stevens, Hamburg
Rupert Klein, Berlin
- 15.08. – 21.08.2010 Low-Dimensional Topology and Number Theory**
Organisers: Paul E. Gunnells, Amherst
Walter Neumann, New York
Adam S. Sikora, New York
Don Zagier, Bonn/Paris
- 29.08. – 04.09.2010 Komplexe Analysis**
Organisers: Jean-Pierre Demailly, Grenoble
Klaus Hulek, Hannover
Thomas Peternell, Bayreuth
- 05.09. – 11.09.2010 Actions and Invariants of Residually Finite Groups: Asymptotic Methods**
Organisers: Miklos Abert, Chicago
Damien Gaboriau, Lyon
Fritz Grunewald, Düsseldorf
- 12.09. – 18.09.2010 Nonlinear Waves and Dispersive Equations**
Organisers: Carlos E. Kenig, Chicago
Herbert Koch, Bonn
Daniel Tataru, Berkeley
- 19.09. – 25.09.2010 Topologie**
Organisers: Thomas Schick, Göttingen
Peter Teichner, Berkeley
Nathalie Wahl, Copenhagen
Michael Weiss, Aberdeen
- 26.09. – 02.10.2010 Deformation Methods in Mathematics and Physics**
Organisers: Alice Fialowski, Budapest
Jürg Fröhlich, Zürich
Martin Schlichenmaier, Luxembourg
- 17.10. – 23.10.2010 Mathematical Challenges in Stochastic Networks**
Organisers: Serguei Foss, Edinburgh
Günter Last, Karlsruhe
Michel Mandjes, Amsterdam
Balaji Prabhakar, Stanford
- 31.10. – 06.11.2010 Operator Theory and Harmonic Analysis**
Organisers: Alexander Borichev, Marseille
Raymond Mortini, Metz
Nicolai Nikolski, Bordeaux
Kristian Seip, Trondheim
- 07.11. – 13.11.2010 Large Scale Stochastic Dynamics**
Organisers: Claudio Landim, Rio de Janeiro
Stefano Olla, Paris
Herbert Spohn, München
- 14.11. – 20.11.2010 Infinite Dimensional Lie Theory**
Organisers: Karl-Hermann Neeb, Darmstadt
Arturo Pianzola, Edmonton
Tudor S. Ratiu, Lausanne
- 14.11. – 20.11.2010 Representation Theory and Harmonic Analysis**
Organisers: Toshiyuki Kobayashi, Tokyo
Bernhard Krötz, Bonn
- 28.11. – 04.12.2010 Teichmüller Theory**
Organisers: Shigeyuki Morita, Tokyo
Athanasios Papadopoulos, Strasbourg
Robert C. Penner, Los Angeles
- 05.12. – 11.12.2010 Classical and Quantum Mechanical Models of Many-Particle Systems**
Organisers: Anton Arnold, Wien
Eric Carlen, Piscataway
Laurent Desvillettes, Cachan

Miniworkshops:

- 17.01. – 23.01.2010 History of Mathematics in Germany, 1920 - 1960**
Organisers: Moritz Epple, Frankfurt
Volker Remmert, Mainz
Norbert Schappacher, Strasbourg
- 17.01. – 23.01.2010 Valuations and Integral Geometry**
Organisers: Semyon Alesker, Tel Aviv
Andreas Bernig, Fribourg
Franz Schuster, Wien
- 17.01. – 23.01.2010 Semiparametric Modelling of Multivariate Economic Time Series with Changing Dynamics**
Organisers: Luc Bauwens, Louvain-la-Neuve
Qiwei Yao, London
Rainer von Sachs, Louvain-la-Neuve
- 22.08. – 28.08.2010 Mechanics of Cell Motion**
Organisers: Wolfgang Alt, Bonn
Davide Ambrosi, Milano

- 22.08. – 28.08.2010 Combinatorics on Words**
Organisers: Valerie Berthe, Montpellier
Juhani Karhumäki, Turku
Dirk Nowotka, Stuttgart
Jeffrey Shallit, Waterloo
- 22.08. – 28.08.2010 Exploiting Symmetry in Optimization**
Organisers: Volker Kaibel, Magdeburg
Leo Liberti, Palaiseau
Achill Schürmann, Delft
Renata Sotirov, Tilburg
- 03.10. – 09.10.2010 Shearlets**
Organisers: Gitta Kutyniok, Osnabrück
Demetrio Labate, Houston
- 03.10. – 09.10.2010 Linear Series on Algebraic Varieties**
Organisers: Thomas Bauer, Marburg
Sandra Di Rocco, Stockholm
Brian Harbourne, Lincoln
Tomasz Szemberg, Krakau
- 03.10. – 09.10.2010 Higher Dimensional Elliptic Fibrations**
Organisers: Gavin Brown, Loughborough
Anda Degeratu, Golm
Katrin Wendland, Augsburg
- 12.12. – 18.12.2010 1-Motives**
Organisers: Luca Barbieri-Viale, Milano
Helene Esnault, Essen
David Harari, Paris
- 12.12. – 18.12.2010 Wellposedness and Controllability of Evolution Equations**
Organisers: Birgit Jacob, Wuppertal
Jonathan Partington, Leeds
Sandra Pott, Paderborn/Glasgow
Hans Zwart, Enschede
- 12.12. – 18.12.2010 Algebraic and Analytic Techniques for Polynomial Vector Fields**
Organisers: Armengol Gasull, Bellaterra
Julia Hartmann, Aachen
Jaume Llibre, Bellaterra
Sebastian Walcher, Aachen

Arbeitsgemeinschaften:

- 04.04. – 10.04.2010 Mathematical Billiards**
Organisers: Sergei Tabachnikov, University Park
Serge Troubetzkoy, Marseille
- 10.10. – 16.10.2010 Topological Robotics**
Organisers: Michael Farber, Durham
Jesus Gonzalez, Mexico
Dirk Schütz, Durham

Oberwolfach Seminare:

- 23.05. – 29.05.2010 Representations of Finite Groups: Local Cohomology and Support**
Organisers: Dave Benson, Aberdeen
Srikanth Iyengar, Lincoln
Henning Krause, Paderborn
- 23.05. – 29.05.2010 Semidefinite Optimization: Theory, Algorithms and Applications**
Organisers: Sanjeev Arora, Princeton
Monique Laurent, Amsterdam
Pablo A. Parrilo, Cambridge MA
Franz Rendl, Klagenfurt
Frank Vallentin, Delft
- 24.10. – 30.10.2010 The Ergodic Theory of Markov Processes**
Organisers: Arnaud Guillin, Clermont-Ferrand
Martin Hairer, New York
Jonathan Mattingly, Durham
Luc Rey-Bellet, Amherst
- 24.10. – 30.10.2010 The Willmore Functional**
Organisers: Ernst Kuwert, Freiburg
Reiner Schätzle, Tübingen
- 21.11. – 27.11.2010 Lipschitz Analysis**
Organisers: Mario Bonk, Ann Arbor
Urs Lang, Zürich
- 21.11. – 27.11.2010 Mathematics of PDE Constrained Optimization**
Organisers: Michael Hinze, Hamburg
Michael Hintermüller, Berlin
Ronald Hoppe, Augsburg

Fortbildungsveranstaltungen:

- 29.05. - 06.06.2010 Trainings- und Abschluß-Seminar für die Internationale Mathematik-Olympiade**
Organiser: Hans-Dietrich Gronau, Rostock
- 31.10. – 06.11.2010 Fortbildung für Mathematik- und Physiklehrer: Statistik in Theorie und Praxis**
Organisers: Michael Falk, Würzburg
Hans Fischer, Eichstätt-Ingolstadt
Frank Marohn, Würzburg
Rene Michel, Frankfurt

2.3. Workshops

WORKSHOP 1001



03.01. – 09.01.2010

Organisers:

Model Theory: Around Valued Fields and Dependent Theories

Andreas Baudisch, Berlin
Anand Pillay, Leeds
Katrin Tent, Münster
Martin Ziegler, Freiburg

ABSTRACT

The general topic of the meeting was “Valued fields and related structures”. It included both applications of model theory, as well as so-called “pure” model theory: the classification of first order structures using new techniques extending those developed in stable theories. The interactions of “theory” and “applications” were very visible in the meeting and in the list of participants which included people working in pure model theory, in more applied model theory, and researchers outside model theory hoping to use the machinery developed here.

PARTICIPANTS

Adler, Hans (Wien), Baudisch, Andreas (Berlin), Ben Yaacov, Itai (Villeurbanne), Berarducci, Alessandro (Pisa), Berenstein, Alexander (Bogota), Bouscaren, Elisabeth (Orsay), Casanovas, Enrique (Barcelona), Cherlin, Gregory L. (Piscataway), Chernikov, Artem (Villeurbanne), Cluckers, Raf (Villeneuve d’Ascq.), Delon, Françoise (Paris), Ealy, Clifton (Macomb), Eleftheriou, Pantelis (Lisboa), Evans, David M. (Norwich), Fornasiero, Antongiulio (Münster), Gismatullin, Jakub (Wrocław), Halupczok, Immanuel (Münster), Haskell, Deirdre (Hamilton), Hils, Martin (Paris), Hrushovski, Ehud (Jerusalem), Jaligot, Eric (Villeurbanne), Kaplan, Itay (Jerusalem), Kim, Byunghan (Seoul), Kowalski, Piotr (Wrocław), Krupinski, Krzysztof (Wrocław), Kuhlmann, Salma (Konstanz), Loeser, François (Paris), Maalouf, Fares (Berlin), MacPherson, H. Dugald (Leeds), Martin-Pizarro, Amador (Villeurbanne), Moosa, Rahim (Waterloo), Newelski, Ludomir (Wrocław), Onay, Gönenc (Paris), Onshuus, Alf (Bogota), Peterzil, Kobi (Haifa), Pillay, Anand (Leeds), Point, Françoise (Paris), Prestel, Alexander (Konstanz), Remy, Bertrand (Villeurbanne), Rothmaler, Philipp (Bronx), Scanlon, Thomas W. (Berkeley), Simon, Pierre (Orsay), Starchenko, Sergei S. (Notre Dame), Steinhorn, Charles (Poughkeepsie), Tent, Katrin (Münster), Thuillier, Amaury (Villeurbanne), Usvyatsov, Alex (Lisboa), Wagner, Frank Olaf (Villeurbanne), Wencel, Roman (Wrocław), Wilkie, Alex (Manchester), Ziegler, Martin (Freiburg), Zilber, Boris I. (Oxford)



10.01. – 16.01.2010

Organisers:

Moduli Spaces in Algebraic Geometry

Dan Abramovich, Providence

Gavril Farkas, Berlin

Stefan Kebekus, Freiburg

ABSTRACT

The workshop on Moduli Spaces in Algebraic Geometry aimed to bring together researchers from all branches of moduli theory, in order to discuss moduli spaces from different points of view, and to give an overview of methods used in their respective fields. Highlights included a complete proof of Göttsche's conjecture, a proof of rationality of a moduli space constructed via GIT quotient using reduction modulo p , and a proof of a conjecture of Looijenga using the ideas of mirror symmetry.

PARTICIPANTS

Abramovich, Dan (Providence), Bauer-Catanese, Ingrid (Bayreuth), Bayer, Arend (Storrs), Behrend, Kai A. (Vancouver), Bergstrom, Jonas (Amsterdam), Böhm, Janko (Saarbrücken), Böhning, Christian (Göttingen), Bridgeland, Tom (Oxford), Catanese, Fabrizio (Bayreuth), Chiodo, Alessandro (Grenoble), Ciocan-Fontanine, Ionut (Minneapolis), Faber, Carel (Stockholm), Fantechi, Barbara (Trieste), Farkas, Gavril (Berlin), van der Geer, Gerard (Amsterdam), Gibney, Angela (Athens), Gillam, William Danny (New York), Göttsche, Lothar (Trieste), Graf, Patrick (Freiburg), Greb, Daniel (Freiburg), Grushevsky, Samuel (Stony Brook), Hacking, Paul (Amherst), Hulek, Klaus (Hannover), Huybrechts, Daniel (Bonn), Kebekus, Stefan (Freiburg), Kovacs, Sandor (Seattle), Kresch, Andrew (Zürich), Lee, Yuan-Pin (Salt Lake City), Lehn, Manfred (Mainz), Lelli-Chiesa, Margherita (Berlin), Lieblich, Max (Seattle), Li, Jun (Stanford), Lohmann, Daniel (Freiburg), Looijenga, Eduard J.N. (Utrecht), Manolache, Cristina (Berlin), Melo, Margarida (Coimbra), Möller, Martin (Frankfurt), Morrison, Ian (Bronx), Müller-Stach, Stefan (Mainz), Mukai, Shigeru (Kyoto), Ortega, Angela (Berlin), Pagani, Nicola (Stockholm), Polishchuk, Alexander (Eugene), Rollenske, Sönke (Mainz), Schreyer, Frank-Olaf (Saarbrücken), Schumacher, Georg (Marburg), Sernesi, Edoardo (Roma), Tarasca, Nicola (Berlin), Tommasi, Orsola (Hannover), Vakil, Ravi (Stanford), Verra, Alessandro (Roma), Viviani, Filippo (Roma)



24.01. – 30.01.2010

Statistical Issues in Prediction: What can be learned for individualized predictive medicine?

Organisers:

Leonhard Held, Zürich
Robin Henderson, Newcastle upon Tyne
Ulrich Mansmann, München

ABSTRACT

Error is unavoidable in prediction. And it is quite common, often sizable, and usually consequential. In a clinical context, especially when dealing with a terminal illness, error in prediction of residual life means that patients and families are misinformed about their illness, that they may take foolish actions as a result, and that they may be given inappropriate or needlessly painful treatments or denied appropriate ones. In meteorology, error in prediction of storm paths or extreme events can have devastating consequences. In finance and economics, major policy decisions are taken on the basis of predictions and forecasts. Rational approaches to reduce and assess error in prediction are presented. Ideas are introduced how to relate these statistical strategies with clinical and medical concepts in particular and how to integrate ideas from apparently different areas.

PARTICIPANTS

Andersen, Per Kragh (Kobenhavn), Beerenwinkel, Niko (Basel), Benner, Axel (Heidelberg), Borgan, Ornulf (Oslo), Bossuyt, Patrick M. (Amsterdam), Braun, Julia (Zürich), Cai, Tianxi (Boston), le Cessie, Saskia (Leiden), Commenges, Daniel (Bordeaux), Copas, John (Coventry), Fahrmeir, Ludwig (München), Gagneur, Julien (Heidelberg), Gail, Mitchell H. (Bethesda), George, Edward I. (Philadelphia), Gerds, Thomas A. (Kobenhavn), Gneiting, Tilmann (Heidelberg), Goeman, Jelle (Leiden), Graf, Erika (Freiburg), Held, Leonhard (Zürich), Henderson, Robin (Newcastle upon Tyne), Hielscher, Thomas (Heidelberg), van Houwelingen, Hans (Bilthoven), Huber, Wolfgang (Cambridge), Kleiber, Will (Seattle), Laubender, Rüdiger (München), Lin, Haiqun (New Haven), Mansmann, Ulrich (München), Pfeiffer, Ruth (Bethesda), Proust-Lima, Cecile (Bordeaux), Rahnenführer, Jörg (Dortmund), Royston, Patrick (London), Rufibach, Kaspar (Zürich), Sabanes Bove, Daniel (Zürich), Sauerbrei, Wilhelm (Freiburg), Schemper, Michael (Wien), Schumacher, Martin (Freiburg), Skovgaard, Lene Theil (Kobenhavn), Spang, Rainer (Regensburg), Stare, Janez (Ljubljana), Steyerberg, Ewout (Rotterdam), Taylor, Jeremy M.G. (Ann Arbor), Thorarinsdottir, Thordis Linda (Heidelberg), van de Wiel, Mark A. (Amsterdam), Zucknick, Manuela (Heidelberg)



31.01. – 06.02.2010

New Directions in Simulation, Control and Analysis for Interfaces and Free Boundaries

Organisers:

Charles M. Elliott, Coventry
Yoshikazu Giga, Tokyo
Michael Hinze, Hamburg
Vanessa Styles, Brighton

ABSTRACT

The field of mathematical and numerical analysis of systems of nonlinear partial differential equations involving interfaces and free boundaries is a flourishing area of research. Many such systems arise from mathematical models in material science, fluid dynamics and biology, for example phase separation in alloys, epitaxial growth, dynamics of multiphase fluids, evolution of cell membranes and in industrial processes such as crystal growth. The governing equations for the dynamics of the interfaces in many of these applications involve surface tension expressed in terms of the mean curvature and a driving force. Here the forcing terms depend on variables that are solutions of additional partial differential equations which hold either on the interface itself or in the surrounding bulk regions. Often in applications of these mathematical models, suitable performance indices and appropriate control actions have to be specified. Mathematically this leads to optimization problems with partial differential equation constraints including free boundaries.

PARTICIPANTS

Abbeloos, Dirk (Heverlee), Abels, Helmut (Regensburg), Alt, Hans Wilhelm (Bonn), Asai, Tomoro (Tokyo), Barrett, John (London), Bellettini, Giovanni (Roma), Bernauer, Martin (Chemnitz), Blank, Luise (Regensburg), Bothe, Dieter (Darmstadt), Casas, Eduardo (Santander), Deckelnick, Klaus (Magdeburg), Dziuk, Gerhard (Freiburg), Elliott, Charles M. (Coventry), Feng, Xiaobing (Knoxville), Fritz, Hans (Freiburg), Garcke, Harald (Regensburg), Giga, Yoshikazu (Tokyo), Günther, Andreas (Berlin), Herzog, Roland (Chemnitz), Hintermüller, Michael (Berlin), Hinze, Michael (Hamburg), Kohsaka, Yoshihito (Muroran), Kornhuber, Ralf (Berlin), Kunisch, Karl (Graz), Niethammer, Barbara (Oxford), Nürnberg, Robert (London), Ohtsuka, Takeshi (Kawasaki), Pinnau, Rene (Kaiserslautern), Pozzi, Paola (Freiburg), Raymond, Jean-Pierre (Toulouse), Reiter, Philipp (Freiburg), Reusken, Arnold (Aachen), Rodrigues, Jose-Francisco (Lisboa), Röger, Matthias (Dortmund), Rybka, Piotr (Warsaw), Sachs, Ekkehard (Trier), Santosa, Fadi (Minneapolis), Sarbu, Lavinia (Brighton), Schmidt, Alfred (Bremen), Schmidt, Stephan (Trier), Siebert, Kunibert G. (Duisburg), Sprekels, Jürgen (Berlin), Stinner, Björn (Coventry), Stoll, Martin (Oxford), Styles, Vanessa (Brighton), Süli, Endre (Oxford), Tobiska, Lutz (Magdeburg), Tröltzsch, Fredi (Berlin), Vexler, Boris (Garching), Vierling, Morten (Hamburg), Voigt, Axel (Dresden), Weiner, Thorben (Hamburg), Yan, Ningning (Beijing)



07.02. – 13.02.2010

Optimal Constants in the Theory of Sobolev Spaces and PDEs

Organisers:

Andrea Cianchi, Firenze
Maria J. Esteban, Paris
Bernd Kawohl, Köln

ABSTRACT

Recent research activities on sharp constants and optimal inequalities have shown their impact on a deeper understanding of geometric, analytical and other phenomena in the context of partial differential equations and mathematical physics. These intrinsic questions have applications not only to a-priori estimates or spectral theory but also to numerics, economics, optimization, etc.

PARTICIPANTS

Adimurthi, Adi (Bangalore), Ashbaugh, Mark S. (Columbia), Burchard, Almut (Toronto), Cianchi, Andrea (Firenze), Dolbeault, Jean (Paris), Esteban, Maria J. (Paris), Ferone, Vincenzo (Napoli), Frank, Rupert L. (Princeton), Fusco, Nicola (Napoli), Gangbo, Wilfrid (Atlanta), Gazzola, Filippo (Milano), Hajlasz, Piotr (Pittsburgh), Kawohl, Bernd (Köln), Koskela, Pekka (Jyväskylä), Loss, Michael (Atlanta), Madani, Farid (Paris), Milbers, Zoja (Dresden), Parini, Enea (Köln), del Pino, Manuel (Santiago), Shafrir, Itai (Haifa), Talenti, Giorgio (Firenze), Tarantello, Gabriella (Roma), Tertikas, Achilles (Heraklion), Weth, Tobias (Frankfurt)



07.02. – 13.02.2010

**Noncommutative Geometry and Loop Quantum Gravity:
Loops, Algebras and Spectral Triples**

Organisers:

Christian Fleischhack, Hamburg
Matilde Marcolli, Bonn
Ryszard Nest, Copenhagen

ABSTRACT

Spectral triples have recently turned out to be relevant for different approaches that aim at quantizing gravity and the other fundamental forces of nature in a mathematically rigorous way. The purpose of this workshop was to bring together researchers mainly from noncommutative geometry and loop quantum gravity –two major fields that have used spectral triples independently so far– in order to share their results and open issues.

PARTICIPANTS

Aastrup, Johannes (Göttingen), Bahns, Dorothea (Göttingen), Bahr, Benjamin (Golm), Carey, Alan (Canberra), Denicola, Domenic (Pasadena), Fleischhack, Christian (Paderborn), Fredenhagen, Klaus (Hamburg), Gayral, Victor (Reims), Grimstrup, Jesper M. (Kobenhavn), Kaminski, Diana (Hamburg), Kaminski, Wojciech (Warszawa), Krajewski, Thomas (Marseille), Landi, Giovanni (Trieste), Lewandowski, Jerzy (Warszawa), Lizzi, Fedele (Napoli), Marcolli, Matilde (Pasadena), Nest, Ryszard (Kobenhavn), Sahlmann, Hanno (Karlsruhe), van Suijlekom, Walter D. (Nijmegen), Thiemann, Thomas (Erlangen), Varghese, Mathai (Adelaide), Verch, Rainer (Leipzig), Wulkenhaar, Raimar (Münster)



14.02. – 20.02.2010
Organisers:

Computational Electromagnetism and Acoustics
Ralf Hiptmair, Zürich
Ronald H. W. Hoppe, Augsburg
Patrick Joly, Le Chesnay
Ulrich Langer, Linz

ABSTRACT

The challenge inherent in the accurate and efficient numerical modeling of wave propagation phenomena is the common grand theme in both computational electromagnetics and acoustics. Many excellent contributions at this Oberwolfach workshop were devoted to this theme and a wide range of numerical techniques and algorithms were mustered to tackle this challenge. Among these methods boundary integral equation methods received particular attention, both in frequency and time domain. Combined with phase modulation techniques they pave the way for the construction of frequency robust schemes for wave scattering. This is an exciting recent development, which is complemented by the invention of high-order spectral integral equation methods. In parallel, we also witnessed soaring interest in time-domain integral equation methods.

PARTICIPANTS

Antoine, Xavier L. (Vandoeuvre les Nancy), Banjai, Lehel (Leipzig), Bebendorf, Mario (Bonn), Bendali, Abderrahmane (Toulouse), Biro, Oszkar (Graz), Boffi, Daniele (Pavia), Bonnet-Ben Dhia, Anne-Sophie (Paris), Bruno, Oscar P. (Pasadena), Chandler-Wilde, Simon N. (Reading), Claeys, Xavier (Zürich), Costabel, Martin (Rennes), Dauge, Monique (Rennes), Demkowicz, Leszek F. (Austin), Durufle, Marc (Talence), Ecevit, Fatih (Bebek, Istanbul), Ganesh, Mahadevan (Golden), Grote, Marcus (Basel), Hagstrom, Thomas (Dallas), Heumann, Holger (Zürich), Hiptmair, Ralf (Zürich), Hohage, Thorsten (Göttingen), Hoppe, Ronald H.W. (Augsburg), Jerez-Hanckes, Carlos (Zürich), Joly, Patrick (Le Chesnay), Klöckner, Andreas (Providence), Kreiss, Gunilla (Uppsala), Kurz, Stefan (Tampere), Langdon, Steve (Berkshire), Langer, Ulrich (Linz), Lee, Jin-Fa (Columbus), Li, Jingzhi (Zürich), Michielssen, Eric (Ann Arbor), Moiola, Andrea (Zürich), Monk, Peter (Newark), Nedelec, Jean-Claude (Palaiseau), Pasciak, Joseph E. (College Station), Pechstein, Clemens (Linz), Perugia, Iliaria (Pavia), Rodriguez, Jeronimo (Santiago de Compostela), Runborg, Olof (Stockholm), Sayas, Francisco J. (Minneapolis), Semin, Adrien (Le Chesnay), Sharma, Natascha (Houston), Sonnendrücker, Eric (Strasbourg), Spence, Euan (Bath), Steinbach, Olaf (Graz), Stephan, Ernst Peter (Hannover), Vazquez, Rafael (Pavia), Warburton, Tim C. (Houston), Windisch, Markus (Graz), Zaglmayr, Sabine (Graz), Zou, Jun (Hong Kong)

WORKSHOP 1008



21.02. – 27.02.2010

Organisers:

Graph Theory

Reinhard Diestel, Hamburg

Lex Schrijver, Amsterdam

Paul Seymour, Princeton

ABSTRACT

The aim of this workshop was to offer an exchange forum for the leading researchers from the various fields of structural graph theory. Highlights of the workshop included new developments on graph and matroid minors, continuous structures arising as limits of finite graphs, and new approaches to higher graph connectivity via tree structures. In addition to some excellent main talks the workshop owed most of its spirit to numerous informal workshop organised spontaneously by the participants.

PARTICIPANTS

Aharoni, Ron (Haifa), Berger, Eli (Haifa), Bruhn, Henning (Hamburg), Chudnovsky, Maria (New York), Demaine, Erik D. (Cambridge), DeVos, Matthew J. (Burnaby), Diestel, Reinhard (Hamburg), Dvorak, Zdenek (Prague), Ellis, David C. (Cambridge), Fox, Jacob (Cambridge), Fradkin, Alexandra (Princeton), Frank, Andras (Budapest), Geelen, James F. (Waterloo), Georgakopoulos, Agelos (Graz), Goddyn, Luis (Burnaby), Grohe, Martin (Berlin), Guenin, Bertrand (Waterloo), Haxell, Penny E. (Waterloo), van der Holst, Hein (Eindhoven), Jordan, Tibor (Budapest), Kaiser, Tomas (Pilsen), Kawarabayashi, Ken-ichi (Miyagi), Kral, Daniel (Praha), Kriesell, Matthias (Odense), Krön, Bernhard (Wien), Linial, Nathan (Jerusalem), Loebl, Martin (Praha), Lovasz, Laszlo (Budapest), Mader, Wolfgang (Hannover), Maffray, Frederic (Grenoble), Marx, Daniel (Budapest), Mazoit, Frederic (Talence), Mohar, Bojan (Burnaby), Norin, Sergey (Princeton), Pap, Gyula (Budapest), Pendavingh, Rudi (Eindhoven), Pfender, Florian (Rostock), Postle, Luke (Atlanta), Reed, Bruce (Montreal), Samal, Robert (Praha), Schrijver, Alexander (Amsterdam), Scott, Alex (Oxford), Sebö, Andras (Grenoble), Seymour, Paul (Princeton), Sprüssel, Philipp (Hamburg), Tardos, Gabor (Budapest), Thomas, Robin (Atlanta), Thomason, Andrew (Cambridge), Thomasse, Stephan (Montpellier), Timar, Adam (Bonn), Vuskovic, Kristina (Leeds), Whittle, Geoff (Wellington), Woess, Wolfgang (Graz), Wollan, Paul (Hamburg)



28.02. – 06.03.2010

Organisers:

Disciplines and Styles in Pure Mathematics, 1800-2000

David Rowe, Mainz

Klaus Volkert, Köln

Philippe Nabonnand, Nancy

Volker Remmert, Mainz

ABSTRACT

This workshop addressed issues of discipline and style in number theory, algebra, geometry, topology, analysis, and mathematical physics. Most speakers presented case studies, but some offered global surveys of how stylistic shifts informed the transition and transformation of special research fields. Older traditions in established research communities were considered alongside newer trends, including changing views regarding the role of proof.

PARTICIPANTS

Albrecht, Andrea (Freiburg), Archibald, Thomas (Burnaby), Audin, Michele (Strasbourg), Barrow-Green, June Elizabeth (Milton Keynes), Bottazzini, Umberto (Milano), Brechenmacher, Frederic (Paris), Chang, Fu-Kai (Mainz), Chorlay, Renaud (Vincennes), Cogliati, Alberto (Milano), Corry, Leo (Tel Aviv), Edwards, Harold M. (New York), Ehrhardt, Caroline (Paris), Epple, Moritz (Frankfurt am Main), Ferreiros, Jose (Madrid), Gauthier, Sebastien (Villeurbanne), Gispert, Helene (Orsay), Gray, Jeremy John (Milton Keynes), Guicciardini, Niccolo (Bergamo), Hartshorne, Robin (Berkeley), Hoff Kjeldsen, Tinne (Roskilde), Hoffmann, Hannah (Wuppertal), Kaufholz, Eva (Mainz), Konrad, Thomas (Wuppertal), Lehn, Manfred (Mainz), Lützen, Jesper (Kobenhavn), Mawhin, Jean (Louvain-la-Neuve), McCleary, John (Poughkeepsie), Müller-Stach, Stefan (Mainz), Müllner, Daniel (Stanford), Nabonnand, Philippe (Nancy), Neumann, Peter M. (Oxford), Nossum, Rolf T. (Kristiansand), Peckhaus, Volker (Paderborn), Peiffer, Jeanne (Paris), Ramirez Ogando, G. Alfredo (Wuppertal), Remmert, Volker (Aarhus), Rowe, David E. (Mainz), Sauer, Tilman (Pasadena), Schappacher, Norbert (Strasbourg), Schneider, Martina (Mainz), Scholz, Erhard (Wuppertal), Senechal, Marjorie (Northampton), Siegmund-Schultze, Reinhard (Kristiansand), Sorensen, Henrik Kragh (Aarhus), van Straten, Duco (Mainz), Suarez Aleman, Carlos (Jerez de la Frontera), Tazzioli, Rossana (Villeneuve d'Ascq.), Turner, Laura (Aarhus), Ullrich, Peter (Koblenz), Voelke, Jean-Daniel (Lausanne), Volkert, Klaus (Wuppertal), Wahl, Charlotte (Hannover), Walter, Scott (Nancy)

WORKSHOP 1010



07.03. – 13.03.2010

Organisers:

C*-Algebren

Claire Anantharaman-Delaroche, Orleans

Siegfried Echterhoff, Münster

Mikael Rordam, Copenhagen

Dan-Virgil Voiculescu, Berkeley

ABSTRACT

The theory of C^* -algebras plays a major rôle in many areas of modern mathematics, like Non-commutative Geometry, Dynamical Systems, Harmonic Analysis, and Topology, to name a few. The aim of the conference “ C^* -algebras” is to bring together experts from all those areas to provide a present day picture and to initiate new cooperations in this fast growing mathematical field.

PARTICIPANTS

Anantharaman-Delaroche, Claire (Orleans), Asaeda, Marta (Riverside), Bekka, Bachir (Rennes), Bisch, Dietmar (Nashville), Blackadar, Bruce (Reno), Blanchard, Etienne (Paris), Brown, Nathaniel (University Park), Christensen, Erik (Kobenhavn), Collins, Benoît (Ottawa), Cuntz, Joachim (Münster), Curran, Stephen (Berkeley), Dadarlat, Marius (West Lafayette), Doplicher, Sergio (Roma), Dykema, Ken I. (College Station), Echterhoff, Siegfried (Münster), Eilers, Soren (Copenhagen), Elliott, George A. (Toronto), Falguières, Sebastien (Leuven), Farah, Ilijas (Toronto), Haagerup, Uffe (Copenhagen), Houdayer, Cyril (Lyon), Ioana, Adrian (Pasadena), Kaad, Jens (Copenhagen), Kawahigashi, Yasuyuki (Tokyo), Kerr, David (College Station), Kirchberg, Eberhard (Berlin), Li, Xin (Münster), Longo, Roberto (Roma), Meyer, Ralf (Göttingen), Musat, Magdalena (Copenhagen), Nest, Ryszard (Kobenhavn), Oyono-Oyono, Herve (Metz), Paravicini, Walther (Münster), Peterson, Jesse D. (Nashville), Phillips, N. Christopher (Eugene), Pimsner, Mihai (Philadelphia), Putnam, Ian F. (Victoria), Renault, Jean N. (Orleans), Rordam, Mikael (Kobenhavn), Schick, Thomas (Göttingen), Skandalis, Georges (Paris), Thom, Andreas B. (Leipzig), Timmermann, Thomas (Münster), Toms, Andrew (West Lafayette), Vaes, Stefaan (Leuven), Voiculescu, Dan (Berkeley), Voigt, Christian (Münster), Wassermann, Antony (Marseille), Wassermann, Simon (Glasgow), Weaver, Nik (St. Louis), Weber, Moritz (Münster), Yalkinoglu, Bora (Paris)

WORKSHOP 1011



14.03. – 20.03.2010

Microstructures in Solids: From Quantum Models to Continua

Organisers:

Alexander Mielke, Berlin
Michael Ortiz, Pasadena

ABSTRACT

The mathematical theory of solids was studied from the modern perspective of materials with microstructures. The discussed topics ranged from experimental findings, via numerical simulations and mathematical modeling to the analysis of models with microstructures. A special emphasis was given to theories providing rigorous insight into and justification of the limit passage between different scales.

PARTICIPANTS

Alber, Hans-Dieter (Darmstadt), Balzani, Daniel (Hannover), Bartels, Sören (Bonn), Bhattacharya, Kaushik (Pasadena), Blesgen, Thomas (Leipzig), Conti, Sergio (Bonn), Dal Maso, Gianni (Trieste), DeSimone, Antonio (Trieste), Dolzmann, Georg (Regensburg), Dondl, Patrick W. (Bonn), Francfort, Gilles (Villetaneuse), Garroni, Adriana (Roma), Geers, Marc (Eindhoven), Giacomini, Alessandro (Brescia), Hackl, Klaus (Bochum), Heinz, Sebastian (Berlin), Knees, Dorothee (Berlin), Kochmann, Dennis M. (Madison), Kreisbeck, Carolin (Regensburg), Kruzik, Martin (Prague), Langwallner, Bernhard (Oxford), Larsen, Christopher J. (Worcester), Liero, Matthias (Berlin), Miehe, Christian (Stuttgart), Mielke, Alexander (Berlin), Mora, Maria Giovanna (Trieste), Ortiz, Michael (Pasadena), Ortner, Christoph (Oxford), Petrov, Adrien (Berlin), Ponsiglione, Marcello (Roma), Raabe, Dierk (Düsseldorf), Reddy, B. Daya (Rondebosch), Reina Romo, Celia (Pasadena), Roubicek, Tomas (Praha), Schlömerkemper, Anja (Erlangen), Schmauder, Siegfried (Stuttgart), Sittner, Petr (Praha), Smyshlyaev, Valery P. (Bath), Stefanelli, Ulisse (Pavia), Stelzig, Philipp Emanuel (Garching), Stupkiewicz, Stanislaw (Warsaw), Sullivan, Tim J. (Pasadena), Theil, Florian (Coventry), Thomas, Marita (Berlin), Truskinovsky, Lev (Palaiseau), Zimmer, Johannes (Bath)



21.03. – 27.03.2010

Organisers:

Combinatorial Representation Theory

Christine Bessenrodt, Hannover
Francesco Brenti, Roma
Alexander Kleshchev, Eugene
Arun Ram, Parkville

ABSTRACT

The workshop brought together researchers from different fields in representation theory and algebraic combinatorics for a fruitful interaction. New results, methods and developments ranging from classical and modular representation theory, the theory of symmetric functions and Lie theory to cluster algebras and connections to physics and geometry were discussed.

PARTICIPANTS

Ariki, Susumu (Osaka), Assaf, Sami H. (Cambridge), Bessenrodt, Christine (Hannover), Brenti, Francesco (Roma), Caselli, Fabrizio (Bologna), Chuang, Joseph (London), Comes, Jonny (Eugene), Ehrig, Michael (Bonn), Erdmann, Karin (Oxford), Fayers, Matt (London), Fiebig, Peter (Erlangen), Gaussent, Stephane (Vandoeuvre les Nancy), de Gier, Jan (Parkville, Victoria), Goodwin, Simon (Birmingham), Gordon, Iain (Edinburgh), Haglund, James (Philadelphia), Han, Guoniu (Strasbourg), Henderson, Anthony (Sydney), Hernandez, David (Palaiseau), Hill, David (Berkeley), Jacon, Nicolas (Besancon), Juteau, Daniel (Caen), Kessar, Radha (Aberdeen), Kleshchev, Alexander S. (Eugene), Klostermann, Inka (Köln), Kujawa, Jonathan (Norman), Lam, Thomas (Ann Arbor), Lascoux, Alain (Marne-la-Vallee), Leclerc, Bernard (Caen), Leidwanger, Severine (Paris), Lenart, Cristian (Albany), Malle, Gunter (Kaiserslautern), Marietti, Mario (Roma), Mathas, Andrew (Sydney), Meng, Matthias (Köln), Miemietz, Vanessa (Norwich), Nash, David (Eugene), Nazarov, Maxim L. (York), Olsson, Jörn Börling (Kobenhavn), Papi, Paolo (Roma), Ram, Arun (Parkville), Sagaki, Daisuke (Ibaraki), Schilling, Anne (Davis), Schröer, Jan (Bonn), Stembridge, John (Ann Arbor), Stroppel, Catharina (Bonn), Stump, Christian (Montreal), Thibon, Jean-Yves (Marne-la-Vallee), Vazirani, Monica (Davis), Williams, Lauren K. (Berkeley), van Willigenburg, Stephanie (Vancouver), Yacobi, Oded (Tel Aviv), Yamada, Hiro-Fumi (Okayama), Yip, Martha (Madison)



28.03. – 03.04.2010

**Modern Nonparametric Statistics:
Going Beyond Asymptotic Minimax**

Organisers:

Lucien Birge, Paris
Iain M. Johnstone, Stanford
Vladimir Spokoiny, Berlin

ABSTRACT

During the years 1975 - 1990 a major emphasis in nonparametric estimation was put on computing the asymptotic minimax risk for many classes of functions. Modern statistical practice indicates some serious limitations of the asymptotic minimax approach and calls for some new ideas and methods which can cope with the numerous challenges brought to statisticians by modern sets of data.

PARTICIPANTS

Akakpo, Nathalie (Orsay), Arlot, Sylvain (Paris), Baraud, Yannick (Nice), Belomestny, Denis (Berlin), Beran, Rudolf (Davis), Bibinger, Markus (Berlin), Birge, Lucien (Paris), Blanchard, Gilles (Potsdam), Bochkina, Natalia (Edinburgh), Bontemps, Dominique (Orsay), Bühlmann, Peter (Zürich), Comte, Fabienne (Paris), Dahlhaus, Rainer (Heidelberg), Dalalyan, Arnak (Marne-la-Vallee), Dickhaus, Thorsten (Berlin), Diederichs, Elmar (Berlin), El Karoui, Noureddine (Berkeley), van de Geer, Sara (Zürich), Giraud, Christophe (Palaiseau), Goldenshluger, Alexander (Haifa), Golubev, Yuri (Marseille), Ho, Le-Minh (Berlin), Jin, Jiashun (Pittsburgh), Koltchinskii, Vladimir (Atlanta), Le Pennec, Erwan (Paris), Lepski, Oleg (Marseille), Lounici, Karim (Cambridge), Ma, Zongming (Stanford), Mai, Hilmar (Berlin), Mammen, Enno (Mannheim), Massart, Pascal (Orsay), Neumann, Michael H. (Jena), Nickl, Richard (Cambridge), Panov, Vladimir (Berlin), Reiß, Markus (Berlin), Reynaud-Bouret, Patricia (Nice), Rivoirard, Vincent (Orsay), Rohde, Angelika (Hamburg), Samworth, Richard (Cambridge), Schmidt-Hieber, Johannes (Göttingen), Serdyukova, Nora (Berlin), Söhl, Jakob (Berlin), Spokoiny, Vladimir G. (Berlin), Strauch, Claudia (Hamburg), Tsybakov, Alexandre B. (Malakoff), van der Vaart, Aad W. (Amsterdam), Wainwright, Martin (Berkeley), Zhang, Cun-Hui (Piscataway), Zhou, Huibin (New Haven)

WORKSHOP 1015



11.04. – 17.04.2010

Organisers:

Mathematics and Algorithms in Tomography

Martin Burger, Münster

Alfred Louis, Saarbrücken

Todd Quinto, Medford

ABSTRACT

This is the eighth Oberwolfach conference on the mathematics of tomography. Modalities represented at the workshop included X-ray tomography, sonar, radar, seismic imaging, ultrasound, electron microscopy, impedance imaging, photoacoustic tomography, elastography, vector tomography, and texture analysis.

PARTICIPANTS

Ambartsoumian, Gaik (Arlington), Bal, Guillaume (New York), Boman, Jan (Stockholm), Burger, Martin (Münster), Clackdoyle, Rolf (St. Etienne), Dawood, Mohammad (Münster), Desbat, Laurent (La Tronche), Dorn, Oliver (Manchester), Fischer, Bernd (Lübeck), Hahn, Bernadette (Saarbrücken), Hanke-Bourgeois, Martin (Mainz), von Harrach, Bastian (Garching bei München), de Hoop, Maarten (West Lafayette), Jiang, Ming (Beijing), Jovanovic, Ivana (Lausanne), Kaltenbacher, Barbara (Graz), Katsevich, Alexander (Orlando), Klann, Esther (Linz), Kohr, Holger (Saarbrücken), Kunyansky, Leonid (Tucson), Lakhai, Aref (Saarbrücken), Lorenz, Dirk (Braunschweig), Louis, Alfred K. (Saarbrücken), Maaß, Peter (Bremen), Mair, Bernard A. (Gainesville), McLaughlin, Joyce R. (Troy), Müller, Jahn (Münster), Natterer, Frank (Münster), Nguyen, Linh (College Station), Noo, Frederic (Salt Lake City), Oeckl, Steven (Fürth), Palamodov, Victor P. (Tel Aviv), Quinto, Eric Todd (Medford), Ramlau, Ronny (Linz), Rieder, Andreas (Karlsruhe), Ring, Wolfgang (Graz), Riplinger, Martin (Saarbrücken), Sabatier, Pierre C. (Montpellier), Scherzer, Otmar (Wien), Schotland, John C. (Philadelphia), Schuster, Thomas (Hamburg), Siltanen, Samuli (University of Helsinki), Spiess, Malte (Ulm), Spodarev, Evgeny (Ulm), Trede, Dennis (Bremen), Wübbeling, Frank (Münster)



18.04. – 24.04.2010

Organisers:

Algebraic Groups

Michel Brion, Grenoble

Jens Carsten Jantzen, Aarhus

ABSTRACT

The workshop dealt with a broad range of topics from the structure theory and the representation theory of algebraic groups (in the widest sense). There was emphasis on the following two areas:

- 1) classical and quantum cohomology of homogeneous varieties,
- 2) representation theory and its connections to orbits and flag varieties.

PARTICIPANTS

Avdeev, Roman (Moscow), Baumann, Pierre (Strasbourg), Bravi, Paolo (Roma), Brion, Michel (Saint-Martin-d'Herès), Bulois, Michael (Brest), Chaput, Pierre-Emmanuel (Nantes), Cupit-Foutou, Stephanie (Köln), Ehrig, Michael (Bonn), Fiebig, Peter (Erlangen), Gandini, Jacopo (Roma), Görtz, Ulrich (Essen), Goodwin, Simon (Birmingham), Greb, Daniel (Freiburg), Hille, Lutz (Münster), Jantzen, Jens Carsten (Aarhus), Juteau, Daniel (Caen), Kiritchenko, Valentina (Moscow), Knop, Friedrich (Erlangen), Kraft, Hanspeter (Basel), Kresch, Andrew (Zürich), Kübel, Johannes (Freiburg), Kuttler, Jochen (Edmonton), Lehrer, Gustav I. (Sydney), Littelmann, Peter (Köln), Luna, Dominique (Saint-Martin-d'Herès), Pecher, Tobias (Erlangen), Perling, Markus (Bochum), Perrin, Nicolas (Bonn), Pezzini, Guido (Erlangen), Reichstein, Zinovy (Vancouver), Ressayre, Nicolas (Montpellier), Riche, Simon (Clermont-Ferrand), Röhrle, Gerhard (Bochum), Rumynin, Dmitriy (Coventry), Shan, Peng (Paris), Sivanesan, Narendiran (Freiburg), Soergel, Wolfgang (Freiburg), Tamvakis, Harry (College Park), Varagnolo, Michela (Cergy-Pontoise), Vasserot, Eric (Paris)

WORKSHOP 1017



25.04. – 01.05.2010

Non-positive Curvature and Geometric Structures in Group Theory

Organisers:

Martin Bridson, Oxford
Linus Kramer, Münster
Bertrand Remy, Lyon
Karen Vogtmann, Ithaca

ABSTRACT

The focus of this meeting was the use of geometric methods to study infinite discrete groups. Key topics included isometric actions of such groups on spaces of nonpositive curvature, such as CAT(0) cube complexes, buildings, and hyperbolic or symmetric spaces. These actions lead to a rich and fruitful interplay between geometry and group theoretic questions.

PARTICIPANTS

Alvarez, Aurelien (Orleans), Arzhantseva, Goulmara N. (Wien), Bartels, Arthur (Münster), Bartholdi, Laurent (Göttingen), Behrstock, Jason (Bronx), Bestvina, Mladen (Salt Lake City), Bourdon, Marc (Villeneuve d'Ascq.), Bridson, Martin R. (Oxford), Bux, Kai-Uwe (Bielefeld), Caprace, Pierre-Emmanuel (Louvain-la-Neuve), Charney, Ruth (Waltham), Cotton-Barratt, Owen (Oxford), Davis, Michael W. (Columbus), Delzant, Thomas C. (Strasbourg), Drutu Badea, Cornelia (Oxford), Dymara, Jan (Wrocław), Essert, Jan (Münster), Feighn, Mark E. (Newark), Finster, Myriam (Karlsruhe), Gaboriau, Damien (Lyon), Gramlich, Ralf (Gießen), Groves, Daniel (Chicago), Guirardel, Vincent (Toulouse), Hainke, Guntram (Münster), Howie, James (Edinburgh), Januszkiewicz, Tadeusz (Columbus), Kassel, Fanny (Chicago), Kramer, Linus (Münster), Kropholler, Peter H. (Glasgow), Kuckuck, Benno (Oxford), Leary, Ian J. (Columbus), Lecureux, Jean (Villeurbanne), Leuzinger, Enrico (Karlsruhe), Levitt, Gilbert (Caen), Lück, Wolfgang (Bonn), Lustig, Martin (Marseille), Mozes, Shahar (Jerusalem), Mühlherr, Bernhard M. (Gießen), Niblo, Graham (Southampton), Papazoglu, Panos (Athens), Przytycki, Piotr (Warszawa), Remy, Bertrand (Villeurbanne), Sapir, Mark V. (Nashville), Sauer, Roman (Regensburg), Scheele, Lars (Münster), Schwer, Petra N. (Münster), Swiatkowski, Jacek (Wrocław), Tent, Katrin (Münster), Thomas, Anne (Oxford), Vogtmann, Karen L. (Ithaca), Wade, Richard (Oxford), Weiss, Richard M. (Medford), Weitze-Schmithüsen, Gabriela (Karlsruhe), Witzel, Stefan (Darmstadt), Wortman, Kevin (Salt Lake City)

WORKSHOP 1018



02.05. – 08.05.2010

Organisers:

Progress in Surface Theory

Uwe Abresch, Bochum

Josef Dorfmeister, München

Masaaki Umehara, Osaka

ABSTRACT

The theory of surfaces is interpreted these days as a prototype of submanifold geometry and is characterized by the substantial application of PDE methods and methods from the theory of integrable systems, in addition to the more classical techniques from real and/or complex analysis. In addition, surfaces with singularities are studied intensively. In this workshop we brought together all the main strands of modern surface theory.

PARTICIPANTS

Abresch, Uwe (Bochum), Berdinskiy, Dmitriy A. (Novosibirsk), Bohle, Christoph (Berlin), Breiner, Christine (Cambridge), Burstall, Francis E. (Bath), Carberry, Emma (Sydney), Daniel, Benoit (Creteil), Desideri, Laura (Paris), Dorfmeister, Josef (Garching), Fernandez Delgado, Isabel (Sevilla), Fujimori, Shoichi (Fukuoka), Galvez, Jose (Granada), Grosse-Brauckmann, Karsten (Darmstadt), Guest, Martin A. (Tokyo), Hauswirth, Laurent (Marne-la-Vallee), Heller, Sebastian (Tübingen), Honda, Atsufumi (Tokyo), Inoguchi, Jun-ichi (Yamagata), Karcher, Hermann (Bonn), Kawakami, Yu (Fukuoka), Kenmotsu, Katsuei (Sendai), Khemar, Idrisse (Tübingen), Kilian, Martin (Cork), Knopf, Markus (Mannheim), Kobayashi, Shimpei (Aomori), Koiso, Miyuki (Fukuoka), Koiso, Norihito (Osaka), Kusner, Robert B. (Amherst), Kuwert, Ernst (Freiburg), Leschke, Katrin (Leicester), Ma, Hui (Beijing), Martin, Francisco (Granada), Martinez, Antonio (Granada), Meeks, William H. (Amherst), Mira, Pablo (Cartagena (Murcia)), Miyaoka, Reiko (Sendai), Naokawa, Kosuke (Osaka), Nelli, Barbara (L'Aquila), Nistor, Ana-Irina (Leuven), Ohnita, Yoshihiro (Osaka), Omori, Toshiaki (Sendai), Pacard, Frank (Creteil), Palais, Richard S. (Irvine), Pedit, Franz (Tübingen), Perez, Joaquin (Granada), Pinkall, Ulrich (Berlin), Ritore, Manuel (Granada), Romon, Pascal (Marne-La-Vallee), Ros, Antonio (Granada), Rossman, Wayne (Kobe), Schmidt, Martin Ulrich (Mannheim), Siffert, Anna (Bochum), Taimanov, Iskander A. (Novosibirsk), Terng, Chuu-Lian (Irvine), Umehara, Masaaki (Osaka), Weber, Matthias (Bloomington), Yamada, Kotaro (Tokyo)

WORKSHOP 1019



09.05. – 15.05.2010

Interactions between Algebraic Geometry and Noncommutative Algebra

Organisers:

Dieter Happel, Chemnitz
Lance W. Small, La Jolla
J. Toby Stafford, Manchester
Michel Van den Bergh, Diepenbeek

ABSTRACT

The aim of this workshop was to communicate the most current developments in the field of noncommutative algebra and its interactions with algebraic geometry and representation theory. Areas covered include noncommutative projective algebraic geometry, quantum groups, combinatorial ring theory, representation theory of quivers and preprojective algebras, and applications of categorical techniques in representation theory.

PARTICIPANTS

Alev, Jacques (Reims), Bell, Jason P. (Burnaby), Berest, Yuri (Ithaca), van den Bergh, Michel (Diepenbeek), Bocklandt, Rafael (Antwerpen), Broomhead, Nathan (Hannover), Brown, Ken A. (Glasgow), Calaque, Damien (Villeurbanne), Chan, Daniel (Sydney), Crawley-Boevey, William (Leeds), Dietrich, Karsten (Bielefeld), Gordon, Iain (Edinburgh), Happel, Dieter (Chemnitz), Ingalls, Colin (Fredericton), Iyama, Osamu (Nagoya), Jorgensen, Peter (Newcastle upon Tyne), Keller, Bernhard (Paris), King, Alastair D. (Bath), Krämer, Ulrich (Glasgow), Krause, Henning (Bielefeld), Launois, Stephane (Canterbury), Le Bruyn, Lieven (Antwerpen), Leclerc, Bernard (Caen), Lenagan, Thomas H. (Edinburgh), Lvasseur, Thierry (Brest), Lowen, Wendy Tor (Antwerpen), Martino, Maurizio (Bonn), McGerty, Kevin R. (London), Nevins, Thomas A. (Urbana), van Oystaeyen, Freddy (Antwerpen-Wilrijk), Reineke, Markus (Wuppertal), Reiten, Idun (Trondheim), Ringel, Claus Michael (Bielefeld), Rogalski, Daniel (La Jolla), Schröer, Jan (Bonn), Sierra, Susan J. (Princeton), Small, Lance W. (La Jolla), Stafford, J. Toby (Manchester), Stroppel, Catharina (Bonn), de Thanhoffer de Volcsey, Louis (Diepenbeek), Van Roosmalen, Adam-Christiaan (Bonn), Walton, Chelsea (Ann Arbor), Wemyss, Michael (Edinburgh), Wu, Quan-Shui (Shanghai), Zelevinsky, Andrei V. (Boston), Zelmanov, Efim I. (La Jolla), Zhang, James (Seattle)

WORKSHOP 1020



16.05. – 22.05.2010

Organisers:

Motives and Homotopy Theory of Schemes

Bruno Kahn, Paris

Marc Levine, Boston

Michael Spiess, Bielefeld

ABSTRACT

The 2010 program on Motives and Homotopy Theory of Schemes consisted of a lively and varied series of 19 one-hour lectures on the latest developments in the field, presenting a wide range of aspects of this multifaceted subject. The confluence of algebraic geometry and homological algebra known as the theory of motives has experienced an amazing resurgence of activity in the last twenty years. More recently, the growth of motivic homotopy theory has expanded the area to allow for a systematic treatment of a wide variety of "motivic" phenomena, embedding K-theory, motivic cohomology, quadratic forms into a single larger field. At the same time, the theory allows for the transfer of constructions and techniques from classical homotopy theory to problems in algebraic geometry.

PARTICIPANTS

Asok, Aravind (Los Angeles), Ayoub, Joseph (Zürich), Barbieri Viale, Luca (Milano), Biglari, Shahram (Bielefeld), Calmes, Baptiste (Lens), Cisinski, Denis-Charles (Toulouse), Deglise, Frederic (Villetaneuse), Esnault, Helene (Essen), Flach, Matthias (Pasadena), Furusho, Hidekazu (Nagoya), Geisser, Thomas (Los Angeles), Gille, Stefan (München), Guletskii, Vladimir (Liverpool), Herrmann, Philip (Osnabrück), Holmstrom, Andreas (Cambridge), Hornbostel, Jens (Bonn), Huber-Klawitter, Annette (Freiburg), Ivorra, Florian (Rennes), de Jeu, Rob (Amsterdam), Kahn, Bruno (Paris), Kerz, Moritz (Essen), Kimura, Shun-Ichi (Higashi, Hiroshima), Krashen, Daniel (Athens), Levine, Marc (Boston), Murre, Jacob P. (Leiden), Nguyen, Thi Kim Ngan (Paris), Ostvar, Paul Arne (Oslo), Park, Donghoon (Essen), Park, Jinhyun (Daejeon), Pelaez, Pablo (Essen), Pimenov, Konstantin I. (St. Petersburg), Ramdorai, Sujatha (Mumbai), Riou, Joel (Orsay), Röndigs, Oliver (Osnabrück), Rosenschon, Andreas (München), Ross, Joseph (Essen), Sato, Kanetomo (Nagoya), Schlichting, Marco (Baton Rouge), Schmidt, Alexander (Heidelberg), Semenov, Nikita (Mainz), Spieß, Michael (Bielefeld), Spitzweck, Markus (Oslo), Strunk, Florian (Osnabrück), Sun, Fei (Paris), Szamuely, Tamas (Budapest), Terasoma, Tomohide (Tokyo), Vishik, Alexander (Nottingham), Weibel, Charles A. (New Brunswick), Wendt, Matthias (Freiburg), Wildeshaus, Jörg (Villetaneuse), Yagunov, Serge A. (St. Petersburg), Zainoulline, Kirill (Ottawa), Zibrowius, Marcus (Cambridge)

WORKSHOP 1022



30.05. – 05.06.2010

Organisers:

Phase Transitions

Kaushik Bhattacharya, Pasadena

Dmitri Ioffe, Haifa

Stephan Luckhaus, Leipzig

Felix Otto, Bonn

ABSTRACT

Phase transitions are common phenomena which occur in many fields of material sciences. Models of phase transitions in diverse physical systems often lead to ill-posed mathematical problems whose solutions are characterized by oscillations, bifurcations and singularities. Random fluctuations and stochastic events also play an important role in determining the nature of the solutions.

PARTICIPANTS

Adams, Stefan (Coventry), Alt, Hans Wilhelm (Bonn), Bhattacharya, Kaushik (Pasadena), Biskup, Marek (Los Angeles), Bovier, Anton (Bonn), Crawford, Nicholas J. (Berkeley), De Masi, Anna (L'Aquila), Dirr, Nicolas (Bath), Dondl, Patrick W. (Bonn), Dreyer, Wolfgang (Berlin), Grün, Günther (Erlangen), Ioffe, Dmitri (Haifa), James, Richard D. (Minneapolis), Kastner, Oliver (Bochum), Kitavtsev, Georgy (Leipzig), Kotecky, Roman (Praha), Luckhaus, Stephan (Leipzig), Mattingly, Jonathan C. (Durham), Menon, Govind (Providence), Menz, Georg (Leipzig), Merola, Immacolata (L'Aquila), Mielke, Alexander (Berlin), Müller, Ingo (Berlin), Muratov, Cyrill (Newark), Neukamm, Stefan (Erlangen), Niethammer, Barbara (Oxford), Orlandi, Enza (Roma), Otto, Felix (Leipzig), Pego, Robert (Pittsburgh), Planes, Antoni (Barcelona/Catalonia), Plechac, Petr (Knoxville), Savare, Giuseppe (Pavia), Schlichting, Andre (Leipzig), Schütz, Gunter M. (Jülich), Seis, Christian (Leipzig), Shenoy, Subodh (Hyderabad), Shlosman, Senya B. (Marseille), Slepcev, Dejan (Pittsburgh), Stefanelli, Ulisse (Pavia), Toninelli, Fabio (Lyon), Tsikkou, Charis (Leipzig), Ueltschi, Daniel (Coventry), Velazquez, Juan J. L. (Madrid), Weber, Hendrik (Coventry), Weiss, Georg S. (Tokyo), Westdickenberg, Maria G. (Atlanta), Wohlgemuth, Jens (Leipzig), Wouts, Marc (Villetaneuse), Yip, Aaron Nung Kwan (West Lafayette)



06.06. – 12.06.2010

**Geometry, Quantum Fields, and Strings:
Categorical Aspects**

Organisers:

Peter Bouwknegt, Canberra
Dan Freed, Austin
Christoph Schweigert, Hamburg

ABSTRACT

Currently, in the interaction between string theory, quantum field theory and topology, there is an increased use of category-theoretic methods. Independent developments (e.g. the categorification of knot invariants, bundle gerbes and topological field theories on extended cobordism categories) have put higher categories in the focus. The workshop has brought together researchers working on diverse problems in which categorical ideas play a significant role.

PARTICIPANTS

Ando, Matthew (Urbana), Bakovic, Igor (Zagreb), Bartels, Arthur (Münster), Berwick-Evans, Daniel (Berkeley), Blumberg, Andrew (Austin), Bouwknegt, Peter G. (Canberra), Bunke, Ulrich (Regensburg), Carey, Alan (Canberra), Carqueville, Nils (München), Collier, Braxton (Austin), Costello, Kevin (Evanston), Davidovich, Orit (Austin), Davydov, Alexei (Bonn), Douglas, Michael (Stony Brook), Freed, Daniel S. (Austin), Gaiatsgory, Dennis (Cambridge), Getzler, Ezra (Evanston), Grady, Ryan (Notre Dame), Hannabuss, Keith (Oxford), Hohmann, Manuel (Hamburg), Hori, Kentaro (Tokyo), Huerta, John (Riverside), Jurco, Branislav (Bonn), Kahle, Alexander (Göttingen), Katzarkov, Ludmil (Wien), Kriz, Igor (Ann Arbor), Mickelsson, Jouko (Stockholm), Milburn, Brett (Austin), Moore, Gregory W. (Piscataway), Nikolaus, Thomas (Hamburg), Pantev, Tony (Philadelphia), Pennig, Ulrich (Münster), Ratnam, Rishni (Canberra), Runkel, Ingo (London), Sati, Hisham (College Park), Schick, Thomas (Göttingen), Schreiber, Urs (Hamburg), Schweigert, Christoph (Hamburg), Soibelman, Yan (Manhattan), Teleman, Constantin (Berkeley), Toledano Laredo, Valerio (Boston), Valentino, Alessandro (Göttingen), Varghese, Mathai (Adelaide), Wahl, Nathalie (Copenhagen), Waldorf, Konrad (Berkeley), Walker, Kevin (Santa Barbara), Wendland, Katrin (Augsburg), Westerland, Craig (Parkville), Wockel, Christoph (Hamburg), Woodward, Christopher (Piscataway), Wu, Siye (Hong Kong), Zeinalian, Mahmoud (Brookville)

WORKSHOP 1024



13.06. – 19.06.2010

Organisers:

Geometrie

John Lott, Berkeley

Iskander Taimanov, Novosibirsk

Burkhard Wilking, Münster

ABSTRACT

The program of this meeting covered a wide range of recent developments in geometry such as geometric flows and connections to transport problems, metric and Alexandrov geometry, positively curved manifolds and the positive energy theorem. The official program consisted of 18 lectures and therefore left plenty of space for fruitful informal collaboration of the participants.

PARTICIPANTS

Agricola, Ilka (Marburg), Amann, Manuel (Münster), Bangert, Victor (Freiburg), Bazaikin, Yaroslav V. (Novosibirsk), Bernstein, Jacob (Stanford), Breiner, Christine (Cambridge), Bucher-Karlsson, Michelle (Geneve), Buyalo, Sergei V. (St. Petersburg), Cabezas-Rivas, Esther (Münster), De Lellis, Camillo (Zürich), Ecker, Klaus (Berlin), Fraser, Ailana (Vancouver), Freyn, Walter (Münster), Galaz-Garcia, Fernando (Münster), Goette, Sebastian (Freiburg), Gresing, Sebastian (Karlsruhe), Hauswirth, Laurent (Marne-la-Vallee), Herreros, Pilar (Münster), Herrmann, Martin (Kiel), Hoelzel, Sebastian (Münster), Ilmanen, Tom (Zürich), Isenberg, James (Eugene), Kerin, Martin (Münster), Kleiner, Bruce (New York), Knopf, Dan (Austin), Kramer, Linus (Münster), Lamm, Tobias (Vancouver), Lang, Urs (Zürich), Lauret, Jorge (Cordoba), LeBrun, Claude (Stony Brook), Lohkamp, Joachim (Münster), Lott, John (Berkeley), Maillot, Sylvain (Montpellier), Marques, Fernando Coda (Rio de Janeiro), Naber, Aaron (Cambridge), Petrunin, Anton (Münster), Rademacher, Hans-Bert (Leipzig), Schroeder, Viktor (Zürich), Schulze, Felix (Berlin), Schüth, Dorothee (Berlin), Sebastian, Dennis (Kiel), Sesum, Natasa (New York), Simon, Miles (Freiburg), Sturm, Karl-Theodor (Bonn), Taimanov, Iskander A. (Novosibirsk), Tapie, Samuel (Bonn), Topping, Peter (Coventry), Tosatti, Valentino (New York), Tuschmann, Wilderich (Karlsruhe), Weinkove, Ben (La Jolla), Weiss, Hartmut (München), Wilking, Burkhard (Münster), Witt, Frederik (München), Wörner, Andreas (Münster), Wylie, William (Philadelphia)



20.06. – 26.06.2010

Organisers:

Classical Algebraic Geometry

David Eisenbud, Berkeley
Frank-Olaf Schreyer, Saarbrücken
Ravi Vakil, Stanford
Claire Voisin, Paris

ABSTRACT

Algebraic geometry studies properties of specific algebraic varieties, on the one hand, and moduli spaces of all varieties of fixed topological type on the other hand. Of special importance is the moduli space of curves, whose properties are subject of ongoing research. The rationality versus general type question of these and related spaces is of classical and also very modern interest with recent progress presented in the conference. Certain different birational models of the moduli space of curves and maps have an interpretation as moduli spaces of singular curves and maps. For specific varieties a wide range of questions was addressed, including extrinsic questions (syzygies, the k -secant lemma) and intrinsic ones (generalization of notions of positivity of line bundles, closure operations on ideals and sheaves).

PARTICIPANTS

Alper, Jarod (New York), Barakat, Mohamed (Kaiserslautern), Batyrev, Victor V. (Tübingen), Bayer, Arend (Storrs), Beauville, Arnaud (Nice), Beheshti, Roya (St. Louis), Böhm, Janko (Saarbrücken), Bolognesi, Michele (Roma), von Bothmer, Hans-Christian (Göttingen), Casagrande, Cinzia (Pavia), Catanese, Fabrizio (Bayreuth), Chen, Dawei (Chicago), Christensen, Christian (Tübingen), Coskun, Izzet (Chicago), Debarre, Olivier (Paris), Dedieu, Thomas (Toulouse), Dolgachev, Igor (Ann Arbor), Ein, Lawrence (Chicago), Eisenbud, David (Berkeley), Erman, Daniel (Berkeley), Fantechi, Barbara (Trieste), Farkas, Gavril (Berlin), Geiss, Florian (Saarbrücken), Harris, Joseph (Cambridge), Hassett, Brendan (Houston), Hein, Georg (Essen), Höring, Andreas (Paris), Hulek, Klaus (Hannover), Kapustka, Grzegorz (Krakow), Kebekus, Stefan (Freiburg), Kollar, Janos (Princeton), Kovacs, Sandor (Seattle), Lange, Herbert (Erlangen), Larsen, Paul (Berlin), Lehn, Manfred (Mainz), Lelli-Chiesa, Margherita (Berlin), Manivel, Laurent (Saint-Martin-d'Herès), Mella, Massimiliano (Ferrara), Oprea, Dragos (La Jolla), Payne, Sam (Stanford), Perrin, Nicolas (Bonn), Peskine, Christian (Paris), Rollenske, Sönke (Mainz), Schoen, Chad (Durham), Schreyer, Frank-Olaf (Saarbrücken), Sernesi, Edoardo (Roma), Smith, Gregory G. (Kingston, Ontario), Smyth, David (Cambridge), Totaro, Burt (Cambridge), Vakil, Ravi (Stanford), Verra, Alessandro (Roma)



27.06. – 03.07.2010

Organisers:

Analysis and Geometric Singularities

Jochen Brüning, Berlin
Rafe Mazzeo, Stanford
Paolo Piazza, Roma

ABSTRACT

The Conference on “Analysis and Geometric Singularities” took place from June 27 to July 3, 2010 and had 53 participants. The organization of the meeting followed the well-established scheme, providing plenty of discussion time which was intensely used, especially by the young participants. The four survey talks were given by Gilles Carron, Jean-Michel Bismut, Ulrich Bunke and Xiaonan Ma.

PARTICIPANTS

Albin, Pierre (Paris), Aldana, Clara L. (Bonn), Ammann, Bernd (Regensburg), Antonini, Paolo (Roma), Azzali, Sara (Göttingen), Bär, Christian (Potsdam), Baskin, Dean (Stanford), Biquard, Olivier (Paris), Bismut, Jean-Michel (Orsay), Braverman, Maxim (Boston), Brüning, Jochen (Berlin), Bunke, Ulrich (Regensburg), Carron, Gilles (Nantes), Dai, Xianzhe (Santa Barbara), Degeratu, Anda (Golm), Friedlander, Leonid (Tucson), Fritzsche, Karsten (Oldenburg), Gil, Juan B. (Altoona), Goette, Sebastian (Freiburg), Grandjean, Vincent (Bristol), Grieser, Daniel (Oldenburg), Guillarmou, Colin (Paris), Krainer, Thomas (Altoona), Lesch, Matthias (Bonn), Lescure, Jean-Marie (Aubiere), Ludwig, Ursula Beate (Freiburg), Ma, Xiaonan (Paris), Mazzeo, Rafe (Stanford), Melrose, Richard B. (Cambridge), Mendoza, Gerardo A. (Philadelphia), Montcouquiol, Gregoire (Orsay), Moriyoshi, Hitoshi (Nagoya), Moscovici, Henri (Columbus), Müller, Jörn (Berlin), Müller, Werner (Bonn), Olbrich, Martin (Luxembourg), Piazza, Paolo (Roma), Polterovich, Iosif (Montreal), Richardson, Kenneth (Ft Worth), Rochon, Frederic (Toronto), Rowlett, Julie (Bonn), Sa Barreto, Antonio (West Lafayette), Savin, Anton (Moscow), Schrohe, Elmar (Hannover), Singer, Michael A. (Edinburgh), Sternin, Boris (Moscow), Strohmaier, Alexander (Loughborough), Vasy, Andras (Stanford), Vertman, Boris (Köln), Wang, Fang (Cambridge), Weiss, Hartmut (München), Wunsch, Jared (Evanston), Xie, Zhizhang (Columbus), Zhang, Wei-Ping (Tianjin)



04.07. – 10.07.2010

Organisers:

Homogeneous Spaces and Arithmetic

Manfred Einsiedler, Columbus
Dmitry Kleinbock, Waltham
Elon Lindenstrauss, Jerusalem
Hee Oh, Providence/Seoul

ABSTRACT

The theory of flows on homogeneous spaces of Lie groups has emerged as a distinct, rapidly advancing subject over the last few decades incorporating ergodic theory, geometry and number theory. The workshop showcased the latest advances in the subject as well as a wide range of applications. The workshop "Flows on homogeneous spaces and arithmetic", organised by Manfred Einsiedler (ETH Zürich), Dmitry Kleinbock (Brandeis), Elon Lindenstrauss (Hebrew University) and Hee Oh (Brown) was attended by 52 participants from around the world.

PARTICIPANTS

Abels, Herbert (Bielefeld), Athreya, Jayadev S. (Urbana), Benoist, Yves (Orsay), Breuillard, Emmanuel (Orsay), Cellarosi, Francesco (Princeton), Einsiedler, Manfred (Zürich), Eskin, Alex (Chicago), Fuchs, Elena (Princeton), Furman, Alex (Chicago), Ghosh, Anish (Norwich), Götze, Friedrich (Bielefeld), Gorodnik, Alexander (Bristol), Green, Ben (Cambridge), Guilloux, Antonin (Paris), Guivarch, Yves (Rennes), Haynes, Alan K. (Heslington, York), Jetchev, Dimitar (Lausanne), Kadyrov, Shirali (Bristol), Kassel, Fanny (Chicago), Katok, Anatole B. (University Park), Katok, Svetlana (University Park), Kleinbock, Dmitry (Waltham), Klingler, Bruno (Paris), Kontorovich, Alex (Princeton), Kowalski, Emmanuel (Zürich), Ledrappier, Francois (Paris), Li, Han (New Haven), Lindenstrauss, Elon (Jerusalem), Lytle, Beverly (Zürich), Margulis, Grigori A. (New Haven), Marklof, Jens (Bristol), Maucourant, Francois (Rennes), Morris, Dave Witte (Lethbridge), Mozes, Shahar (Jerusalem), Oh, Hee (Providence), Paulin, Frederic (Paris), Quint, Jean-Francois (Villetaneuse), Roblin, Thomas (Paris), Schapira, Barbara (Amiens), Shah, Nimish A. (Columbus), Shapira, Uri (Jerusalem), Spatzier, Ralf J. (Ann Arbor), Strömbergsson, Andreas (Uppsala), Tomanov, Georges (Villeurbanne), Ubis Martinez, Adrian (Madrid), Varju, Peter (Princeton), Wang, Zhiren (Princeton), Zamojski, Tomasz (Chicago), Ziegler, Tamar (Haifa)



11.07. – 17.07.2010

Geometric Group Theory, Hyperbolic Dynamics and Symplectic Geometry

Organisers:

Gerhard Knieper, Bochum
Leonid Polterovich, Tel Aviv
Leonid Potyagailo, Lille

ABSTRACT

The main theme of the workshop is the interaction between the speedily developing fields of mathematics mentioned in the title. One of the purposes of the workshop is to highlight new exciting developments which are happening right now on the borderline between hyperbolic dynamics, geometric group theory and symplectic geometry.

PARTICIPANTS

Bangert, Victor (Freiburg), Bourgeois, Frederic (Bruxelles), Bowditch, Brian H. (Coventry), Brandenbursky, Michael (Haifa), Buhovsky, Lev (Tel Aviv), Burger, Marc (Zürich), Butler, Leo (Edinburgh), Calegari, Danny (Pasadena), Cornea, Octav (Montreal), Courtois, Gilles (Palaiseau), Dahmani, Francois (Toulouse), Entov, Michael (Haifa), Erschler, Anna (Orsay), Felshtyn, Alexander (Szczecin), Flaminio, Livio (Villeneuve d' Ascq.), Fujiwara, Koji (Sendai), Gal, Swiatoslaw R. (Wroclaw), Gerasimov, Victor (Belo Horizonte), Glasmachers, Eva (Bochum), Glutsyuk, Alexey (Lyon), Guirardel, Vincent (Toulouse), Hohloch, Sonja (Stanford), Iozzi, Alessandra (Zürich), Jimenez Rolland, Rita (Chicago), Kapovich, Misha (Davis), Karlsson, Anders (Geneve), Katok, Anatole B. (University Park), Katok, Svetlana (University Park), Knieper, Gerhard (Bochum), Koehler, Henrik (Bochum), Köttschick, Dieter (München), Le Roux, Frederic (Orsay), Ledrappier, Francois (Paris), Leuzinger, Enrico (Karlsruhe), Levitt, Gilbert (Caen), Markovic, Vladimir (Coventry), Morris, Dave Witte (Lethbridge), Mozes, Shahar (Jerusalem), Muranov, Alexey Yu. (Toulouse), Nemirovski, Stefan (Moscow), Oh, Yong-Geun (Madison), Ott, Andreas (Zürich), Peigne, Marc (Tours), Peyerimhoff, Norbert (Durham), Pollicott, Mark (Coventry), Polterovich, Iosif (Montreal), Polterovich, Leonid V. (Tel Aviv), Potyagailo, Leonid D. (Villeneuve d' Ascq.), Sapir, Mark V. (Nashville), Schlenk, Felix (Neuchatel), Schultens, Jennifer (Davis), Siburg, Karl Friedrich (Dortmund), Stratmann, Thomas (Bochum), Yang, Wen Yuan (Villeneuve d'Ascq), Yue, Chengbo (Beijing)



18.07. – 24.07.2010

Organisers:

Calculus of Variations

Camillo De Lellis, Zürich

Gerhard Huisken, Golm

Robert J. McCann, Toronto

ABSTRACT

Since its invention by Newton, the calculus of variations has formed one of the central techniques for studying problems in geometry, physics, and partial differential equations. This trend continues even today. On the one hand, slow but steady progress is made on long-standing questions concerning minimal surfaces, curvature flows, and related geometric objects. Basic questions also remain in such areas as mathematical physics and general relativity. On the other hand, new types of question emerge, driven by applications from economics and engineering to materials science, whose solution will depend on developing ideas and techniques in this classical branch of analysis. The July 2010 Oberwolfach workshop on the Calculus of Variations showcased a blend of continued progress in traditional areas with surprising developments which emerged from the exploration of new lines of research.

PARTICIPANTS

Alberti, Giovanni (Pisa), Ambrosio, Luigi (Pisa), Breit, Dominic (Saarbrücken), Brendle, Simon (Stanford), Brenier, Yann (Nice), Buttazzo, Giuseppe (Pisa), Carlier, Guillaume (Paris), Chen, Shibing (Toronto), Da Lio, Francesca (Padova), De Lellis, Camillo (Zürich), Faraco, Daniel (Madrid), Figalli, Alessio (Austin), Fusco, Nicola (Napoli), Head, John (Golm), Henao Manrique, Duvan (Paris), Hirsch, Jonas (Zürich), Huisken, Gerhard (Golm), Ignat, Radu (Orsay), Jerrard, Robert L. (Toronto), Kawohl, Bernd (Köln), Kim, Young-Heon (Vancouver), Kirchheim, Bernd (Oxford), Lee, Paul (Berkeley), Maggi, Francesco (Firenze), Marchis, Julianna H. (Cluj-Napoca), Marquardt, Thomas (Golm), McCann, Robert J. (Toronto), Merigot, Quentin (Sophia Antipolis), Mingione, Giuseppe R. (Parma), Müller, Stefan (Bonn), Neves, Andre (Princeton), Niethammer, Barbara (Oxford), Otto, Felix (Leipzig), Pass, Brendan (Toronto), Plakhov, Alexander (Aveiro), Pratelli, Aldo (Pavia), von Renesse, Max (Berlin), Riviere, Tristan (Zürich), Schätzle, Reiner (Tübingen), Seiringer, Robert (Princeton), Smart, Charles K. (Berkeley), Spadaro, Emanuele Nunzio (Bonn), Struwe, Michael (Zürich), Topping, Peter (Coventry), Trudinger, Neil S. (Canberra), Tzou, Leo (Helsinki), Wang, Mu-Tao (New York), Westdickenberg, Michael (Atlanta), White, Brian (Stanford)



25.07. – 31.07.2010

Cohomology of Finite Groups: Interactions and Applications

Organisers:

Alejandro Adem, Vancouver
Jon F. Carlson, Athens
Henning Krause, Paderborn

ABSTRACT

The cohomology of finite groups is an important tool in many subjects including representation theory and algebraic topology. This meeting was the third in a series that has emphasized the interactions of group cohomology with other areas. The workshop brought together mathematicians from several areas of algebra and topology. The common theme was the use and application of techniques from the cohomology theory of finite groups.

PARTICIPANTS

Adem, Alejandro (Vancouver), Andersen, Kasper K.S. (Aarhus), Avramov, Luchezar L. (Lincoln), Balmer, Paul (Los Angeles), Benson, David J. (Aberdeen), Bödigheimer, Carl-Friedrich (Bonn), Bouc, Serge (Amiens), Broto, Carles (Bellaterra), Browder, William (Princeton), Carlson, Jon F. (Athens), Chebolu, Sunil Kumar (Normal), Chuang, Joseph (London), Cohen, Frederick R. (Rochester), Dell'Ambrogio, Ivo (Singapore), Djament, Aurelien (Nantes), Erdmann, Karin (Oxford), Farnsteiner, Rolf (Kiel), Friedlander, Eric M. (Los Angeles), Gomez, Jose Manuel (Vancouver), Green, David J. (Jena), Greenlees, John P.C. (Sheffield), Grodal, Jesper (Copenhagen), Guillot, Pierre (Strasbourg), Hanke, Bernhard (Augsburg), Hemmer, David (Buffalo), Hermann, Reiner (Bielefeld), Holm, Thorsten (Hannover), Johnson, Niles (Athens), Juan-Pineda, Daniel (Morelia), Kessar, Radha (Aberdeen), Krause, Henning (Bielefeld), Kuhn, Nicholas J. (Charlottesville), Langer, Martin (Münster), Levi, Ran (Aberdeen), Linckelmann, Markus (Aberdeen), Mazza, Nadia (Lancaster), Minac, Jan (London, Ontario), Nakano, Daniel K. (Athens), Oliver, Robert (Villetaneuse), Onofrei, Silvia (Columbus), Pevtsova, Julia (Seattle), Rickard, Jeremy (Bristol), Rodenhausen, Moritz (Bonn), Sinha, Dev Prakash (Eugene), Smith, Jeff (Vancouver), Stancu, Radu (Amiens), Symonds, Peter (Manchester), Thevenaz, Jacques (Lausanne), Vespa, Christine (Strasbourg), Webb, Peter J. (Minneapolis), Xu, Fei (Bellaterra), Yalcin, Ergün (Bilkent, Ankara), Zimmermann, Alexander (Amiens)



01.08. – 07.08.2010

Organisers:

Wavelet and Multiscale Methods

Albert Cohen, Paris
Wolfgang Dahmen, Aachen
Ronald A. DeVore, College Station
Angela Kunoth, Paderborn

ABSTRACT

Extracting essential information from complex structures and developing rigorous models to quantify the quality of information leads to tasks that are not tractable by standard numerical techniques. The last decade has seen the emergence of several new computational methodologies to address this situation. Their common features are the nonlinearity of the solution methods as well as the ability of separating solution characteristics living on different length scales. This workshop proposed to deepen the understanding of the underlying mathematical concepts that drive this new evolution of computation and to promote the exchange of ideas emerging in various disciplines. A special emphasis was placed on high dimensional problems since these amplify even further the need for novel theory and computation.

PARTICIPANTS

Bachmayr, Markus (Aachen), Binev, Peter G. (Columbia), Börm, Steffen (Kiel), Braess, Dietrich (Bochum), Canuto, Claudio (Torino), Cohen, Albert (Paris), Dahlke, Stephan (Marburg), Dahmen, Wolfgang (Aachen), De Mol, Christine (Bruxelles), Dekel, Shai (Herzlia), DeVore, Ronald A. (College Station), Dyn, Nira (Tel Aviv), Fornasier, Massimo (Linz), Foucart, Simon (Paris), Graham, Ivan G. (Bath), Grasedyck, Lars (Aachen), Gröchenig, Karlheinz (Wien), Harbrecht, Helmut (Stuttgart), Huang, Boqiang (Shanghai), Huang, Chunyan (Aachen), Kerkyacharian, Gerard (Paris), Khoromskij, Boris N. (Leipzig), Kunoth, Angela (Paderborn), Lamby, Philipp (Columbia), Lim, Wang-Q. (Osnabrück), Mirebeau, Jean-Marie (Paris), Mollet, Christian (Paderborn), Oswald, Peter (Bremen), Pabel, Roland (Paderborn), Peterseim, Daniel (Berlin), Petrova, Guergana (College Station), Petrushev, Pencho P. (Columbia), Picard, Dominique (Paris), Popov, Bojan (College Station), Rauhut, Holger (Bonn), Sapiro, Guillermo (Minneapolis), Schäfer, Roland (Aachen), Schneider, Reinhold (Berlin), Schwab, Christoph (Zürich), Stapel, Florian (Paderborn), Stevenson, Rob (Amsterdam), Süli, Endre (Oxford), Tabacco, Anita (Torino), Tadmor, Eitan (College Park), Temlyakov, Vladimir N. (Columbia), Wang, Xiaohui (College Station), Ward, Rachel (New York), Welper, Gerrit (Aachen), Wiechers, Katharina (Paderborn), Wojtaszczyk, Przemek (Warszawa), Yserentant, Harry (Berlin), Zeiser, Andreas (Berlin)



08.08. – 14.08.2010

**Mathematical Theory and Modelling in
Atmosphere-Ocean-Science**

Organisers:

Andrew J. Majda, New York
Bjorn Stevens, Hamburg
Rupert Klein, Berlin

ABSTRACT

Participants from around the world gathered to review application and development of mathematics in relation to problems in the atmospheric, oceanic and climate sciences. This year's workshop was well attended by over 50 participants from mostly North America and Europe. Participants from the broader fields of fluid dynamics, atmospheric, oceanic and climate science were joined by mathematicians with interests in PDEs, stochastics and numerical methods.

PARTICIPANTS

Achatz, Ulrich (Frankfurt), Benacchio, Tommaso (Padova), Biello, Joseph (Davis), Bordoni, Simona (Pasadena), Brenier, Yann (Nice), Bühler, Oliver (New York), Cessi, Paola (La Jolla), Craig, George (München), Dolaptchiev, Stamen (Frankfurt), Egger, Joseph (München), Frank, Jason (Amsterdam), Franzke, Christian (Cambridge), Frierson, Dargan M. (Seattle), Gerber, Ed (New York), Giannakis, Dimitris (New York), Giraldo, Francis (Monterey), Gritsun, Andrey (Moscow), Grote, Marcus (Basel), Horenko, Illia (Lugano), Khouider, Boualem (Victoria), Klein, Rupert (Berlin), Korn, Peter (Hamburg), Kwasniok, Frank (Exeter), Mellado, Juan-Pedro (Hamburg), Müller, Andreas (Mainz), Muraki, David James (Burnaby), Norbury, John (Oxford), Owinoh, Antony Z. (Berlin), Paeschke, Eileen (Berlin), Pauluis, Olivier (New York), Reich, Sebastian (Potsdam), Restelli, Marco (Sevilla), Roulstone, Ian (Surrey), Selten, Frank (AE De Bilt), Senf, Fabian (Kühlungsborn), Smith, Leslie (Madison), Smith, Shafer (New York), Srinivasan, Ashwanth (Miami), Stechmann, Samuel N. (Los Angeles), Stevens, Bjorn (Hamburg), Tabak, Esteban G. (New York), Titi, Edriss S. (Irvine), Turkington, Bruce (Amherst), Vanneste, Jacques (Edinburgh), Wang, Xiaoming (Tallahassee), Will, Andreas (Cottbus), Williams, Paul (Reading), Young, William R. (La Jolla), Zeitlin, Vladimir (Paris)



15.08. – 21.08.2010

Organisers:

Low-Dimensional Topology and Number Theory

Paul E. Gunnells, Amherst
Walter Neumann, New York
Adam S. Sikora, New York
Don Zagier, Bonn/Paris

ABSTRACT

The workshop on Low-Dimensional Topology and Number Theory brought together researchers in these areas with the intent of exploring the many tantalizing connections between Low-Dimensional Topology and Number Theory. Some of the most actively discussed topics were the appearances of modularity in quantum invariants and mutual relations between hyperbolic volume, K-theory, and asymptotics of quantum invariants.

PARTICIPANTS

Baader, Sebastian (Bern), Beliakova, Anna (Zürich), Belolipetsky, Mikhail (Durham), Boston, Nigel (Madison), Boyer, Steven (Montreal), Champanerkar, Abhijit (Staten Island), Chinburg, Ted C. (Philadelphia), Cochran, Tim D. (Houston), Culler, Marc (Chicago), Dasbach, Oliver T. (Baton Rouge), Dunfield, Nathan M. (Urbana), Emery, Vincent (Fribourg), Gangl, Herbert (Durham), Garoufalidis, Stavros (Atlanta), Gunnells, Paul E. (Amherst), Hajir, Farshid (Amherst), Hikami, Kazuhiro (Naruto), Kashaev, Rinat (Geneve), Keegan, Sinead (Dublin), Kofman, Ilya (Staten Island), Kreck, Matthias (Bonn), Lalin, Matilde N. (Montreal), Lawrence, Ruth (Jerusalem), Le, Thang (Atlanta), Masbaum, Gregor (Paris), Mellit, Anton (Bonn), Morava, Jack (Baltimore), Morishita, Masanori (Fukuoka), Murakami, Hitoshi (Tokyo), Nahm, Werner (Dublin), Neumann, Walter David (New York), Ontiveros, Michael David (Bonn), Petersen, Kathleen (Tallahassee), Rodriguez-Villegas, Fernando (Austin), Sikora, Adam (Buffalo), Silver, Dan (Mobile), Sinick, Jonah (Urbana), van der Veen, Roland (Amsterdam), Willerton, Simon (Sheffield), Williams, Susan G. (Mobile), Yokota, Yoshiyuki (Tokyo), Zagier, Don B. (Bonn), Zickert, Christian (Berkeley), Zwegers, Sander P. (Dublin)



29.08. – 04.09.2010

Organisers:

Komplexe Analysis

Jean-Pierre Demailly, Grenoble

Klaus Hulek, Hannover

Thomas Peternell, Bayreuth

ABSTRACT

The aim of this workshop was to discuss recent developments in several complex variables and complex geometry. Special emphasis was put on the interaction between model theory and the classification theory of complex manifolds. Other topics included Kähler geometry, foliations, complex symplectic manifolds and moduli theory.

PARTICIPANTS

Barlet, Daniel (Vandoeuvre les Nancy), Bauer-Catanese, Ingrid (Bayreuth), Campana, Frederic (Vandoeuvre-les-Nancy), Catanese, Fabrizio (Bayreuth), Demailly, Jean-Pierre (Saint-Martin d'Herès), Dethloff, Gerd E. (Brest), Ebeling, Wolfgang (Hannover), Eyssidieux, Philippe (St. Martin d'Herès), Farkas, Gavril (Berlin), van der Geer, Gerard (Amsterdam), Greb, Daniel (Freiburg), Gritsenko, A. Valery (Villeneuve d'Ascq.), Grushevsky, Samuel (Stony Brook), Gulbrandsen, Martin G. (Haugesund), Halle, Lars Halvard (Hannover), Heinzner, Peter (Bochum), Höring, Andreas (Paris), Huckleberry, Alan T. (Bochum), Hulek, Klaus (Hannover), Hwang, Jun-Muk (Seoul), Katzarkov, Ludmil (Wien), Kebekus, Stefan (Freiburg), Keller, Julien (Marseille), Kirschner, Tim (Bayreuth), Krug, Sebastian (Hannover), Larsen, Paul (Berlin), Markman, Eyal (Amherst), Markwig, Hannah (Göttingen), Möller, Martin (Frankfurt), Mukai, Shigeru (Kyoto), Mustata, Mircea (Ann Arbor), Paun, Mihai (Vandoeuvre les Nancy), Peternell, Thomas (Bayreuth), Pillay, Anand (Leeds), Ploog, David (Hannover), Popovici, Dan (Toulouse), Prendergast-Smith, Arthur (Hannover), Rohde, Jan Christian (Hannover), Rollenske, Sönke (Mainz), Rousseau, Erwan (Strasbourg), Sankaran, Gregory (Bath Somerset), Sano, Yuji (Fukuoka), Schrack, Florian (Bayreuth), Schumacher, Georg (Marburg), Sibony, Nessim (Orsay), Teicher, Mina (Ramat-Gan), Teleman, Andrei (Marseille), Tent, Katrin (Münster), Tommasi, Orsola (Hannover), Verbitsky, Misha (Moscow), Ziegler, Martin (Freiburg), Zilber, Boris I. (Oxford)



05.09. – 11.09.2010

**Actions and Invariants of Residually Finite Groups:
Asymptotic Methods**

Organisers:

Miklos Abert, Chicago
Damien Gaboriau, Lyon
Fritz Grunewald, Düsseldorf

ABSTRACT

The workshop brought together experts in finite group theory, L^2 -cohomology, measured group theory, the theory of lattices in Lie groups, probability and topology. The common object of interest was residually finite groups, that each field investigates from a different angle. There are various group invariants whose asymptotic behaviour on the subgroup lattice of a residually finite group is connected to an interesting analytic invariant of the group. These include the rank and various homological and spectral invariants.

PARTICIPANTS

Abert, Miklos (Budapest), Alvarez, Aurelien (Orleans), Barnea, Yiftach (Surrey), Bartholdi, Laurent (Göttingen), Bergeron, Nicolas (Paris), Bermudez, Miguel (Paris), Bogopolski, Oleg (Düsseldorf), Breuillard, Emmanuel (Orsay), Bridson, Martin R. (Oxford), de Cornulier, Yves (Orsay), Elek, Gabor (Budapest), Ershov, Mikhail (Charlottesville), Felshtyn, Alexander (Szczecin), Gaboriau, Damien (Lyon), Gelander, Tsachik (Jerusalem), Glasner, Yair (Beer Sheva), Grabowski, Lukasz (Göttingen), Grigorchuk, Rostislav Ivan (College Station), Houdayer, Cyril (Lyon), Jaikin-Zapirain, Andrei (Madrid), Kassabov, Martin (Ithaca), Klopsch, Benjamin (Surrey), Le Maitre, Francois (Lyon), Lippner, Gabor (Cambridge), Lück, Wolfgang (Bonn), Melleray, Julien (Villeurbanne), Mercier, Pierre-Adelin (Lyon), Mozes, Shahar (Jerusalem), Nikolov, Nikolay (London), Ozawa, Narutaka (Tokyo), Perin, Chloe (Strasbourg), Pete, Gabor (Toronto), Pichot, Mikael (Tokyo), Pyber, Laszlo (Budapest), Reich, Holger (Berlin), Remy, Bertrand (Villeurbanne), Ribnere, Evija (Düsseldorf), Sapir, Mark V. (Nashville), Sauer, Roman (Regensburg), Schick, Thomas (Göttingen), Schlage-Puchta, Jan-Christoph (Gent), Segal, Dan (Oxford), Szabo, Endre (Budapest), Szegedy, Balazs (Toronto), Terpai, Tamas (Budapest), Tessera, Romain A. (Lyon), Thom, Andreas B. (Leipzig), Tsankov, Todor (Paris), Virag, Balint (Toronto), Voll, Christopher (Southampton), Wilson, John S. (Oxford), Zalesski, Pavel Alexandr. (Brasilia)



12.09. – 18.09.2010

Organisers:

Nonlinear Waves and Dispersive Equations

Carlos E. Kenig, Chicago

Herbert Koch, Bonn

Daniel Tataru, Berkeley

ABSTRACT

The aim of the workshop was to discuss current developments in nonlinear waves and dispersive equations from a PDE based view. The talks centered around rough initial data, long time and global existence, perturbations of special solutions, and applications. Nonlinear dispersive equations are models for nonlinear waves in a wide range of physical contexts. They display the competing or cooperating effects of linear dispersion and nonlinear interactions, which may be focussing or defocussing. They are linked to diverse areas of mathematics and physics, ranging from nonlinear optics over Fourier analysis to integrable systems.

PARTICIPANTS

Bejenaru, Ioan (Chicago), Burq, Nicolas (Orsay), Colliander, James E. (Toronto), Constantin, Adrian (Wien), Cote, Raphael (Palaiseau), Cuccagna, Scipio (Reggio Emilia), Dafermos, Mihalis (Cambridge), Delort, Jean-Marc (Villetaneuse), Dodson, Ben (Berkeley), Ettinger, Boris (Berkeley), Geba, Dan (Rochester), Germain, Pierre (New York), Grünrock, Axel (Düsseldorf), Gustafson, Stephen (Vancouver), Herr, Sebastian (Bonn), Ionescu, Alexandru D. (Madison), Ivanovici, Oana (Nice), Kalantarova, Habiba (Bonn), Killip, Rowan (Los Angeles), Koch, Herbert (Bonn), Krieger, Joachim (Philadelphia), Kunze, Markus (Essen), Lindblad, Hans (La Jolla), Liu, Baoping (Berkeley), Marzuola, Jeremy L. (Chapel Hill), Merle, Frank (Cergy-Pontoise), Metcalfe, Jason (Chapel Hill), Munoz, Claudio (Versailles), Nakanishi, Kenji (Kyoto), Paniccia, Irene (Bonn), Pavlovic, Natasa (Austin), Perelman, Galina (Palaiseau), Planchon, Fabrice (Nice), Ponce, Gustavo Alberto (Santa Barbara), Racke, Reinhard (Konstanz), Schlag, Wilhelm (Chicago), Schlein, Benjamin (Bonn), Selberg, Sigmund (Trondheim), Smith, Paul (Los Angeles), Staffilani, Gigliola (Cambridge), Sterbenz, Jacob (La Jolla), Szeftel, Jeremy (Paris), Tataru, Daniel (Berkeley), Tohaneanu, Mihai H. (West Lafayette), Tzvetkov, Nikolay (Cergy-Pontoise), Vega, Luis (Bilbao), Visan, Monica (Los Angeles), Visciglia, Nicola (Pisa), Wong, Willie (Cambridge), Wu, Sijue (Ann Arbor)



19.09. – 25.09.2010

Organisers:

Topologie

Thomas Schick, Göttingen
Peter Teichner, Berkeley
Nathalie Wahl, Copenhagen
Michael Weiss, Aberdeen

ABSTRACT

This conference is one of the few occasions where researchers from many different areas in algebraic and geometric topology are able to meet and exchange ideas. Accordingly, the program covered a wide range of new developments in such fields as geometric group theory, rigidity of group actions, knot theory, and stable and unstable homotopy theory. More specifically, we discussed progress on problems such as the Farrell-Jones conjecture, the Levine conjecture in grope cobordism of knots and Rosenberg's conjecture about homotopy invariance of negative algebraic K-theory, to mention just a few subjects with a name attached. One of the highlights was a series of four talks on the solution of Arf-Kervaire invariant problem by Mike Hill and Doug Ravenel, reporting on their joint work with Mike Hopkins.

PARTICIPANTS

Alekseev, Vadim (Göttingen), Ausoni, Christian (Münster), Ayala, David (Copenhagen), Bartels, Arthur (Münster), Bauer, Tilman (Amsterdam), Berglund, Alexander (Kobenhavn), Brito, Pedro Boavida (Aberdeen), Bucher-Karlsson, Michelle (Geneve), Bunke, Ulrich (Regensburg), Cochran, Tim D. (Houston), Conant, Jim (Knoxville), Ebert, Johannes (Bonn), Friedl, Stefan Klaus (Coventry), Ghiggini, Paolo (Nantes), Gordon, Cameron M. (Austin), Greenlees, John P.C. (Sheffield), Grodal, Jesper (Copenhagen), Habiro, Kazuo (Kyoto), Hanke, Bernhard (Augsburg), Harvey, Shelly (Houston), Henriques, Andre (Utrecht), Hill, Mike (Charlottesville), Kahle, Alexander (Göttingen), Kreck, Matthias (Bonn), Löh, Clara (Regensburg), Madsen, Ib (Copenhagen), Martens, Johan (Aarhus), Meier, Lennart (Bonn), Noel, Justin (Bonn), Notbohm, Dietrich (Amsterdam), Oliver, Robert (Villetaneuse), Pavlov, Dmitri (Bonn), Pennig, Ulrich (Münster), Prat-Waldron, Arturo (Bonn), Randal-Williams, Oscar (Copenhagen), Ranicki, Andrew A. (Edinburgh), Raptis, Georgios (Osnabrück), Ravenel, Douglas (Rochester), Reich, Holger (Berlin), Richter, Birgit (Hamburg), Sauer, Roman (Regensburg), Schick, Thomas (Göttingen), Schleimer, Saul (Coventry), Schwede, Stefan (Bonn), Shipley, Brooke (Chicago), Steimle, Wolfgang (Münster), Teichner, Peter (Bonn), Thom, Andreas B. (Leipzig), Vallette, Bruno (Bonn), Vidussi, Stefano (Riverside), Vogel, Thomas (Bonn), Wahl, Nathalie (Copenhagen), Weiss, Michael (Aberdeen)

WORKSHOP 1039



26.09. – 02.10.2010

Organisers:

Deformation Methods in Mathematics and Physics

Alice Fialowski, Budapest

Jürg Fröhlich, Zürich

Martin Schlichenmaier, Luxembourg

ABSTRACT

Deformations of mathematical structures play an important role in most parts of mathematics but also in theoretical physics. In this interdisciplinary workshop, different aspects of deformations and their applications were discussed. The workshop was attended by experts in the fields, but also by quite a number of young post-docs and PhD students. One of the goals was to foster interactions between different communities.

PARTICIPANTS

Alekseev, Anton Yu. (Geneve), Aschieri, Paolo (Alessandria), Bahns, Dorothea (Göttingen), Bieliavsky, Pierre (Louvain-La-Neuve), Bordemann, Martin (Mulhouse), Burde, Dietrich (Wien), Castellani, Leonardo (Alessandria), Doubek, Martin (Praha), Elchinger, Olivier (Mulhouse), Fialowski, Alice (Budapest), Fregier, Yael (Luxembourg), Fröhlich, Jürg M. (Zürich), Gerstenhaber, Murray (Philadelphia), Giaquinto, Anthony (Chicago), Grabowski, Janusz (Warszawa), Grimstrup, Jesper M. (Kobenhavn), Grosse, Harald (Wien), Gutt, Simone (Bruxelles), Herbig, Hans-Christian (Aarhus), Hirsh, Joseph (New York), Laudal, Olav Arnfinn (Oslo), Lazarev, Andrey (Leicester), Lechner, Gandalf (Wien), Lentner, Simon David (München), Makhlof, Abdenacer (Mulhouse), Mandal, Ashis (Luxembourg), Markl, Martin (Praha), Mickelsson, Jouko (Helsinki), Millionschikov, Dmitri (Moscow), Neeb, Karl-Hermann (Erlangen), O'Connor, Denjoe (Dublin), Omirov, Bakhrom (Tashkent), Paleani, Christian (München), Penkava, Michael R. (Eau Claire), Rogers, Chris (Riverside), Sämann, Christian (Edinburgh), Schenkel, Alexander (Würzburg), Schlichenmaier, Martin (Luxembourg), Schottenloher, Martin (München), Schupp, Peter (Bremen), Schweigert, Christoph (Hamburg), Sheinman, Oleg K. (Moscow), Steinacker, Harold (Wien), Sternheimer, Daniel (Dijon), Vizman, Cornelia (Timisoara), Voronov, Alexander A. (Minneapolis), Wagemann, Friedrich (Nantes), Waldmann, Stefan (Freiburg), Wendland, Katrin (Augsburg)



17.10. – 23.10.2010

Organisers:

Mathematical Challenges in Stochastic Networks

Serguei Foss, Edinburgh
Günter Last, Karlsruhe
Michel Mandjes, Amsterdam
Balaji Prabhakar, Stanford

ABSTRACT

The workshop was devoted to the discussion of recent progress in modern stochastic network theory and to the exploration of open mathematical challenging problems in the field. The workshop covered a wide range of mathematical topics; while being centered around applied probability, it also included a substantial amount of graph theory and (combinatorial) optimization.

PARTICIPANTS

Anantharam, Venkat (Berkeley), Asmussen, Soren (Aarhus), Baurdoux, Erik J. (London), Blaszczyszyn, Bartek (Paris), Boxma, Onno J. (Eindhoven), Brandt, Andreas (Berlin), Daduna, Hans (Hamburg), Debicki, Krzysztof (Wroclaw), Dieker, Ton (Atlanta), Foss, Serguei (Edinburgh), Gamarnik, David (Cambridge), Ganesh, Ayalvadi (Bristol), Gentner, Daniel (Karlsruhe), Glynn, Peter (Stanford), Hajek, Bruce (Urbana), Hooghiemstra, Gerard (Delft), Ivanovs, Jevgenijs (Eindhoven), Johari, Ramesh (Stanford), Kella, Offer (Jerusalem), Konstantopoulos, Takis (Uppsala), Last, Günter (Karlsruhe), Lelarge, Marc (Paris), Leskelä, Lasse (Aalto), Majewski, Kurt (München), Mandjes, Michel (Amsterdam), Martin, James B. (Oxford), Massoulié, Laurent (Boulogne), McDonald, David R. (Ottawa), Mylosz, Jennifer (Hamburg), Norros, Ilkka (VTT), Prabhakar, Balaji (Stanford), Proutiere, Alexandre (Cambridge), Ramanan, Kavita (Providence), Righter, Rhonda (Berkeley), Robert, Philippe (Le Chesnay), Salez, Justin (Paris), Schmidt, Philipp (Oxford), Schmidt, Volker (Ulm), Shah, Devavrat (Cambridge), Stolyar, Alexander (Murray Hill), Szekli, Ryszard (Wroclaw), Taylor, Peter G. (Melbourne), Thiran, Patrick (Lausanne), Wachtel, Vitali (München), Walton, Neil (Cambridge), Wichelhaus, Cornelia (Heidelberg), Winkler, Andrea (Münster), Wischik, Damon (London), Zachary, Stanley (Edinburgh), Ziedins, Ilze (Auckland), Zuyev, Sergei (Göteborg), Zwart, Bert (Amsterdam)



31.10. – 06.11.2010

Organisers:

Operator Theory and Harmonic Analysis

Alexander Borichev, Marseille
Raymond Mortini, Metz
Nicolai Nikolski, Bordeaux
Kristian Seip, Trondheim

ABSTRACT

The major topics discussed in this workshop were the Feichtinger conjecture and related questions of harmonic analysis, the corona problem for the ball B^n , the weighted approximation problem, and questions related to the model spaces, to multipliers, (hyper-)cyclicity, differentiability, Bezout and Fermat equations, traces and Toeplitz operators in different function spaces. A list of open problems raised at this workshop is also included.

PARTICIPANTS

Abakoumov, Evgeny (Paris), Alexandrov, Alexey (St. Petersburg), Arcozzi, Nicola (Bologna), Baranov, Anton (St. Petersburg), Belov, Yurii (Trondheim), Borichev, Alexander (Marseille), Brennan, James E. (Lexington), Casazza, Peter G. (Columbia), Dyakonov, Konstantin (Barcelona), Hedenmalm, Hakan (Stockholm), Kellay, Karim (Marseille), Lev, Nir (Rehovot), Lyubarskii, Yurii (Trondheim), Nicolau, Artur (Bellaterra), Olsen, Jan-Fredrik (Lund), Petermichl, Stefanie (Toulouse), Poltoratski, Alexei (College Station), Rochberg, Richard (St. Louis), Saksman, Eero (Helsinki), Sundberg, Carl (Knoxville), Trent, Tavan (Tuscaloosa), Vasyunin, Vasily (St. Petersburg), Wick, Brett D. (Atlanta), Zarouf, Rachid (Marseille)



07.11. – 13.11.2010

Organisers:

Large Scale Stochastic Dynamics

Claudio Landim, Rio de Janeiro

Stefano Olla, Paris

Herbert Spohn, München

ABSTRACT

In focus are interacting stochastic systems with many components, ranging from stochastic partial differential equations to discrete systems as interacting particles on a lattice moving through random jumps. More specifically one wants to understand the large scale behavior, large in spatial extent but also over long time spans, as entailed by the characterization of stationary measures, effective macroscopic evolution laws, transport of conserved fields, homogenization, self-similar structure and scaling, critical dynamics, aging, dynamical phase transitions, large deviations, to mention only a few key items.

PARTICIPANTS

Auffinger, Antonio (New York), Bahadoran, Christophe (Aubiere), Balazs, Marton (Budapest), Beltran Ramirez, Johel (Lausanne), Bernardin, Cedric (Lyon), Bolthausen, Erwin (Zürich), Carmona, Philippe (Nantes), Carvalho Goncalves, Ana Patricia (Braga), Comets, Francis M. (Paris), Corwin, Ivan (New York), de Roeck, Wojciech (Heidelberg), Derrida, Bernard (Paris), Deuschel, Jean Dominique (Berlin), Faggionato, Alessandra (Roma), Ferrari, Patrik (Bonn), Ferrari, Pablo A. (Buenos Aires), Franco Santos Franco, Tertuliano (Rio de Janeiro), Fritz, Jozsef (Budapest), Funaki, Tadahisa (Tokyo), Giacomin, Giambattista (Paris), Grosskinsky, Stefan (Coventry), Huveneers, Francois (Louvain-la-Neuve), Jara, Milton (Paris), Kirkpatrick, Kay (New York), Klingenberg, Christian (Würzburg), Komorowski, Tomasz (Lublin), Kupiainen, Antti (Helsinki), Landim, Claudio (Rio de Janeiro), Le Bris, Claude (Marne La Vallee), Legoll, Frederic (Marne la Vallee), Lelievre, Tony (Marne La Vallee), Liverani, Carlangelo (Roma), Loulakis, Michalis (Heraklion), Lukkarinen, Jani (Helsinki), Martinelli, Fabio (Roma), Mountford, Thomas (Lausanne), Mourrat, Jean-Christophe (Lausanne), Nagy, Katalin (Budapest), Olla, Stefano (Paris), Saada, Ellen (Paris), Sasada, Makiko (Tokyo), Schütz, Gunter M. (Jülich), Seppäläinen, Timo (Madison), Sethuraman, Sunder (Ames), Spohn, Herbert (Garching), Stoltz, Gabriel (Marne La Vallee), Teixeira, Augusto (Paris), Toninelli, Cristina (Paris), Toninelli, Fabio (Lyon), Toth, Balint (Budapest), Valesin, Daniel (Lausanne), Voss, Jochen (Leeds), Zeitouni, Ofer (Minneapolis)

WORKSHOP 1046a



14.11. – 20.11.2010

Organisers:

Infinite Dimensional Lie Theory

Karl-Hermann Neeb, Darmstadt

Arturo Pianzola, Edmonton

Tudor S. Ratiu, Lausanne

ABSTRACT

The workshop focussed on recent developments in infinite-dimensional Lie theory. The talks covered a broad range of topics, such as structure and classification theory of infinite-dimensional Lie algebras, geometry of infinite-dimensional Lie groups and homogeneous spaces and representations theory of infinite-dimensional Lie groups, Lie algebras and Lie-superalgebras.

PARTICIPANTS

Beltita, Daniel (Bucharest), Billig, Yuly (Ottawa), Chernousov, Vladimir (Edmonton), Gille, Philippe (Paris), Glöckner, Helge (Paderborn), Gordina, Maria (Storrs), Grundling, Hendrik (Sydney), Janssens, Bas (Utrecht), Kumar, Shrawan (Chapel Hill), Lau, Michael K. (Quebec), Littelmann, Peter (Köln), Merigon, Stephane (Erlangen), Mickelsson, Jouko (Stockholm), Neeb, Karl-Hermann (Erlangen), Neher, Erhard (Ottawa), Odziejewicz, Anatol (Bialystok), Orsted, Bent (Aarhus), Penkov, Ivan (Bremen), Pianzola, Arturo (Edmonton, Alberta), Ratiu, Tudor S. (Lausanne), Salmasian, Hadi (Ottawa), Sasaki, Atsumu (Tokyo), Serganova, Vera V. (Berkeley), Tumpach, Alice Barbara (Villeneuve d'Ascq.), Wagner, Stefan (Erlangen), Wolf, Joseph Albert (Berkeley), Wurzbacher, Tilmann (Bochum)

WORKSHOP 1046b



14.11. – 20.11.2010

Organisers:

Representation Theory and Harmonic Analysis

Toshiyuki Kobayashi, Tokyo

Bernhard Krötz, Bonn

ABSTRACT

The workshop gave an overview of current research in the representation theory and harmonic analysis of reductive Lie groups and its relation to algebraic number theory. Some particular topics covered in the 17 talks related to unitarity questions and globalizations for Harish-Chandra modules, Fourier transformation on symmetric spaces and p -adic groups, affine Hecke algebras or the spectral theory of automorphic forms and trace formulas.

PARTICIPANTS

Aizenbud, Avraham (Cambridge), van den Ban, Erik P. (Utrecht), Bernstein, Joseph (Tel Aviv), Delorme, Patrick (Marseille), Duflo, Michel (Paris), Gimperlein, Heiko (Copenhagen), Hilgert, Joachim (Paderborn), Kobayashi, Toshiyuki (Tokyo), Krötz, Bernhard J. (Hannover), Kuit, Job Jacob (Utrecht), Lienau, Christoph (Hannover), Moellers, Jan (Paderborn), Müller, Werner (Bonn), Neretin, Yuri (Moscow), Offen, Omer (Haifa), Opdam, Eric (Amsterdam), Pevzner, Misha (Reims), Sahi, Siddhartha (New Brunswick), Sayag, Eitan (Beer-Sheva), Schlichtkrull, Henrik (Kobenhavn), Schmid, Wilfried (Cambridge), Souaifi, Sofiane (Strasbourg), Speh, Birgit (Ithaca), Stanton, Robert J. (Columbus), Vargas, Jorge (Cordoba), Yoshino, Taro (Tokyo)



28.11. – 04.12.2010

Organisers:

Teichmüller Theory

Shigeyuki Morita, Tokyo

Athanase Papadopoulos, Strasbourg

Robert C. Penner, Los Angeles

ABSTRACT

The workshop brought together people working in various aspects of the field, with a focus on recent developments. The topics discussed included higher Teichmüller theory, moduli spaces of flat connections, cluster algebras, quantization of Teichmüller spaces, the dynamical aspects of the Teichmüller and Weil-Petersson geodesic flows, the metric and the boundary theory of Teichmüller space including the new developments on Thurston's asymmetric metric, string topology, geometric analysis on moduli spaces, and relations with three-manifold topology and with minimal surface theory were also highlighted. The mapping class group was also discussed in detail, from various points of view, including its actions on simplicial complexes and on infinite-dimensional Teichmüller spaces, its asymptotic dimension, the relation with the arc operad, the generalizations of the Johnson homomorphisms to the monoid of homology cylinders, making contact with knot theory and with the Casson invariant and other 3-manifolds invariants.

PARTICIPANTS

A'Campo, Norbert (Basel), Alessandrini, Daniele (Strasbourg), Andersen, Jorgen E. (Aarhus), Bene, Alex (Kashiwa), Bødigheimer, Carl-Friedrich (Bonn), Bouschbacher, Fabien (Strasbourg), Costantino, Francesco (Strasbourg), Disarlo, Valentina (Pisa), Fock, Vladimir V. (Strasbourg), Fujikawa, Ege (Chiba-Shi), Fujiwara, Koji (Sendai), Funar, Louis (Saint-Martin-d'Heres), Guichard, Olivier (Orsay), Hamenstädt, Ursula (Bonn), Ji, Lizhen (Ann Arbor), Kashaev, Rinat (Geneve), Kaufmann, Ralph (West Lafayette), Kawazumi, Nariya (Tokyo), Kida, Yoshikata (Kyoto), Kitano, Teruaki (Tokyo), Kojima, Sadayoshi (Tokyo), Komori, Yohei (Osaka), Korkmaz, Mustafa (Ankara), Kuno, Yusuke (Hiroshima), Liu, Lixin (Guangzhou), Malouf, Ousama (Strasbourg), Masbaum, Gregor (Paris), Massuyeau, Gwenaél (Strasbourg), McShane, Greg (Saint-Martin-d'Heres), Meilhan, Jean-Baptiste (Saint-Martin-d'Heres), Möller, Martin (Frankfurt), Mondello, Gabriele (Roma), Morifuji, Takayuki (Tokyo), Morita, Shigeyuki (Tokyo), Obitsu, Kunio (Kagoshima), Ohshika, Ken'ichi (Osaka), Papadopoulos, Athanase (Strasbourg), Paris, Luis (Dijon), Penner, Robert C. (Los Angeles), Poirier, Kate (Berkeley), Said, Ahmad (Strasbourg), Sakasai, Takuya (Tokyo), Saric, Dragomir (Flushing), Sato, Masatoshi (Tokyo), Satoh, Takao (Kyoto), Sergiescu, Vlad (Saint-Martin-d'Heres), Shiga, Hiroshige (Tokyo), Sikander, Shehryar (Aarhus), Suzuki, Masaaki (Akita), Tadokoro, Yuuki (Chiba), Walsh, Cormac (Palaiseau), Wienhard, Anna Katharina (Princeton), Yamada, Sumio (Sendai)



05.12. – 11.12.2010

**Classical and Quantum Mechanical Models
of Many-Particle Systems**

Organisers:

Anton Arnold, Wien
Eric Carlen, Piscataway
Laurent Desvillettes, Cachan

ABSTRACT

The topic of this meeting were non-linear partial differential and integro-differential equations (in particular kinetic equations and their macroscopic/fluid-dynamical limits) modeling the dynamics of many-particle systems with applications in physics, engineering, and mathematical biology. Typical questions of interest were the derivation of macro-models from micro-models, the mathematical analysis (well-posedness, stability, asymptotic behavior of solutions), and "to a lesser extent" numerical aspects of such equations. A highlight of this meeting was a mini-course on the recent mathematical theory of Landau damping.

PARTICIPANTS

Aki, Gonca L. (Berlin), Arnold, Anton (Wien), Bisi, Marzia (Parma), Bobylev, Alexander W. (Karlstad), Brenier, Yann (Nice), Caglioti, Emanuele (Roma), Canizo, Jose Alfredo (Bellaterra), Caprino, Silvia (Roma), Carlen, Eric (Piscataway), Carles, Remi (Montpellier), Carrillo, Jose Antonio (Bellaterra), Carvalho, Maria da C.V. (Lisboa), Catto, Isabelle (Paris), Degond, Pierre (Toulouse), Desvillettes, Laurent (Cachan), Dolbeault, Jean (Paris), Dolera, Emanuele (Pavia), Escobedo, Miguel (Leioa), Esposito, Raffaele (L'Aquila), Fagnola, Franco (Milano), Fellner, Klemens (Cambridge), Filbet, Francis (Villeurbanne), Golse, Francois (Palaiseau), Guo, Yan (Providence), Herty, Michael (Aachen), Illner, Reinhard (Victoria), Jüngel, Ansgar (Wien), Klar, Axel (Kaiserslautern), Lu, Xuguang (Beijing), Marra, Rossana (Roma), Matthes, Daniel (Garching bei München), Michelangeli, Alessandro (München), Mischler, Stephane (Paris), Mouhot, Clement (Paris), Negulescu, Claudia (Marseille), Neumann, Lukas (Innsbruck), Nouri, Anne (Marseille), Otto, Felix (Leipzig), Pareschi, Lorenzo (Ferrara), Pulvirenti, Mario (Roma), Raoul, Gael (Cambridge), Rein, Gerhard (Bayreuth), Salvarani, Francesco (Pavia), Schmeiser, Christian (Wien), Sonnendrücker, Eric (Strasbourg), Sparber, Christof (Cambridge), Strain, Robert (Philadelphia), Vignal, Marie-Helene (Toulouse), Villani, Cedric (Paris), Wennberg, Bernt (Göteborg)

2.4. Miniworkshops

MINIWORKSHOP 1003a



17.01. – 23.01.2010

Organisers:

History of Mathematics in Germany, 1920 – 1960

Moritz Epple, Frankfurt

Volker Remmert, Mainz

Norbert Schappacher, Strasbourg

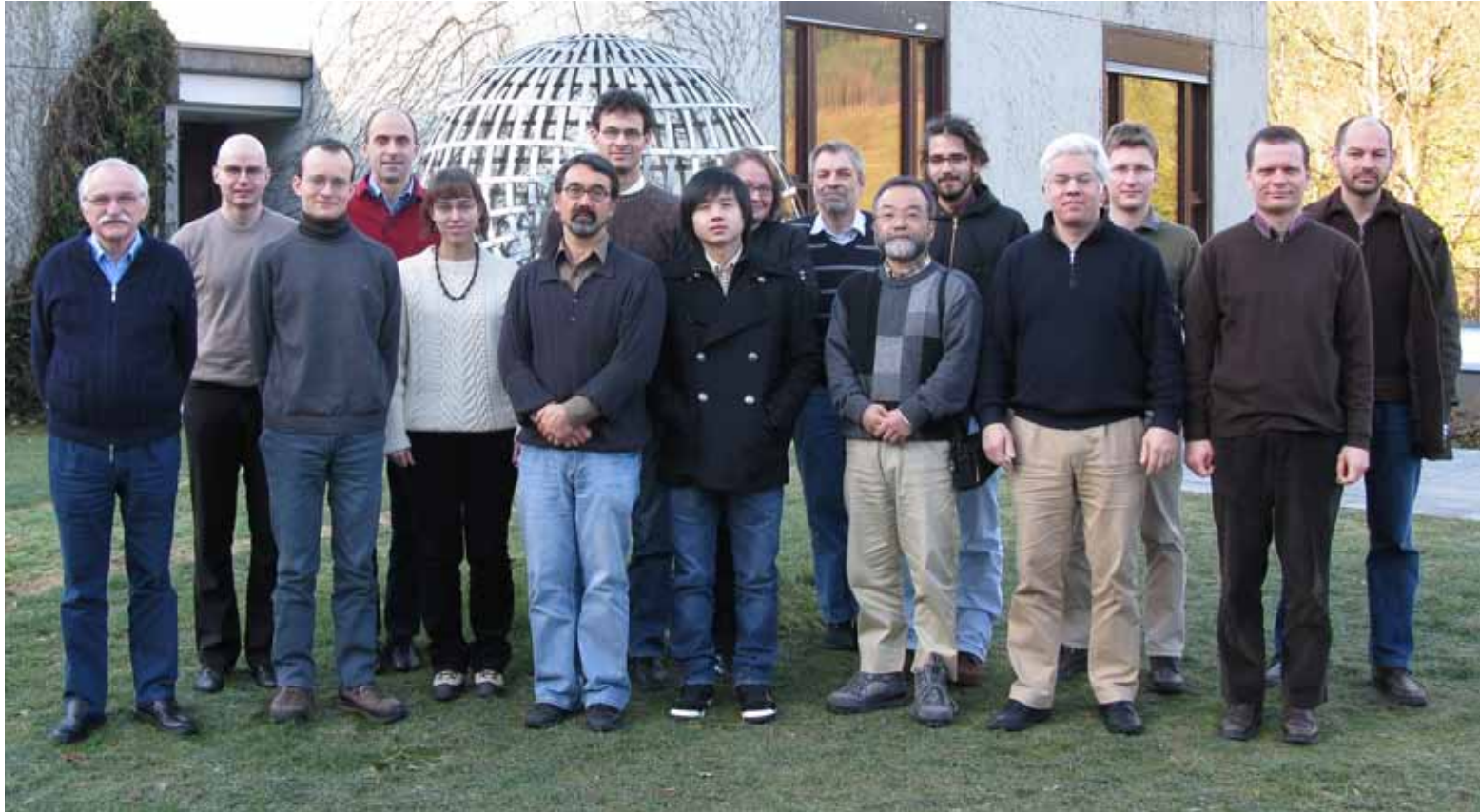
ABSTRACT

The Mini-Workshop dealt with the history of mathematics in Germany between 1920 and 1960, with a particular focus on the social history of mathematics. For the period under discussion research in the history of mathematics is faced with some fundamental problems, which cannot be addressed by individuals. Consequently the Mini-Workshop's aim was to develop future perspectives and methods for research and ways to organise new research projects. Among the topics addressed during the Mini-Workshop were the international relations of mathematicians in Germany before, during and after World War II; the prosopography of mathematicians in Germany from before 1933 into the 1950s; the role of mathematics as a key technology in World War II; and the professional policies from the 1920s to the 1950s.

PARTICIPANTS

Albrecht, Andrea (Freiburg), Bergmann, Birgit (Frankfurt am Main), Epple, Moritz (Frankfurt am Main), Hashagen, Ulf (München), Heim, Susanne (Berlin), Kranz, Philipp (Mainz), Krömer, Ralf (Siegen), Peckhaus, Volker (Paderborn), Remenyi, Maria (Mainz), Remmert, Volker (Aarhus), Schappacher, Norbert (Strasbourg), Schmaltz, Florian (Frankfurt am Main), Scholz, Erhard (Wuppertal), Schwermer, Joachim (Wien), Siegmund-Schultze, Reinhard (Kristiansand)

MINIWORKSHOP 1003b



17.01. – 23.01.2010

Organisers:

Mini-Workshop: Valuations and Integral Geometry

Semyon Alesker, Tel Aviv

Andreas Bernig, Fribourg

Franz Schuster, Wien

ABSTRACT

As a generalization of the notion of measure, valuations have long played a central role in the integral geometry of convex sets. In recent years there has been a series of striking developments. Several examples were presented at this meeting, e.g. the work of Bernig and Fu on the integral geometry of groups acting transitively on the unit sphere, that of Hug and Schneider on kinematic and Crofton formulas for tensor valued valuations and a series of results by Ludwig and Reitzner on classifications of affine invariant notions of surface areas and of convex body valued valuations.

PARTICIPANTS

Abardia, Judit (Bellaterra), Alesker, Semyon (Ramat Aviv, Tel Aviv), Berck, Gautier (Fribourg), Bernig, Andreas (Frankfurt), Fu, Joseph (Athens), Haberl, Christoph (Brooklyn), Hug, Daniel (Karlsruhe), Ludwig, Monika (Wien), Reitzner, Matthias (Osnabrück), Schneider, Rolf (Freiburg), Schuster, Franz (Wien), Solanes Farres, Gil (Bellaterra), Tasaki, Hiroyuki (Ibaraki), Tsang, Andy (Brooklyn), Wannerer, Thomas (Osnabrück), Weil, Wolfgang (Karlsruhe)



17.01. – 23.01.2010

Semiparametric Modelling of Multivariate Economic Time Series with Changing Dynamics

Organisers:

Luc Bauwens, Louvain-la-Neuve
Qiwei Yao, London
Rainer von Sachs, Louvain-la-Neuve

ABSTRACT

Modelling multivariate time series of possibly high dimension calls for appropriate dimension-reduction, e.g. by some factor modelling, additive modelling, or some simplified parametric structure for the dynamics (i.e. the serial dependence) of the time series. This workshop aimed to bring together experts in this field in order to discuss recent methodology for multivariate time series dynamics which are changing over time: by an abrupt switch between two (or more) different regimes or rather smoothly evolving over time. The emphasis has been on mathematical methods for semiparametric modelling and estimation, where "semiparametric" is to be understood in a rather broad sense: parametric models where the parameters are themselves nonparametric functions (of time), regime-switching nonparametric models with a parametric specification of the transition mechanism, and alike. An ultimate goal of these models to be applied to economic and financial time series is prediction. Another emphasis has been on comparing Bayesian with frequentist approaches, and to cover both theoretical aspects of estimation, such as consistency and efficiency, and computational aspects.

PARTICIPANTS

Barigozzi, Matteo (Bruxelles), Bauwens, Luc (Louvain-la-Neuve), Deistler, Manfred (Wien), Franke, Jürgen (Kaiserslautern), Fryzlewicz, Piotr (London), Hafner, Christian M. (Louvain-La-Neuve), Koop, Gary (Glasgow), Linton, Oliver (London), Palm, Franz (Maastricht), Rombouts, Jeroen (Montreal (Quebec)), von Sachs, Rainer (Louvain-La-Neuve), Song, Richard Song (Berlin), Teräsvirta, Timo (Aarhus), Van Bellegem, Sebastien (Toulouse), Yao, Qiwei (London)



22.08. – 28.08.2010

Organisers:

Mechanics of Cell Motion

Wolfgang Alt, Bonn

Davide Ambrosi, Milano

ABSTRACT

This mini-workshop brought together established researchers and newer entrants in the field of cell motility, a challenging research area located at the crossroads of biology, mathematics and physics. Cell locomotion occurs through complex interactions that involve, among others, actin polymerization, matrix degradation, chemical signaling, adhesion and pulling on the substrate and fibers. In recent years the spatial resolution of experiments at a cellular and sub-cellular level have revealed a landscape of unexpected behaviors that demand for the application of physics and classical mathematical methods to reveal the principles that are at the basis of cell motion in terms of adhesion, directionality, internal engines. The focus of the mini-workshop was on the fundamental research in mathematical methods for biophysics of the cell, especially on the mathematical framework for the mechanics of the actin network, the *encadrement* of cellular traction as an inverse problem and the relation between cell-to-cell communication and morphogenesis.

PARTICIPANTS

Alt, Wolfgang (Bonn), Ambrosi, Davide (Milano), Beyer, Tilo (Magdeburg), Bock, Martin (Bonn), Czirok, Andras (Kansas City), Enculescu, Mihaela (Berlin), Fuhrmann, Jan (Heidelberg), Galle, Jörg (Leipzig), Jilkine, Alexandra (Dallas), Kabla, Alexandre (Cambridge), Maree, Stan (Norwich), Ölz, Dietmar (Wien), Oliver, James (Oxford), Peruani, Fernando (Dresden), Stolarska, Magdalena (St. Paul)



22.08. – 28.08.2010

Organisers:

Combinatorics on Words

Valerie Berthe, Montpellier
Juhani Karhumäki, Turku
Dirk Nowotka, Stuttgart
Jeffrey Shallit, Waterloo

ABSTRACT

The area of combinatorics on words is concerned with properties of sequences of symbols. It is characteristic to the field that questions arise from various mathematical problems, and hence, many fundamental results on words have been established in different areas. Over the last two decades the theory has developed into a quickly growing topic of its own. This workshop was dedicated to reflect on the current status of the field, discuss the impact of recent results, and provide new research challenges. This is a report on the meeting and presentation of extended abstracts of the lectures.

PARTICIPANTS

Allouche, Jean-Paul (Orsay), Berthe, Valerie (Montpellier), Cassaigne, Julien (Marseille), Currie, James (Winnipeg), Glen, Amy (Murdoch), Harju, Tero (Turku), Holub, Stepan (Praha), Karhumäki, Juhani (Turku), de Luca, Aldo (Napoli), Nowotka, Dirk (Stuttgart), Ochem, Pascal (Orsay), Pribavkina, Elena (Ekaterinburg), Rowland, Eric (New Orleans), Saari, Kalle (Turku), Shallit, Jeffrey (Waterloo), Stoll, Thomas (Marseille), Zamboni, Luca (Villeurbanne)



22.08. – 28.08.2010

Organisers:

Exploiting Symmetry in Optimization

Volker Kaibel, Magdeburg

Leo Liberti, Palaiseau

Achill Schürmann, Delft

Renata Sotirov, Tilburg

ABSTRACT

The feasible regions of mathematical optimization models quite often exhibit a high degree of symmetry. In recent years, several groups of researchers have independently worked on algorithmic approaches to exploit such symmetries in a variety of contexts. Many of the techniques that have been developed are related or rely on similar computational tools. The workshop brought together researchers working on symmetry aspects in different areas of optimization. The exchange of state-of-the-art knowledge between these areas lead to identification of important directions for future research activities.

PARTICIPANTS

Bremner, David (Fredericton), Costa, Alberto (Palaiseau), Dutour Sikiric, Mathieu (Zagreb), Herr, Katrin (Darmstadt), Hulpke, Alexander (Fort Collins), Kaibel, Volker (Magdeburg), Koeppel, Matthias (Davis), Liberti, Leo (Palaiseau), Linderoth, Jeffrey T. (Madison), Ostrowski, James (Waterloo), Pasechnik, Dmitrii V. (Singapore), Pfetsch, Marc (Braunschweig), Rehn, Thomas (Magdeburg), Schürmann, Achill (Rostock), Smith, Barbara M. (Leeds), Sotirov, Renata (Tilburg), Vallentin, Frank (Delft)



03.10. – 09.10.2010

Organisers:

Shearlets

Gitta Kutyniok, Osnabrück

Demetrio Labate, Houston

ABSTRACT

Over the last 20 years, multiscale methods and wavelets have revolutionized the field of applied mathematics by providing an efficient means for encoding isotropic phenomena. Directional multiscale systems, particularly shearlets, are now having the same dramatic impact on the encoding of multivariate signals. Since its introduction about five years ago, the theory of shearlets has rapidly developed and gained wide recognition as the superior way of achieving a truly unified treatment in both the continuum and digital setting. By now, shearlet analysis has reached maturity as a research field, with deep mathematical results, efficient numerical methods, and a variety of high-impact applications. The main goal of the Mini-Workshop *Shearlets* was to gather the world's experts in this field in order to foster closer interaction, attack challenging open problems, and identify future research directions.

PARTICIPANTS

Bodmann, Bernhard G. (Houston), Dahlke, Stephan (Marburg), De Mari, Filippo (Genova), De Vito, Ernesto (Genova), Easley, Glenn R. (Arlington), Grohs, Philipp (Zürich), Guo, Kanghui (Springfield), Kutyniok, Gitta (Osnabrück), Labate, Demetrio (Houston), Lemvig, Jakob (Osnabrück), Lim, Wang-Q. (Osnabrück), Patel, Vishal (College Park), Sauer, Tomas (Giessen), Steidl, Gabriele (Mannheim), Teschke, Gerd (Neubrandenburg), Zhuang, Xiaosheng (Edmonton)



03.10. – 09.10.2010

Organisers:

Linear Series on Algebraic Varieties

Thomas Bauer, Marburg
Sandra Di Rocco, Stockholm
Brian Harbourne, Lincoln
Tomasz Szemberg, Krakau

ABSTRACT

Linear series have long played a central role in algebraic geometry. In recent years, starting with seminal papers by Demailly and Ein-Lazarsfeld, local properties of linear series – in particular local positivity, as measured by Seshadri constants – have come into focus. Interestingly, in their multi-point version they are closely related to the famous Nagata conjecture on plane curves. While a number of important basic results are available by now, there are still a large number of open questions and even completely open lines of research.

PARTICIPANTS

Bauer, Thomas (Marburg), Bocci, Cristiano (Siena), Cooper, Susan (Lincoln), Di Rocco, Sandra (Stockholm), Dumnicki, Marcin (Krakow), Ein, Lawrence (Chicago), Evain, Laurent (Angers), Harbourne, Brian (Lincoln), Hwang, Jun-Muk (Seoul), Jabbusch, Kelly (Stockholm), Knutsen, Andreas Leopold (Bergen), Küronya, Alex (Freiburg), Miranda, Rick (Fort Collins), Munoz, Roberto (Mostoles, Madrid), Roe, Joaquim (Bellaterra (Barcelona)), Schenck, Henry K. (Urbana), Szemberg, Tomasz (Krakow), Teitler, Zach (Boise)



03.10. – 09.10.2010

Organisers:

Higher Dimensional Elliptic Fibrations

Gavin Brown, Loughborough
Anda Degeratu, Golm
Katrin Wendland, Augsburg

ABSTRACT

Elliptic fibrations play a central role in the geometry of complex surfaces, and there is a comprehensive array of theory and examples. They arise also as a tool in many applications, such as the construction of rational points in arithmetic, metrics in differential geometry and certain string dualities in physics. In higher dimensional geometry, the foundational results of the past 30 years have not yet developed into a practical collection of everyday tools, as they have in the surface case. Nevertheless, the applications already work in higher dimensions – a glance at the literature shows the extent to which practical calculations in physics alone now far outpace the existing theory. This workshop brings together geometers, physicists and others to compare applications of elliptic fibrations and the state of the general theory.

PARTICIPANTS

Altmann, Klaus (Berlin), Brown, Gavin D. (Loughborough), Degeratu, Anda (Golm), Grassi, Antonella (Philadelphia), Katzarkov, Ludmil (Wien), Kloosterman, Remke (Berlin), McIntyre, Andrew (Bennington), Melnikov, Ilarion (Golm), Nikulin, Viacheslav V. (Moscow), Park, Jihun (Korea), Previato, Emma (Boston), Scheidegger, Emanuel (Augsburg), Schütt, Matthias (Hannover), Shepherd-Barron, Nick I. (Cambridge), Singer, Michael A. (Edinburgh), Wendland, Katrin (Augsburg)



12.12. – 18.12.2010

Organisers:

1-Motives

Luca Barbieri-Viale, Milano

Hélène Esnault, Essen

David Harari, Paris

ABSTRACT

One-motives were introduced by Deligne in 1974 [10], as a generalization of the theory of semiabelian varieties. Viewed today, after Voevodsky's theory of mixed motives [31], it can be understood as motives of level ≤ 1 . While Voevodsky's more general theory of mixed motives contains deep conjectures which at present seem to be out of reach, one-motives are much more accessible. In this mini-workshop, recent progresses were discussed: various aspects of one-motives and their realizations were explained, some applications in arithmetic algebraic geometry were given.

PARTICIPANTS

Andreatta, Fabrizio (Milano), Ayoub, Joseph (Zürich), Barbieri Viale, Luca (Milano), Bertapelle, Alessandra (Padova), Caspar, Alexander (Zürich), Esnault, Hélène (Essen), Fresan, Javier (Villetaneuse), Harari, David (Orsay), Jossen, Peter (Regensburg), Mazza, Carlo (Genova), Park, Donghoon (Essen), Riou, Joel (Orsay), Russell, Henrik (Essen), Stewart, Allen (Eugene), Szamuely, Tamas (Budapest), Zhao, Heer (Padova)



12.12. – 18.12.2010

Organisers:

Wellposedness and Controllability of Evolution Equations

Birgit Jacob, Wuppertal
Jonathan Partington, Leeds
Sandra Pott, Paderborn/Glasgow
Hans Zwart, Enschede

ABSTRACT

This mini-workshop brought together mathematicians engaged in partial differential equations, operator theory, functional analysis and harmonic analysis in order to address a number of current problems in the wellposedness and controllability of infinite-dimensional systems. This meeting was well attended with 16 participants with broad geographic representation.

PARTICIPANTS

Haak, Bernhard H. (Talence), Hytönen, Tuomas (Helsinki), Jacob, Birgit (Wuppertal), Klöss, Bernd (Tübingen), Miller, Luc (Nanterre), Nagel, Rainer (Tübingen), Opmeer, Mark (Bath), Partington, Jonathan R. (Leeds), Staffans, Olof Johan (Abo), Tucsnak, Marius (Vandoeuvre les Nancy), Wegner, Sven-Ake (Wuppertal), Weis, Lutz (Karlsruhe), Weiss, George (Ramat Aviv), Wick, Brett D. (Atlanta), Wyss, Christian (Wuppertal), Zwart, Hans (Enschede)



12.12. – 18.12.2010

Algebraic and Analytic Techniques for Polynomial Vector Fields

Organisers:

Armengol Gasull, Bellaterra
Julia Hartmann, Aachen
Jaume Llibre, Bellaterra
Sebastian Walcher, Aachen

ABSTRACT

Polynomial vector fields are in the focus of research in various areas of mathematics and its applications. As a consequence, researchers from rather different disciplines work with polynomial vector fields. The main goal of this mini workshop was to create new and consolidate existing interdisciplinary exchange on the subject.

PARTICIPANTS

Barakat, Mohamed (Kaiserslautern), Caubergh, Magdalena (Bellaterra), Christopher, Colin Jeffrey (Plymouth, Devon), Cima, Anna (Bellaterra), Derksen, Harm (Ann Arbor), Draisma, Jan (Eindhoven), Françoise, Jean-Pierre (Paris), Gasull, Armengol (Bellaterra), Hartmann, Julia (Aachen), Kemper, Gregor (Garching), Li, Chengzhi (Bellaterra), Llibre, Jaume (Bellaterra), Pantazi, Chara (Barcelona), Sanabria, Camilo (Bronx), Walcher, Sebastian (Aachen), Zerk, Eva (Aachen), Zhang, Xiang (Shanghai)

2.5. Arbeitsgemeinschaften

ARBEITSGEMEINSCHAFT 1014



04.04. – 10.04.2010

Organisers:

Mathematical Billiards

Sergei Tabachnikov, University Park

Serge Troubetzkoy, Marseille

ABSTRACT

The workshop *Mathematical Billiards*, organised by Serge Tabachnikov (Penn State) and Serge Troubetzkoy (Marseille) was held April 4th– April 10th, 2010. This meeting was well attended by over 40 participants including a number of master and PhD students, with broad geographic representation. This workshop was a nice blend of researchers with various backgrounds who brought in their various point of views to cover the classics as well as recent advances in mathematical billiards and flat surfaces. The report consists in the abstracts for the 18 lectures, followed by the abstracts for the 4 short talks that took place in the evenings. During the workshop, there was also a demo of the mathematical software Sage.

PARTICIPANTS

Arnold, Maxim (Moscow), Baryshnikov, Yuliy (Murray Hill), Beckmann, Ralf (Tübingen), Bedaride, Nicolas (Marseille), Bobok, Jozef (Praha), Brehm, Bernhard (Berlin), Chaika, Jonathan M. (Houston), Deitmar, Anton (Tübingen), Delcroix, Vincent (Marseille), Deninger, Christopher (Münster), Dudko, Dzmitry (Bremen), El Kassar, Susann (Dortmund), Gimperlein, Heiko (Copenhagen), Herrlich, Frank (Karlsruhe), Kremer, Karsten (Karlsruhe), Krüger, Tyll (Bielefeld), Lelievre, Samuel (Orsay), Li, Du (Göttingen), Link, Gabriele (Karlsruhe), Ludwig, Judith (Tübingen), Merlet, Glenn (Marseille), Mikulich, Yauhen Zhenya (Bremen), Monteil, Thierry (Montpellier), Monzner, Alexandra (Dortmund), Müller, Stefan (Seoul), Niemeyer, Robert (Riverside), Nisbach, Florian (Karlsruhe), Oliffson Kamphorst, Sylvie (Belo Horizonte), Ralston, David (Columbus), Ramirez-Ros, Rafael (Barcelona), Schleicher, Dierk (Bremen), Schmöll, Martin (Clemson), Scholbach, Jakob (Münster), Schulz, Frank (Dortmund), Selinger, Nikita (Bremen), Seri, Marcello (Bologna), Simanyi, Nandor (Birmingham), Spaeth, Peter (Seoul), Tabachnikov, Serge (University Park), Tamarit, Anna (Barcelona), Troubetzkoy, Serge (Marseille), Weitze-Schmithüsen, Gabriela (Karlsruhe), Zeytin, Ayberk (Frankfurt/M.)

ARBEITSGEMEINSCHAFT 1041



10.10. – 16.10.2010

Organisers:

Arbeitsgemeinschaft: Topological Robotics

Michael Farber, Durham

Jesus Gonzalez, Mexico

Dirk Schütz, Durham

ABSTRACT

The purpose of the Arbeitsgemeinschaft was to enable PhD students and researchers to study Topological Robotics, a new field investigating topological problems motivated by robotics and engineering as well as problems of practical robotics requiring topological tools. The topics broadly fell into the areas of Topology of configuration spaces, Topological complexity of robot motion planning algorithms and Stochastic topology.

PARTICIPANTS

Angel, Andres (Bonn), d'Antonio, Giacomo (Bremen), Babson, Eric (Davis), Baryshnikov, Yuliy (Murray Hill), Basabe, Ibai (Gainesville), Benedetti, Bruno (Berlin), Chhabra, Robin (Toronto), Cohen, Daniel C. (Baton Rouge), Colman, Hellen (Chicago), Costa, Armindo (Durham), Deeley, Kenneth (Durham), Di Fabio, Barbara (Bologna), Farber, Michael (Durham), Farley, Daniel (Oxford), Feichtner, Eva Maria (Bremen), Finster, Myriam (Karlsruhe), Franc, Aleksandra (Ljubljana), Fromm, Viktor (Durham), Gal, Swiatoslaw R. (Wroclaw), Gonzalez Espino Barros, Jesus (Mexico City), Grant, Mark (Edinburgh), Grbic, Jelena (Manchester), Grensing, Sebastian (Karlsruhe), Guillemard, Mijail (Hamburg), Gundert, Anna (Zürich), Haga, Tim (Bremen), Hamann, Marco (Dresden), Hanbury, Liz (Durham), Hanke, Bernhard (Augsburg), Horak, Danijela (Leipzig), Kappeler, Thomas (Zürich), Khristoforov, Mikhail (Saint-Petersburg), Klaus, Stephan (Oberwolfach), Kuessner, Thilo (Münster), Lu, Rongmin (Wien), Lupton, Gregory M. (Cleveland), Matschke, Benjamin (Berlin), Meshulam, Roy (Haifa), Nisbach, Florian (Karlsruhe), Olbermann, Martin (Bonn), Oprea, John F. (Cleveland), Ozornova, Viktoriya (Bonn), Raußen, Martin (Aalborg Ost), Rodenhausen, Moritz (Bonn), Ruiz, Albert (Bellaterra), Schütz, Dirk (Durham), Selinger, Nikita (Bremen), Stein, Luba (Bonn), Thorrainin, Thansri (Nagano), Tuschmann, Wilderich (Karlsruhe), Vera, Ramon (Durham), Viruel, Antonio (Malaga), Wagner, Uli (Zürich), Xicotencatl, Miguel A. (Mexico City)

2.6. Oberwolfach Seminare OBERWOLFACH SEMINAR 1021a



23.05. – 29.05.2010

Representations of Finite Groups: Local Cohomology and Support

Organisers:

Dave Benson, Aberdeen
Srikanth Iyengar, Lincoln
Henning Krause, Paderborn

ABSTRACT

The seminar discusses some unifying themes in commutative algebra, representation theory, and homotopy theory. The underlying concept is the notion of support which provides a geometric approach for studying various algebraic structures. In terms of applications, the focus will be on modular representations of finite groups. In particular, classifications of thick and localizing subcategories of the stable module categories associated to a finite group will be presented. There will be three series of lectures, starting with background material from group representation theory, commutative algebra, and the theory of derived categories. The goal is to explain local cohomology functors for specific triangulated categories and to discuss their applications.

PARTICIPANTS

Beck, Kristen A. (Arlington), Benson, David J. (Aberdeen), Burke, Jesse (Lincoln), Chen, Xiao-Wu (Paderborn), Diveris, Kosmas (Syracuse), Eghbali, Majid (Halle), Henrich, Thilo (Bonn), Hermann, Reiner (Bielefeld), Iyengar, Srikanth B. (Lincoln), Koehler, Claudia (Paderborn), Krause, Henning (Bielefeld), Langer, Martin (Münster), Lassueur, Caroline L. (Lausanne), Livesey, Michael (Aberdeen), McKemey, Robert (Manchester), Park, Sejong (Aberdeen), Psaroudakis, Chrysostomos (Ioannina), Purin, Marju (Syracuse), Reid, Fergus (Aberdeen), Robertson, Marcy (Chicago), Sane, Sarang (Mumbai), Scheretzke, Sarah (Paris), Shamir, Shoham (Bergen), Varbaro, Matteo (Genova), Warkentin, Matthias (Chemnitz), Witt, Emily E. (Ann Arbor), Xu, Fei (Bellaterra)



23.05. – 29.05.2010

Organisers:

**Semidefinite Optimization:
Theory, Algorithms and Applications**

Sanjeev Arora, Princeton
Monique Laurent, Amsterdam
Pablo A. Parrilo, Cambridge MA
Franz Rendl, Klagenfurt
Frank Vallentin, Delft

ABSTRACT

Semidefinite programming turned out to be a very powerful tool in optimization in the past decades, which applies to a great variety of research areas, including graph theory, geometry, combinatorial optimization, real algebraic geometry, quantum computing, approximation algorithms, and complexity theory. The aim of this seminar is to introduce the participants to the basic theory of semidefinite programming, to algorithmic and complexity aspects, and to a number of applications to several other fields of pure and applied mathematics. The organizers have prepared a webpage containing details about the scientific scope of the seminar.

PARTICIPANTS

Ahmadi, Amir Ali (Cambridge), Aholt, Christopher Ch. (Seattle), Allen, Peter D. (Coventry), Arora, Sanjeev (Princeton), Biswal, Punyashloka (Seattle), Böttcher, Julia (Sao Paulo), Briet, Jop (Amsterdam), Burgdorf, Sabine (Konstanz), Dong, Hongbo (Iowa City), Forster, Manuel (Zürich), Hungerländer, Philipp (Klagenfurt), Kim, Edward D. (Davis), Kolla, Alexandra (Princeton), Laurent, Monique (Amsterdam), de Oliveira Filho, Fernando M. (Tilburg), Padrol, Arnau (Barcelona), Papp, David (Piscataway), Parrilo, Pablo A. (Cambridge), Pashkovich, Kanstantsin (Magdeburg), Regts, Guus (Amsterdam), Rendl, Franz (Klagenfurt), Ryan, Christopher (Vancouver), Shah, Parikshit (Cambridge), Steurer, David (Princeton), Tulsiani, Madhur (Princeton), Vallentin, Frank (Delft), Varvitsiotis, Antonios E. (Amsterdam), Verstichel, Brecht (Zwijnaarde)



24.10. – 30.10.2010

Organisers:

The Ergodic Theory of Markov Processes

Arnaud Guillin, Clermont-Ferrand
Martin Hairer, New York
Jonathan Mattingly, Durham
Luc Rey-Bellet, Amherst

ABSTRACT

In recent years, much attention has been devoted to the study of stochastic partial differential equations (SPDEs) that arise in a number of areas like turbulence, quantum field theory, material science, spatial models in epidemiology. The solutions to such SPDEs form Markov processes, but on infinite-dimensional functional spaces. Stochastic delay equations from another class of stochastic dynamics which also produces a Markov process on an infinite dimensional space. While there are situations where the traditional tools of the theory of Markov processes can be applied to such systems, they do fail in many important cases. This spurred a number of recent advances in the theory. These have centered around the realization that the total variation metric, while very effective for countable state space Markov chains and for finite-dimensional diffusion processes, is much less useful in the infinite dimensional setting. The introduction of tools like asymptotic coupling and the asymptotic strong Feller property have lead to progress on a number of problems which had been previously out of reach. The aim of the proposed seminar is to provide young researchers with a grounding in these recent advances as well as the foundations on which they are built. In addition, there will be a few advanced lectures on related topics.

PARTICIPANTS

Barret, Florent (Palaiseau), Biskamp, Moritz (Berlin), Bou-Rabee, Nawaf (New York), Diaz-Espinosa, Oliver (Austin), Guillin, Arnaud (Aubiere), Hairer, Martin (Coventry), Heil, Hadrian (Tübingen), Hein, Claudia (Berlin), Hinz, Michael (Jena), Hwang, Sung-Ha (Amherst), Kelly, David (Coventry), Kunze, Markus Christia (Delft), Li, Liang (Heslington,), Liu, Wei (Bielefeld), Maas, Jan (Bonn), Matic, Ivan (Durham), Mattingly, Jonathan C. (Durham), Menz, Georg (Leipzig), Mohammed, Wael (Augsburg), Ouyang, Shun-Xiang (Bielefeld), Pillai, Natesh S. (Cambridge), Rey-Bellet, Luc (Amherst), Runa, Eris (Bonn), Tautenhahn, Martin (Chemnitz), Vollmer, Sebastian (Coventry), Weber, Hendrik (Coventry), Wübker, Achim (Göttingen)



24.10. – 30.10.2010

Organisers:

The Willmore Functional

Ernst Kuwert, Freiburg

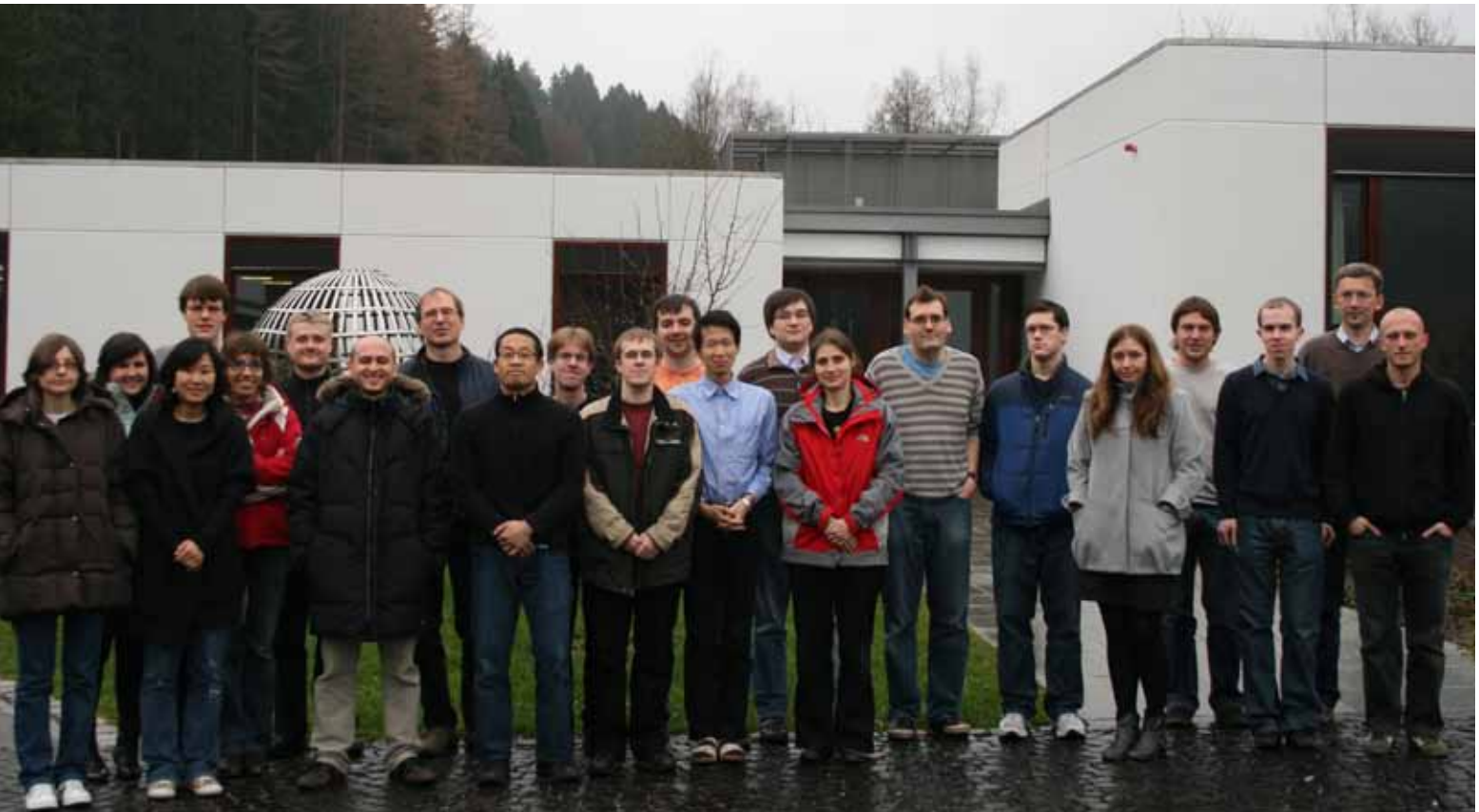
Reiner Schätzle, Tübingen

ABSTRACT

The Willmore energy of an immersed surface in Euclidean space is the integral of the squared mean curvature with respect to surface measure. The functional is of interest in differential geometry, two-dimensional elasticity and in the geometric calculus of variations. The seminar will focus on recent ideas from nonlinear partial differential equations and variational methods.

PARTICIPANTS

Baker, Charles (Canberra), Bergner, Matthias (Hannover), Bernard, Yann (Freiburg), Dall'Acqua, Anna (Magdeburg), Hammerschmidt, Adrian (Berlin), Heller, Lynn (Tübingen), Jachan, Felix (Berlin), Kewlin, Wjatscheslaw (Tübingen), Kuwert, Ernst (Freiburg), Mäder, Elena (Freiburg), Magni, Annibale (Dortmund), Mondino, Andrea (Trieste), Müller, Reto (Pisa), Müller, Lars (Regensburg), Ndiaye, Cheikh B. (Tübingen), Plotnikova, Alexandra (Novosibirsk), Raisch, Alexander (Bonn), Ruzhytska, Svitlana (Göteborg), Schaefer, Lars (Hannover), Schätzle, Reiner (Tübingen), Schygulla, Johannes (Freiburg), Sharp, Ben (Coventry), Volkmann, Alexander (Freiburg), Wheeler, Glen (Magdeburg), Xia, Chao (Freiburg), Zaal, Martijn (Amsterdam)



21.11. – 27.11.2010

Organisers:

Lipschitz Analysis

Mario Bonk, Ann Arbor

Urs Lang, Zürich

ABSTRACT

Many analytic theories that extend classical analysis to non-standard or non-smooth settings are based on the class of Lipschitz functions and maps. Examples include the Ambrosio-Kirchheim theory of metric currents, Weaver's theory of metric derivations, or Cheeger's differentiation theory. In these studies it is often important to investigate the finer properties of Lipschitz maps. This workshop will give an introduction to these recent developments. It will also include a review of some more classical results on Lipschitz functions. The two organizers will give introductory survey lectures at the beginning of the seminar. Some participants (selected by the organizers) will present more specialized subjects.

PARTICIPANTS

Bate, David (Coventry), Bonk, Mario (Los Angeles), Dore, Michael (Birmingham), Durand-Cartagena, Estibalitz (Madrid), Fernandez Leon, Aurora (Sevilla), Gimperlein, Heiko (Copenhagen), Gong, Jasun (Pittsburgh), Kajino, Naotaka (Kyoto), Khripunova, Anna (Vladimir), Lang, Urs (Zürich), Le Donne, Enrico (Zuerich), Lieb, Christian (Zürich), Meyer, Daniel (Helsinki), Nicolae, Adriana-Maria (Cluj-Napoca), Pankka, Pekka Julius (Helsinki), Riedweg, Christian (Zürich), Seo, Jeehyeon (Urbana), Smirnov, Alexander (St. Petersburg), Speight, Gareth (Coventry), Szumanska, Marta (Warszawa), Wildrick, Kevin (Jyväskylä), Williams, Marshall (Chicago), Zuest, Roger (Zürich)



21.11. – 27.11.2010

Organisers:

Mathematics of PDE Constrained Optimization

Michael Hinze, Hamburg
Michael Hintermüller, Berlin
Ronald Hoppe, Augsburg

ABSTRACT

Optimization problems subject to constraints given by partial differential equations (PDEs) with additional constraints on the control and/or state variables belong to the most challenging problem classes in industrial, medical and economical applications, where the transition from model-based numerical simulation to model-based design and optimal control is crucial. In the mathematical treatment of such optimization problems the interaction of mathematical modeling, analysis, optimization techniques and numerical simulation plays a central role. With the seminar we intend to provide a concise introduction to the state of the art in this prosperous research field. The target group of attendees contains researchers on advanced graduate and early post doc level. The topics of the seminar include modeling, analysis, as well as algorithmic, discrete, and adaptive concepts. The organizers have prepared a webpage containing details about the scientific scope of the seminar.

PARTICIPANTS

Akindeinde, Saheed Ojo (Linz), Deolmi, Giulia (Padova), Farshbaf-Shaker, M. Hassan (Regensburg), Flaig, Thomas (Neubiberg), Fraunholz, Thomas (Augsburg), Hintermüller, Michael (Berlin), Hinze, Michael (Hamburg), Hoppe, Ronald H.W. (Augsburg), Kaland, Lena (Berlin), Ketelaer, Eva (Karlsruhe), Kirchner, Alana (Garching), Klein, Markus (Tübingen), Kohls, Kristina (Duisburg), Krause, Mathias J. (Karlsruhe), Kröner, Axel (Garching), Kurics, Tamas (Budapest), Lass, Oliver (Konstanz), Löbhard, Caroline (Berlin), Mancini, Roberta (Konstanz), Neher, Johannes (Augsburg), Ovcharova, Nina (Neubiberg), Rau, Sebastian (Kaiserslautern), Steinig, Simeon (Duisburg), Strogies, Nikolai (Berlin), Surowiec, Thomas M. (Berlin)

2.7. Fortbildungsveranstaltung / Training week

TRAININGS- UND ABSCHLUß-SEMINAR FÜR DIE INTERNATIONALE MATHEMATIK-OLYMPIADE 1022



29.05.-06.06.2010

Trainings- und Abschluß-Seminar für die Internationale Mathematik-Olympiade

Organiser:

Hans-Dietrich Gronau, Rostock

ABSTRACT

The Institute hosted again the annual final training week for especially gifted German pupils to prepare for the International Mathematical Olympiad.

PARTICIPANTS

Buchholz, Simon (Unna), Graeber, Marius (Baden-Baden), Gundlach, Fabian (Neubiberg), Kaczmarczyk, Fabian (Königs Wusterhausen), Krause, Achim (Horb), Martin, Jeans-François, Pape-Lange, Julian (Peine), Penner, Markus (Berlin), Phan, Phi-Long (München), Puchert, Aaron (Jena), Reinhold, Jens (Bielefeld), Reinke, Antonia (Bonn), Sauermann, Lisa (Dresden), Schubert, Michael (Karlsruhe), Schweiger, Florian (Marktoberdorf), Standke, Christoph (Chemnitz), Thomas, Alexander (Chemnitz)



31.10.-06.11.2010

Organiser:

**Fortbildung für Mathematik- und Physiklehrer an
Gymnasien: Statistik in Theorie und Praxis**

Michael Falk, Würzburg
Hans Fischer, Eichstätt-Ingolstadt
Frank Marohn, Würzburg
Rene Michel, Frankfurt

ABSTRACT

Usually, a detailed data analysis by statistical methods and specific software packages is not included in the math curricula of secondary schools. This workshop for teachers in mathematics or physics gave an introduction to mathematical statistics with some real-life examples using the software package "R" together with the interface "RCommander". Suggestions how to enhance the math curricula of secondary schools by this subject were also discussed.

PARTICIPANTS

Falk, Michael (Würzburg), Fezer, Simon (Wendlingen), Fischer, Hans (Eichstätt), Fütterer, Stefan (Baden-Baden), Gegg, Andreas (Eichstätt), Haas, Klaus (Hausach), Junker, Klaus (Wolfach), Kutzelmann, Josef (Würzburg), Marohn, Frank (Würzburg), Michel, Rene (Würzburg), Momm, Siegfried (Künzelsau), Schlagenhaut, Reiner (Ludwigsburg), Seyboldt, Wolfgang (Friedrichshafen), Stroppel, Bernhild (Böblingen)

2.8. Research in Pairs

Die folgenden Forscher nahmen 2010 am Research in Pairs Programm teil.

MANUILOV, Vladimir / Moscow THOMSEN, Klaus / Aarhus	03.01. - 23.01.2010
MITREA, Dorina Irena / Columbia MITREA, Marius / Columbia MONNIAUX, Sylvie / Marseille	17.01. - 06.02.2010
FAUSER, Bertfried / Konstanz JARVIS, Peter David / Hobart Tas KING, Ronald C. / Southampton	07.02. - 20.02.2010
BOROS, Endre / Piscataway ELBASSIONI, Khaled M. / Saarbrücken GURVICH, Vladimir A. / Piscataway MAKINO, Kazuhisa / Tokyo	07.03. - 20.03.2010
KIRALY, Franz / Ulm MEINECKE, Frank / Berlin MÜLLER, Klaus-Robert / Berlin VON BÜNAU, Paul / Berlin	07.03. - 20.03.2010
BALDONI, Maria Welleda / Roma BERLINE, Nicole / Palaiseau KOEPE, Matthias / Davis VERGNE, Michele / Paris	21.03. - 03.04.2010
COHEN, Daniel C. / Baton Rouge FARBER, Michael / Durham	04.04. - 17.04.2010
ORNEA, Liviu / Bucharest PANOV, Dmitry / London VERBITSKY, Misha / Moscow	18.04. - 01.05.2010
VINNIKOV, Victor / Beer-Sheva KALIUZHNYI-VERBOVESTKYI, Dmitry / Philadelphia	02.05. - 15.05.2010
ROWLEY, Peter J. / Manchester PARKER, Christopher W. / Birmingham	09.05. - 22.05.2010
HOLM, Henrik / Frederiksberg CHRISTENSEN, Lars Winther / Lubbock	16.05. - 29.05.2010
GRANGER, Michel / Angers MOND, David / Coventry SCHULZE, Mathias / Stillwater	23.05. - 05.06.2010
POLETAEVA, Elena / Edinburgh SERGANOVA, Vera V. / Berkeley	23.05. - 05.06.2010
BAIER, Stephan / Bremen ZHAO, Liangyi / Singapore	06.06. - 26.06.2010
BREUER, Florian / Stellenbosch PINK, Richard / Zürich	06.06. - 19.06.2010
GORDON, Iain / Edinburgh LOSEU, Ivan / Cambridge	20.06. - 03.07.2010
TIKHOMIROV, Alexander / Syktyvkar MARKUSHEVICH, Dimitri / Villeneuve d'Ascq.	27.06. - 10.07.2010
BRAY, John N. / London HOLT, Derek F. / Coventry RONEY-DOUGAL, Colva M. / St. Andrews	04.07. - 17.07.2010
KAUFFMAN, Louis H. / Chicago LAMBROPOULOU, Sofia / Athens	18.07. - 31.07.2010

The following researchers attended the Research in Pairs Programme in 2010.

FUCHS, Dmitry B. / Davis TABACHNIKOV, Serge / University Park	17.07. - 31.07.2010
KLEP, Igor / Ljubljana SCHWEIGHOFER, Markus / Konstanz	01.08.-13.08.2010
GEKHTMAN, Michael / Notre Dame SHAPIRO, Michael / East Lansing VAINSHTAIN, Alek / Haifa	01.08. - 14.08.2010
DJAKOV, Plamen / Istanbul MITYAGIN, Boris / Columbus	15.08. - 04.09.2010
HONE, Andrew / Canterbury LAFORTUNE, Stephane / Charleston	05.09. - 18.09.2010
FILO, Jan / Bratislava PLUSCHKE, Volker / Halle	05.09. - 18.09.2010
HÄRDLE, Wolfgang / Berlin RITOV, Yaacov / Jerusalem WANG, Weining / Berlin	19.09. - 02.10.2010
DOUGLASS, Matthew / Denton PFEIFFER, Götz / Galway RÖHRLE, Gerhard / Bochum	19.09. - 02.10.2010
MATVEEV, Sergey V. / Chelyabinsk POLYAK, Michael / Haifa	03.10. - 16.10.2010
THAS, Koen / Gent SCHILLEWAERT, Jeroen Jan / Christchurch	31.10. - 13.11.2010
KHIMSHIASHVILI, Giorgi / Tbilisi PANINA, Gaiane / St. Petersburg SIERSMA, Dirk / Utrecht ZHUKOVA, Alena / St. Petersburg	31.10. - 20.11.2010
DEGTYAREV, Alexander / Ankara ITENBERG, Ilia / Strasbourg	14.11. - 27.11.2010
LOOS, Ottmar / Hagen NEHER, Erhard / Ottawa	21.11. - 11.12.2010
KUNKEL, Peter / Leipzig MEHRMANN, Volker / Berlin	28.11. - 18.12.2010



V. Manuilov, K. Thomson



D. Mitrea, M. Mitrea, S. Monniaux



B. Fauser, P. Jarvis, R. King



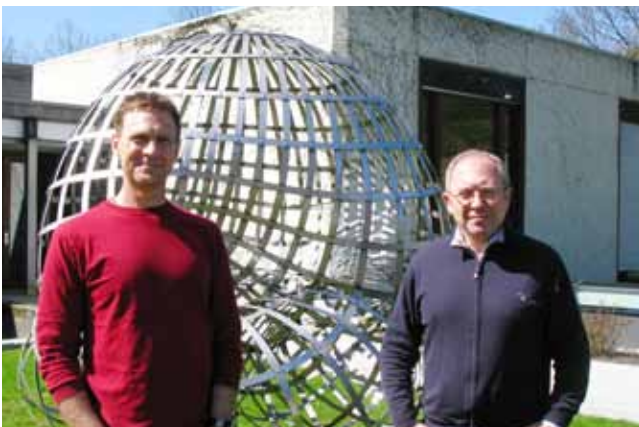
E. Boros, K. Elbassioni, V. Gurvich, K. Makino



K. Müller, F. Kiraly, P. von Büнау, F. Meinecke



M. Koepe, N. Berline, M. Baldoni, M. Vergne



D. Cohen, M. Farber



L. Ornea, M. Verbitsky, D. Panov



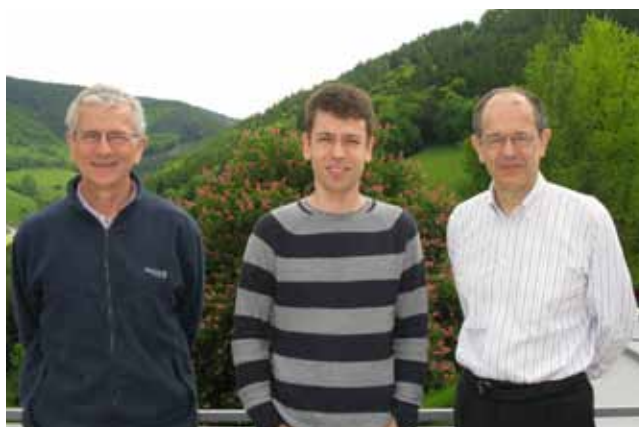
V. Vinnikov, D. Kaliuzhnyi-Verbovestkyi



P. Parker, C. Rowley



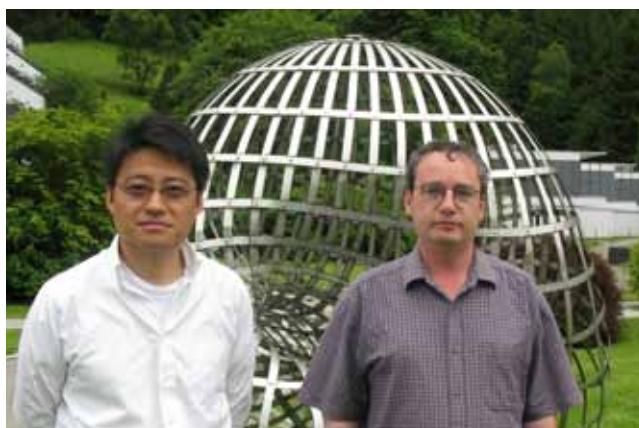
L. Christensen, H. Holm



D. Mond, M. Schulze, M. Granger



V. Serganova, E. Poletaeva



L. Zhao, S. Baier



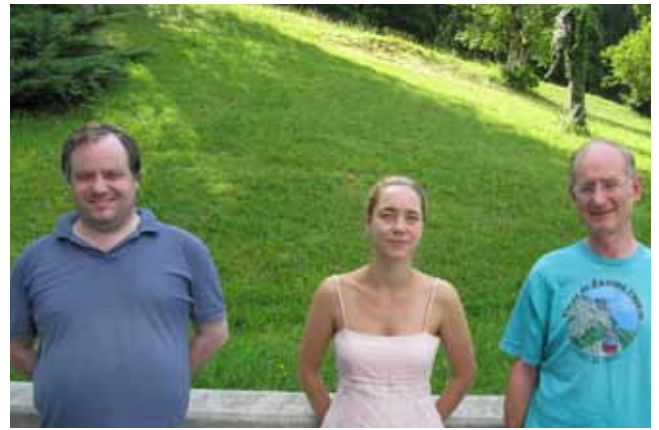
F. Breuer, R. Pink



I. Loseu, I. Gordon (photo not available)



D. Markushevich, A. Tikhomirov



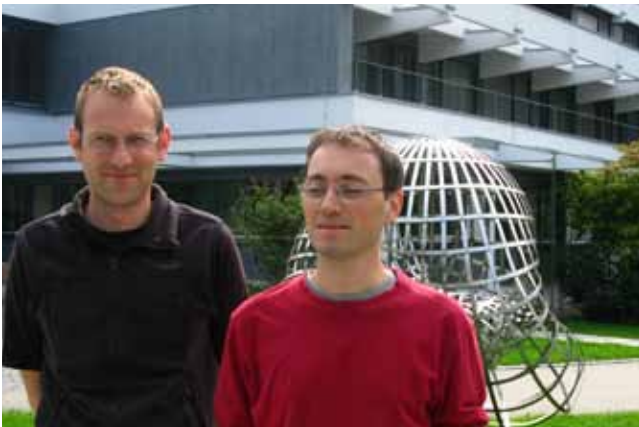
J. Bray, C. Roney-Dougal, D. Holt



L. Kauffman, S. Lambropoulou



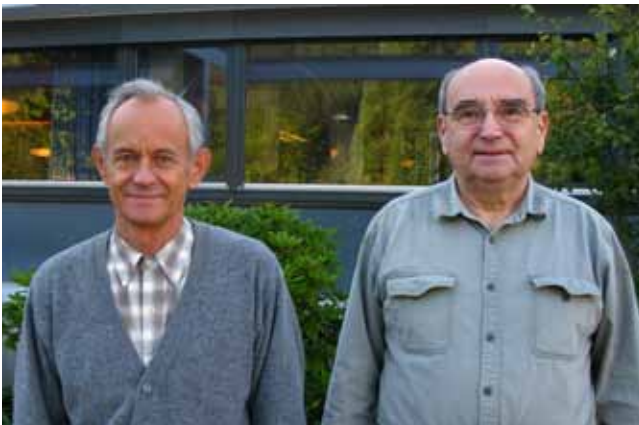
D. Fuchs, S. Tabachnikov



M. Schweighofer, I. Klep



M. Gekhtman, M. Shapiro, A. Vainshtein



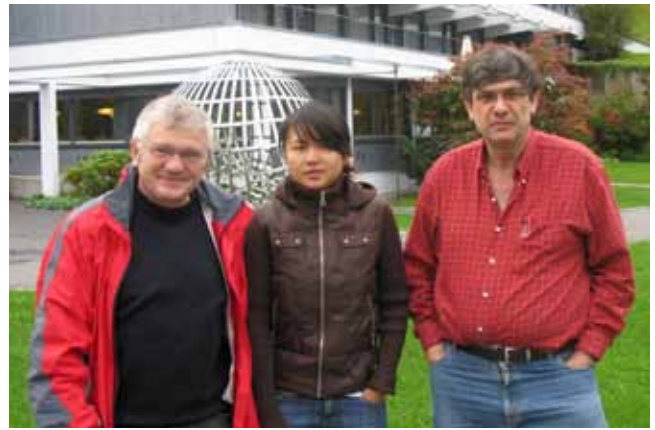
P. Djakov, B. Mityagin



A. Hone, S. Lafortune



J. Filo, V. Pluschke



W. Härdle, W. Wang, Y. Ritov



G. Pfeiffer, G. Röhrle, M. Douglass



S. Matveev, M. Polyak



K. Thas, J. Schillewaert



O. Loos, E. Neher



V. Mehrmann, P. Kunkel

2.9. Oberwolfach Leibniz Fellows

Anfang 2007 wurde am Mathematischen Forschungsinstitut Oberwolfach (MFO) ein neues Postdoktorandenprogramm eingeführt, das durch die Leibniz-Gemeinschaft gefördert wird. Ziel dieses Programms ist es, herausragende junge Mathematiker bei der Realisierung eines eigenen Forschungsprojekts während einer wichtigen Phase ihrer wissenschaftlichen Laufbahn zu unterstützen. Das MFO bietet hierfür ungestörte Arbeitsbedingungen mit einer exzellenten Infrastruktur in einem internationalen Umfeld.

Beginning in 2007 the Mathematisches Forschungsinstitut Oberwolfach (MFO) has set up a new programme for postdoctoral researchers. This programme is supported by the Leibniz-Gemeinschaft. The focus of this programme is to support outstanding young mathematical researchers in the realization of their own research projects during an important period of their scientific career. The MFO offers undisturbed working conditions with an excellent infrastructure embedded in an international environment.

OSAJDA, Damian / Warschau external guest researcher: KRÖN, Bernhard / Wien	17 weeks 1 week	01.02. – 31.05.2010 21.03. - 26.03.2010
ONARAN, Sinem / Ankara external guest researcher: GEIGES, Jörg / Köln	4 weeks 1 week	01.01. – 31.01.2010 03.01. – 08.01.2010
BODNARCHUK, Lesya / Kaiserslautern external guest researchers: OVSIENKO, Sergei A. / Kiev KOENIG, Steffen / Stuttgart CARQUEVILLE, Nils / München	4 weeks + 4 weeks 4 weeks 4 weeks + 4 weeks 1 week	04.01. - 30.01.2010 05.09. – 02.10.2010 04.01. - 29.01.2010 04.01. – 29.01.2010 06.09. – 01.10.2010 05.09. – 10.09.2010
KERNER, Dmitry / Tel Aviv without external researchers	2 weeks	15.01. – 30.01.2010
MORIER-GENOUD, Sophie / Paris external guest researcher: OVSIENKO, Valentin / Villeurbanne	8 weeks+ 5 weeks 2 weeks + 1 week 1 week 1 week	07.02. – 03.04.2010 18.04. – 22.05.2010 07.02. – 19.02.2010 13.03. – 20.03.2010 25.04. – 01.05.2010 16.05. – 22.05.2010
AISTLEITNER, Christoph / Graz external guest researchers: HORMANN, Siegfried / Brüssel ZIEGLER, Volker / Debrecen FUKUYAMA, Katusi / Kobe	13 weeks 2 week 2 week 1 week	01.04. – 30.06.2010 26.05. – 02.06.2010 05.05. – 12.05.2010 12.06. – 18.06.2010
IZHAKIAN, Zur/Ramat-Gan external guest researchers: KNEBUSCH, Manfred / Regensburg RHODES, John / Berkeley ROWEN, Louis / Ramat-Gan	3 weeks + 5 weeks 1 week + 1 week 2 weeks 1 week	25.04. – 15.05.2010 11.08. – 11.09.2010 02.05. – 08.05.2010 29.08. – 04.09.2010 15.08. – 27.08.2010 27.08. – 04.09.2010
TRAN, Van Tan / Hanoi without external researchers	10 weeks + 3 weeks	15.05. – 23.07.2010 10.10. – 31.10.2010

HERING, Milena / Minneapolis	3 weeks +	06.06. – 26.06.2010
external researcher:	3 weeks	02.08. – 20.08.2010
MACLAGAN, Diane / Piscataway	1 week	01.08. – 07.08.2010
PELAYO, Alvaro / Berkeley	5 weeks	20.06. -27.07.2010
external researchers:	1 week	03.07. – 10.07.2010
RATIU, Tudor / Lausanne	1 week	22.06. – 27.06.2010
PIRES, Ana Rita / Cambridge		
BELLAMY, Gwyn / Edinburgh	9 weeks	01.08. - 30.09.2010
external researcher:		
MARTINO, Maurizio / Bonn	1 week	05.09. – 11.09.2010
AKHTARI, Shabnam / Kinston	5 weeks	01.07. – 30.07.2010
external researcher:		
LORSCHIED, Oliver / Wuppertal	2 weeks	19.07. – 30.07.2010
ROULLEAU, Xavier / Bonn	3 weeks	01.11. – 19.11.2010
without external researcher		



S. Onaran



L. Bodnarchuk



D. Kerner



S. Morier-Genoud



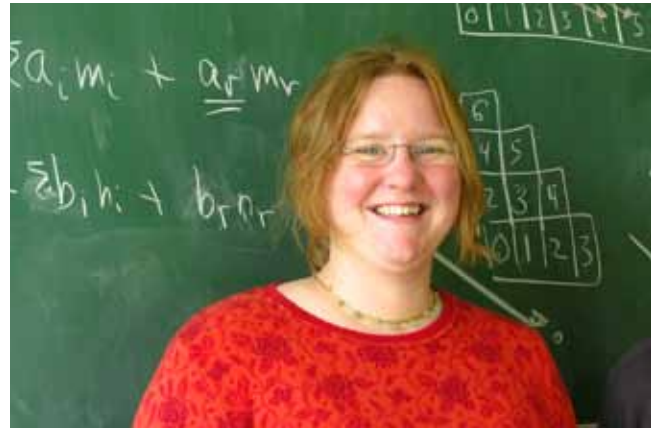
C. Aistleitner



Z. Izhakian



V. Tran



M. Hering



A. Pelayo



G. Bellamy



S. Akhtari



X. Roulleau

2.10. Publikationen 2010

Das MFO unterstützt die Idee von Open Access. Daher sind alle Publikationen auf der Webseite www.mfo.de des MFO elektronisch frei verfügbar (mit Ausnahme der Buchreihe Oberwolfach Seminars beim Birkhäuser Verlag).

Oberwolfach Reports (OWR)

OWR wird in Zusammenarbeit mit dem Publishing House der EMS veröffentlicht und enthält die Ergebnisse der Workshops, Miniworkshops und Arbeitsgemeinschaften in Form von extended abstracts der Vorträge. In 2010 sind die Bände OWR 7.1 bis 7.4 mit mehr als 3.300 Seiten erschienen.

Oberwolfach Seminars (OWS)

OWS ist eine Buchreihe in Zusammenarbeit mit dem Birkhäuser Verlag (Basel), die den Stoff der Oberwolfach Seminare für Doktoranden, Postdocs und interessierte Forscher zugänglich macht. In 2010 wurden zwei Titel publiziert:

- Oberwolfach Seminars vol. 40 (2010), 164 Seiten
Titel: Conformal Differential Geometry
Autoren: Baum, Helga; Juhl, Andreas
- Oberwolfach Seminars vol. 41 (2010), 220 Seiten
Titel: Classification of Higher Dimension Algebraic Varieties
Autoren: Hacon, Christopher D.; Kovács, Sándor

Oberwolfach Preprints (OWP)

In OWP werden Resultate von längerfristigen Forschungsaufenthalten (RiP und OWLF) publiziert, aber auch von mathematischen Vorträgen am MFO im Rahmen von besonderen Veranstaltungen, z.B. der Oberwolfach Vorlesung. In 2010 sind die folgenden Preprints erschienen:

- OWP 2010 - 22
Title: Stochastic Mean Payoff Games: Smoothed Analysis and Approximation Schemes
Authors: Endre Boros, Khaled Elbassioni, Mahmoud Fouz, Vladimir Gurvich, Kazuhisa Makino and Bodo Manthey (RiP 2010)
- OWP 2010 - 21
Title: Unconditional Convergence of Spectral Decompositions of 1D Dirac Operators with Regular Boundary Conditions
Authors: Plamen Djakov and Boris Mityagin (RiP 2010)
- OWP 2010 - 20
Title: Supertropical Matrix Algebra III: Powers of Matrices and Generalized Eigenspaces
Authors: Zur Izhakian and Louis Rowen (OWLF 2010)
- OWP 2010 - 19
Title: Non-Integrated Defect Relation for Meromorphic Maps of Complete Kähler Manifolds into a Projective Variety Intersecting Hypersurfaces
Authors: Tran Van Tan and Vu Van Truong (OWLF 2010)
- OWP 2010 - 18
Title: On Selfinjective Artin Algebras Having Generalized Standard Quasitubes
Authors: Maciej Karpicz, Andrzej Skowroński and Kunio Yamagata (RiP 2009)
- OWP 2010 - 17
Title: Semi-Invertible Extensions of C^* -Algebras
Authors: Vladimir Manuilov and Klaus Thomsen (RiP 2010)
- OWP 2010 - 16
Title: Shape Theory and Extensions of C^* -Algebras
Authors: Vladimir Manuilov and Klaus Thomsen (RiP 2010)

2.10. Publications 2010

The MFO supports the idea of Open Access. Hence, all publications are freely available on the website www.mfo.de of the MFO (with the exception of the book series Oberwolfach Seminars from Birkhäuser).

Oberwolfach Reports (OWR)

OWR is published in cooperation with the EMS publishing house and contains extended abstracts of the talks in the workshops miniworkshops and Arbeitsgemeinschaften. In 2010, the issues OWR 7.1 to 7.4 were published with more than 3,300 pages in total.

Oberwolfach Seminars (OWS)

In order to make the Oberwolfach Seminars available to an even larger audience, the MFO supports the publication within the book series OWS, published in cooperation with Birkhäuser (Basel). In 2010, two books were published:

Oberwolfach Preprints (OWP)

OWP mainly contains research results related to a longer stay in Oberwolfach (RiP and OWLF), but this can also include an Oberwolfach Lecture, for example. The following preprints were published in 2010:

- OWP 2010 - 15
Title: Weak-Duality Based Adaptive Finite Element Methods for PDE-Constrained Optimization with Pointwise Gradient State-Constraints
Authors: M. Hintermüller, M. Hinze, and R. H. W. Hoppe (OWLF 2009)
- OWP 2010 - 14
Title: Supertropical Linear Algebra
Authors: Zur Izhakian, Manfred Knebusch, and Louis Rowen (OWLF 2009/10)
- OWP 2010 - 13
Title: Locally Conformally Kähler Manifolds Admitting a Holomorphic Conformal Flow
Authors: Liviu Ornea and Misha Verbitsky (RiP 2010)
- OWP 2010 - 12
Title: Plethysms, Replicated Schur Functions and Series, with Applications to Vertex Operators
Authors: Bertfried Fauser, Peter D. Jarvis, and Ronald C. King (RiP 2010)
- OWP 2010 - 11
Title: On the Complement of the Dense Orbit for a Quiver of Type A
Authors: Karin Baur and Lutz Hille (OWLF 2009)
- OWP 2010 - 10
Title: A Series of Algebras Generalizing the Octonions and Hurwitz-Radon Identity
Authors: Sophie Morier-Genoud and Valentin Ovsienko (OWLF 2010)
- OWP 2010 - 09
Title: On the Complement of the Richardson Orbit
Authors: Karin Baur and Lutz Hille (RiP 2009)
- OWP 2010 - 08
Title: Spectral Sequences in Combinatorial Geometry: Cheeses, Inscribed Sets, and Borsuk-Ulam Type Theorems
Authors: Pavle V. M. Blagojević, Aleksandra Dimitrijević Blagojević and John McCleary (RiP 2009)
- OWP 2010 - 07
Title: Representation Theory of Non-Commutative Association Schemes of Order
Authors: Akihito Hanaki and Paul-Hermann Zieschang (RiP 2009)
- OWP 2010 - 06
Title: On Generalizations of Kac-Moody Groups
Authors: Rieuwert J. Blok and Corneliu Hoffman (RiP 2009)
- OWP 2010 - 05
Title: Supertropical Semirings and Supervaluations
Authors: Zur Izhakian, Manfred Knebusch, and Louis Rowen (OWLF 2009)
- OWP 2010 - 04
Title: A Construction of Hyperbolic Coxeter Groups
Author: Damian Osajda (OWLF 2009/10)
- OWP 2010 - 03
Title: Fibonacci-like Unimodal Inverse Limit Spaces
Authors: H. Bruin and S. Štimac (RiP 2009)
- OWP 2010 - 02
Title: The Ingram Conjecture
Authors: M. Barge, H. Bruin and S. Štimac (RiP 2009)
- OWP 2010 - 01
Title: There is a Unique Real Tight Contact 3-Ball
Authors: Ferit Öztürk and Nermin Salepci (OWLF 2009)

3. Sachlicher und Finanzieller Teil

3.1. Übersicht der Bereiche

Die wissenschaftliche Arbeit der Gastforscher am Institut wird durch eine effiziente Infrastruktur ermöglicht.

Von besonderer Bedeutung ist dabei die Bibliothek, die in der mathematischen Forschung eine ähnliche Rolle spielt wie das Labor in den Naturwissenschaften. Die Bibliothek des MFO zählt zu den weltweit besten Spezialbibliotheken in der Mathematik und steht den Wissenschaftlern Tag und Nacht zur Verfügung.

Daneben spielt der Bereich der Informationstechnologie eine wichtige Rolle, einerseits direkt für die wissenschaftliche Arbeit (elektronische Publikationen, Datenbanken und mathematische Software), andererseits auch für die weltweite Kommunikation der Forscher untereinander (Email, Internet und Informationsdienste).

Zur Planung, Durchführung und Begleitung der wissenschaftlichen Programme waren am Institut etwa 20 Stellen in den Bereichen der wissenschaftlichen Verwaltung, Bibliothek, IT-Abteilung, Verwaltungsleitung, Gästebetreuung und Hauswirtschaft besetzt. Für die effiziente konzentrierte Arbeit der Forscher am MFO sind dabei die abgeschiedene Lage, die hervorragende wissenschaftliche Infrastruktur, und nicht zuletzt auch die ideale Betreuung einschließlich Unterbringung und Verpflegung im Gästehaus, direkt neben dem Tagungs- und Bibliotheksgebäude, wichtige Faktoren.

Die folgenden Abschnitte geben einen eingehenden Bericht über die genannten Bereiche.

3.2 Bibliothek

Die Bibliothek ist und bleibt für die Wissenschaftler in Oberwolfach das wichtigste Arbeitsmittel. Vor allem die Forscher in den Programmen „Research in Pairs“ und „Oberwolfach Leibniz Fellows“ nutzen die Bibliothek äußerst intensiv, aber auch für die Teilnehmer der einzelnen Workshops ist sie unverzichtbar. Immer wieder kommen Mathematiker nach Oberwolfach, um Literatur zu bearbeiten, die für sie sonst nicht zugänglich ist. Als Präsenzbibliothek ist sie für die Teilnehmer der Forschungsprogramme rund um die Uhr geöffnet. Neben dem hohen internationalen Standard des wissenschaftlichen Programms und den exzellenten Rahmenbedingungen für den persönlichen Gedankenaustausch ist

3. General and financial statements

3.1. Overview on the divisions

The MFO has set up an excellent infrastructure for scientific research activities.

The library represents a vital part of this infrastructure and plays an important role, similar to laboratories in experimental sciences. The MFO's library is one of the world's most excellent libraries in mathematics and can be used by the guest researchers 24 hours a day.

But also information technology is of great importance for assisting research activities (electronic publications, database and mathematical software), and also to ensure worldwide communication among the scientific community (e-mail, internet, and information services).

For the planning and realization of the scientific programme approximately 20 positions in various divisions, such as scientific and administration management, library, IT-service, guest service, and housekeeping are provided. Besides the excellent scientific infrastructure it is also the institute's remote location, and the excellent service with board and lodging in our guest house close to the conference and library building, that guarantees efficient and concentrated working conditions for our guests.

In the following detailed information will be given on the various divisions.

3.2 Library

The library has been and stays the most important working tool for scientific research at Oberwolfach. It is used most intensively especially by the researchers visiting the MFO as part of the Research in Pairs Programme and the Oberwolfach Leibniz Fellow Programme, but also by the participants of the workshop programme. Repeatedly, mathematicians are visiting Oberwolfach in order to use literature to which they wouldn't have access otherwise. As a reference library, it can be used by the Institute's guests 24 hours a day. Besides the high international standard of the scientific programme and the excellent working conditions, the library is an important factor for the high

die Bibliothek ein wichtiger Grund für das hohe Ansehen des MFO weltweit. Angesichts dramatisch steigender Preise bei den wissenschaftlichen Zeitschriften ist es schwierig, das erreichte Niveau zu halten oder gar zu steigern. Dies war nur möglich durch das Förderprogramm „Literaturerwerbungen der DFG-Sondersammelgebiete und Spezialbibliotheken“ der Deutschen Forschungsgemeinschaft (DFG) und durch Spenden der Carl Friedrich von Siemens Stiftung sowie durch Sachspenden von Verlagen.

Das MFO nimmt seit 1995 am Südwestdeutschen Bibliotheksverbund (SWB) teil. Die Arbeit im Verbund sowie die durch das Bibliotheksservice-Zentrum Baden-Württemberg (BSZ) als betreuende Institution bereitgestellte Software bedeuten für das Institut eine erhebliche Erleichterung bei der Verwaltung der Bibliotheksbestände.

3.2.1. Bestandsüberblick

Zum Jahresende 2010 belief sich der im elektronischen Katalog nachgewiesene Gesamtbestand an Büchern auf etwa 49.500 Bände. Hinzu kamen 27.000 Zeitschriftenbände. Darüber hinaus standen den Institutsgästen ca. 4.000 Dissertationen, 524 laufende Zeitschriften-Abonnements in gedruckter Form sowie über 4.000 lizenzierte elektronische Zeitschriften zur Verfügung.

3.2.2. Bestandsentwicklung

Der Bestand an Büchern wurde im Jahr 2010 um insgesamt 2.000 Bände vermehrt. Davon hat die Bibliothek 543 Bände im Rahmen der ständigen Buchausstellung erhalten. 265 Bücher wurden mit Mitteln der Deutschen Forschungsgemeinschaft (DFG) erworben. Mit Mitteln der Siemens Stiftung wurden 138 Bücher erworben.

Zum Jahresende 2010 hat das MFO 524 Zeitschriften laufend bezogen. Davon wurden 376 durch ein reguläres Abonnement gegen Rechnung bezogen, von denen wiederum 29 die DFG finanziert hat; 77 Titel erhielten wir im Rahmen eines Tauschabkommens und weitere 56 Titel erhielten wir als Geschenk.

Um die Versorgung mit elektronischer Fachinformation an deutschen Hochschulen, Forschungseinrichtungen und wissenschaftlichen Bibliotheken nachhaltig zu verbessern, finanziert die Deutsche Forschungsgemeinschaft seit 2004 den Erwerb von Nationallizenzen und bietet diese den einzelnen Einrichtungen kostenlos an. Das MFO hat im Rahmen dieser Nationallizenzen zusätzlich zu den etwa 540 regulären elektronischen Zeitschriftenabonnements weitere ca. 4.000 Zeitschriften elektronisch zur Verfügung stellen können.

reputation of the MFO worldwide. In times of dramatically increasing prices for scientific journals it is difficult to keep this level; this has only been possible because of support from the Deutsche Forschungsgemeinschaft (DFG), a donation from the Carl-Friedrich von Siemens Stiftung and book donations from publishing houses.

Since 1995 the MFO has been a member of the Südwestdeutscher Bibliotheksverbund (SWB), which, together with the software provided by the Bibliotheksservice-Zentrum Baden-Württemberg (BSZ) as supporting institution, facilitates the cataloguing of our library collection enormously.

3.2.1. Overview of the inventory

By the end of 2010 the stock of books included in our electronic catalogue totalled approx. 49,500 volumes and approx. 27,000 volumes of bound journals. In addition to that, approx. 4,000 dissertations, 524 current subscriptions to journals as well as more than 4,000 licensed electronic journals were available to the institute's guests.

3.2.2. Development of the inventory

The book inventory increased in 2010 by 2,000 volumes in total; 543 of these were donations for the permanent book exhibition. 265 volumes were financed through means of the Deutsche Forschungsgemeinschaft (DFG). 138 volumes were bought with means from the Siemens Stiftung.

By the end of 2010, the institute subscribed to 524 journals, 376 of those by regular subscription on account, 77 within an exchange agreement, and 56 were received as donations.

In order to substantially improve the acquisition of digital scientific literature by German universities, research centres and scientific libraries, the DFG started in 2004 to finance national licenses and to offer them for free to the institutions. Within this programme of German national licenses the Institute has been able to provide further 4,000 electronic journals in addition to the 540 regular electronic subscriptions.

3.2.3. Buchausstellung

Die ständige Buchausstellung gibt interessierten wissenschaftlichen Verlagen die Möglichkeit, ihre Neuerscheinungen im Bereich Mathematik am MFO über einen längeren Zeitraum zu präsentieren. Einige der wichtigsten Verlagshäuser weltweit beteiligen sich teilweise mit ihrem gesamten mathematischen Programm daran. Insgesamt gingen 543 Bücher von 33 verschiedenen Verlagen im Rahmen der Buchausstellung in den Bibliotheksbestand ein.

3.2.4. Fotosammlung

Das MFO verfügt über eine sehr große Sammlung an Mathematiker-Porträts, zusammengetragen durch Herrn Prof. Dr. Konrad Jacobs, Erlangen. Diese Sammlung ist im Jahr 2004 mit Hilfe des Springer Verlags Heidelberg digitalisiert worden; sie steht im Internet mit verschiedenen Recherche-Funktionen frei zur Verfügung. Die Sammlung ist auch im Jahr 2010 stark angewachsen. Neben den 583 institutseigenen Fotos kamen weitere aus verschiedenen Quellen hinzu. Besonders erwähnen möchten wir an dieser Stelle nochmals Prof. George M. Bergman, der regelmäßig seine neuesten Aufnahmen für die Oberwolfacher Sammlung zur Verfügung stellt. Ende 2010 waren ca. 12.100 Fotos in der Datenbank enthalten.

3.2.5. DFG-Projekt: Oberwolfach Digital Archive

Das von der DFG seit September 2008 geförderte Projekt hat zum Ziel, die Vortragsbücher, Gästebücher, Tagungsberichte sowie weiteres, vorrangig archivarisches Material, das Geschichte und Arbeitsweise des MFO seit seiner Gründung 1944 dokumentiert, zu digitalisieren, formal und inhaltlich zu erschließen sowie durch Mikroverfilmung langfristig zu bewahren. Am Ende des Projekts wird eine umfassende Datenbank in Form eines Online-Archivs stehen, das über das Internet der Forschung frei zugänglich gemacht wird.

Die Arbeit an dem Projekt konnte in 2010 weiter vorangetrieben werden. Die Projekt-Website <http://oda.mfo.de> wurde deutlich verbessert, Erschließungsdaten eingespielt sowie die Suchfunktionen angepasst und erweitert. Seit August 2010 stehen alle Tagungsberichte bis einschließlich 1998, die Vortragsbücher bis einschließlich 2008 sowie die ersten 4 Gästebücher über das Online-Archiv frei zur Verfügung und können in einem eigens dafür entwickelten Viewer gelesen oder heruntergeladen werden.

3.2.3. Book exhibition

The permanent book exhibition is an offer for interested scientific publishing houses to present their latest mathematical releases at the Institute over a longer period. Some of the most important publishing houses worldwide use this platform to present their programme in mathematical sciences. Consequently 543 books from 33 different publishing houses have become part of the library's collection within the year 2010.

3.2.4. Photo collection

The MFO owns a large photo-collection of mathematicians which is based on the collection of Prof. Dr. Konrad Jacobs, Erlangen. In 2004, the collection was digitalised with the help of Springer Verlag, Heidelberg, and since then has been freely available on the internet with several research functions. The collection has grown again in 2010. Apart from the 583 institute-own photos, further pictures have come from various sources. We want to give special recognition here once again to Prof. George M. Bergman, who regularly provides his newest pictures for the Oberwolfach collection. By the end of 2010 the database listed approx. 12,100 photographs.

3.2.5. DFG project: Oberwolfach Digital Archive

This project is supported by the DFG since September 2008 and aims at the digitisation, preservation, and long-term microfilm archiving of the old, hand-written lecture books, guest books, conference proceedings, and further archived documentation. These originals were collected since the foundation of the institute in 1944. Once the project is completed, a comprehensive database in the form of an online-archive will be freely available via the internet for mathematical research.

Work on this project progressed further in 2010. The project-website <http://oda.mfo.de> was significantly improved, descriptive data was added and the search functions were adjusted and expanded. Since August 2010 all Workshop Reports up to 1998, all Books of Abstracts up to 2008 as well as the first four Guest Books are freely accessible via the online-archive and can be viewed and downloaded in a specially developed Viewer.

3.2.6. DFG-Projekt „Ausbau und Erweiterung des Bibliotheksbestandes am MFO“

Seit dem Jahr 2004 hat die Deutsche Forschungsgemeinschaft die Bibliothek des MFO jährlich mit 30.000 (2004-2007) bzw. 40.000 (2008-2010) Euro unterstützt. Mit diesen Mitteln konnten insgesamt 1.464 Monographien sowie jährlich ca. 30 Zeitschriften-Abonnements aus dem asiatischen und osteuropäischen Raum finanziert werden. Wir möchten der DFG an dieser Stelle ganz herzlich für die langjährige Unterstützung danken. Da das entsprechende Förderprogramm der DFG nach umfangreichen Änderungen in der Förderstruktur zum Ende des Jahres 2010 auslief, ist eine Fortsetzung dieses Projekts nicht mehr möglich. Für 2011 wurde auf Anregung der DFG ein neues Projekt in einer neuen Förderlinie beantragt.

3.3. IT-Bereich

Zweck der IT am MFO ist, den Gastforschern und den Verwaltungsmitarbeitern effiziente Arbeitsmöglichkeiten zu bieten. Neben den üblichen Kommunikationsmitteln – Web, E-Mail, Remote Login, Dateitransfer, Office-Produkte – beinhaltet dies Literaturrecherche und Zugriff auf online verfügbare Fachzeitschriften, die Nutzung mathematischer Software auf einem Computerserver, sowie die technische Ausstattung von Vortragssälen und Bibliothek.

Die Mitarbeiter nutzen datenbankgestützte Anwendungen für die Verwaltung der Tagungen, der Bibliothek und der Finanzen. Darüber hinaus stehen die Webdienste des Instituts der Gesamtheit der Wissenschaftler zur Verfügung.

Diese umfassen

- die regulären Webseiten
- die Oberwolfach References on Mathematical Software
- die Fotosammlung
- den Bibliothekskatalog
- die Oberwolfach Reports
- das Oberwolfach Digital Archive
- die elektronischen Abonnements für anwesende Nutzer

3.3.1. Bestand Ende 2010

Hardware

- Redundante Internetanbindung über das Deutsche Forschungsnetz (DFN-Verein) mit einer 20 Mbit/s und einer 7 Mbit/s Standleitung
- LAN mit Gigabit Ethernet Backbone und Fast Ethernet Peripherie, verteilt auf 5 Knoten in 3 Gebäuden mit ca. 150 Twisted Pair Anschlüssen und 6 WLAN Access Points

3.2.6. DFG-project „Expansion of the library collection at the MFO“

Since the year 2004 the Deutsche Forschungsgemeinschaft (DFG) supported the library of the MFO with 30,000 (2004-2007) respectively 40,000 (2008-2010) Euro. With these funds 1,464 monographs as well as annually ca. 30 journal-subscriptions from Asia and Eastern Europe were funded. We would like to thank the DFG most sincerely for their long lasting support. Due to extensive changes in the support structure, the corresponding support programme of the DFG was discontinued in 2010, making the continuation of this project impossible. Upon suggestion by the DFG a new project in a different support programme was applied for in 2011.

3.3. IT Division

The purpose of the IT at the MFO is to provide guest researchers and administrative staff with efficient working conditions. Besides the usual means of communication, i. e. web, e-mail, remote login, file transfer, office products, this also comprises retrieval of literature and access to online scientific journals, the use of mathematical software on an application server, and finally the technical equipment of lecture rooms and the library.

Staff members use databased applications for the administration of conferences, the library and for the financial accounting. In addition, the web services of the Institute are at the disposal of the whole scientific community.

They comprise

- the regular web pages
- the Oberwolfach References on Mathematical Software
- the Oberwolfach Photo Collection
- the library catalogue
- the Oberwolfach Reports
- the Oberwolfach Digital Archive
- the subscribed electronic journals for local users

3.3.1. Stock by the end of 2010

Hardware

- Redundant Internet connection via the Deutsches Forschungsnetz (DFN-Verein) with 20 Mbit/s and 7 Mbit/s leased lines, resp.
- Local Area Network with Gigabit Ethernet backbone and Fast Ethernet periphery, distributed over 3 buildings with 5 nodes with about 150 Twisted Pair connectors and 6 wireless access points

- 2 Virtualisierungshosts mit ca. 10 virtuellen Servern sowie 4 konventionelle Server, teils für zentrale Dienste, teils als Terminal Server für die Arbeitsplätze
- Im Wissenschaftsbereich 23 fest installierte Arbeitsplätze, 15 Laptoparbeitsplätze, 11 Zimmer mit Netzwerkanschluß, WLAN
- Im Verwaltungsbereich 16 Arbeitsplätze

Software

Auf dem allen Gastforschern zugänglichen Compu-teserver sind etwa 10 der am meisten nachgefragten wissenschaftlichen Softwaresysteme installiert, sowohl kommerzielle wie Maple, Mathematica und Magma als auch freie wie Singular, GAP, Cocoa und Surfer. Schon Ende der achtziger Jahre wurde wegen der speziellen Anforderungen des Tagungsbetriebs am MFO eine eigene datenbankgestützte Software entwickelt. Ferner wird die Finanzbuchhaltungs- und Finanzplanungssoftware Office Line 100 der Firma Sage sowie mit Unterstützung des Bibliotheksservice-zentrums des Südwestdeutschen Bibliotheksverbundes (BSZ) die Bibliothekssoftware Horizon am MFO eingesetzt.

3.3.2. Entwicklungen und Neuerungen im Jahr 2010

Das Kernstück der IT-gestützten Verwaltung ist seit vielen Jahren die Tagungsverwaltungssoftware, die stark in die Arbeitsläufe und IT-Prozesse am MFO integriert ist. Ihre Ablösung durch eine moderne datenbankbasierte Webanwendung ist derzeit das wichtigste und umfangreichste Projekt. Aufgrund der speziellen Anforderungen fiel die Entscheidung wiederum zugunsten einer Eigenentwicklung. Dazu haben 2010 zahlreiche Arbeiten stattgefunden. Die neue Software wird bereits zur Generierung der dynamischen Webseiten und zur Recherche genutzt.

Ein wichtiger Schritt zur Konsolidierung der Serverlandschaft war die Virtualisierung: die Migration der meisten Server auf zwei Virtualisierungshosts mit VMWare ESX 4.0. Gleichzeitig wurden sämtliche Nutzerdaten und Systemdaten in einen zentralen Datenspeicher (SAN) überführt. Sämtliche Geräte wurden durch eine neue, leistungsstärkere USV abgesichert. Dadurch wurden eine größere Flexibilität, eine höhere Leistung und eine bessere Auslastung der Ressourcen bei gleichzeitiger Reduzierung von Geräteanzahl und Stromverbrauch erreicht.

Das Institut ist jetzt redundant ans Internet angebunden. Vom DFN wurde eine zweite Glasfaserleitung gelegt, vonseiten des Instituts wurden zwei neue Router integriert. Außerdem wurden Infrastruktur und Netzverfügbarkeit für die zunehmend eingesetzten mobile Endgeräte

- 2 virtualisation hosts with ca. 10 virtual servers plus 4 conventional servers, partly for central services, partly as terminal servers for the workplaces
- The scientific subnet offers 23 fixed terminals, 15 workplaces for laptops, 11 rooms with network connection, wireless network
- The administrative subnet offers 16 workplaces

Software

About 10 of the most popular mathematical software systems are installed on a dedicated application server accessible to all guest researchers. Among the systems installed are both commercial ones like Maple, Mathematica, and Magma and freely distributed ones like Singular, GAP, Cocoa and Surfer. Because of its special requirements the MFO's conference management software has been developed already in the late 1980s. Furthermore, the staff uses the financial accounting and planning software Sage OfficeLine 100, and, supported by the Bibliotheksservicezentrum of the Südwestdeutscher Bibliotheksverbund (BSZ), the librarian software Horizon.

3.3.2. Developments and innovations in 2010

Since many years the conference management software is the core of the IT-based administration, highly integrated into the workflows at the MFO. To replace it by a modern databased web application is the most important and the most involved of the current projects. Because of its special requirements it was decided once again to develop it in-house. In 2010 many steps have been taken to this end. The new software is already active generating the dynamical web pages and offering information retrieval.

Virtualisation was a major step in consolidating our stock of servers. Most of the servers have been migrated onto two virtualisation hosts running VMWare ESX 4.0. Simultaneously all user and system data have been transferred into a Storage Area Network. All machines are protected now by a new, well-sized Uninterruptable Power Supply. This yields a higher flexibility and performance and an improved utilization of the resources along with a reduction of the server units and power consumption.

Now the Institute has a failsafe connection to the Internet: The DFN installed a second glass fibre cable to this end while the Institute integrated two new routers into the network. Apart from this, the network infrastructure has been optimised for the increasing use of mobile

wie Smartphones und Notebooks optimiert.

Am 30. Januar 2010 eröffnete in Oberwolfach das MiMa, ein Museum, das interaktive mathematische Exponate mit der bestehenden Mineraliensammlung kombiniert. Die mathematischen Exponate wurden vom IMAGINARY-Team des MFO konzipiert und installiert, ihre Betreuung liegt beim IT-Bereich des Instituts.

3.3.3. ORMS

Mathematische Software entwickelte sich in den letzten zwanzig Jahren zu einem etablierten Werkzeug mathematischer Forschung und Lehre, deren Stellenwert in einigen Bereichen inzwischen dem der mathematischen Literatur vergleichbar ist. Doch es gab bisher nur rudimentäre Sammlungen mathematischer Software. Die „Oberwolfach References on Mathematical Software“ (ORMS) sollen diese Lücke schließen. Dies beinhaltet einerseits eine web-basierte Sammlung von detaillierten Informationen und Querverweisen, andererseits ein Klassifikationsschema mathematischer Software, das die gesamte thematische Breite mathematischer Software erfassen soll.

Die in den ORMS dokumentierten Systeme sind sorgfältig ausgewählt und umfassen sowohl Mehrzweck- als auch spezialisierte Systeme bis hin zu spezifischen Implementierungen von Algorithmen für besondere mathematische Forschungsprobleme, und auch Lehrsoftware. Die Benutzer können die Aufnahme weiterer Softwaresysteme in die Datenbank vorschlagen. Die Entscheidung darüber trifft der wissenschaftliche Beirat der ORMS. Registrierte Autoren können ihre Projekte in der ORMS-Datenbank direkt bearbeiten. Weitere Informationen finden sich auf der Homepage, <http://orms.mfo.de>.

Im Jahr 2010 ist das ORMS-Projekt auf einen neuen Server umgezogen, der schnellere und skalierbare Auslieferung der Seiten gewährleisten soll.

Darüber hinaus hat das Institut erfolgreich ein neues Projekt mit Namen SMATH beantragt, das ORMS ergänzen soll. SMATH ist ein Gemeinschaftsprojekt zusammen mit dem FIZ Karlsruhe. Finanziert wird es durch die Leibniz-Gemeinschaft.

Ziel von SMATH ist die Erstellung einer Open-Access Datenbank für mathematische Software. Es soll mit dem riesigen Bestand an Reviews mathematischer Publikationen im Zentralblatt (FIZ Karlsruhe) und der spezialisierten Datenbank ORMS verknüpft werden. Hauptziel ist die

devices like smartphones and notebooks.

On 30 January 2010, the MiMa opened in Oberwolfach, a museum, which combines interactive mathematical exhibits with the established collection of minerals. The mathematical exhibits were conceived and installed by the IMANGINARY team of the MFO and are supervised by the Institute's IT group.

3.3.3. ORMS

During the last twenty years, mathematical software has become an established tool in mathematical research and education. In some fields, its importance is comparable to that of mathematical literature. However, collections of mathematical software so far only exist in a rudimentary manner. The intention of the 'Oberwolfach References on Mathematical Software' (ORMS) project is to fill this gap. This includes a web-interfaced collection of detailed information and links on the one hand, and on the other hand a classification scheme for mathematical software eventually aiming to cover all thematic aspects of mathematical software.

The systems documented in ORMS are carefully selected and comprise general purpose software systems, teaching software, as well as more specialized packages, up to specific implementations of algorithms for particular mathematical research problems. ORMS users can suggest the inclusion of further software systems into the database. The ORMS advisory board decides on these proposals. Registered authors can edit their projects directly in the ORMS database. More information can be found on the ORMS web page, <http://orms.mfo.de>.

In 2010 the ORMS project moved a new server which should provide much better performance and scalability.

Moreover, the institute successfully applied for a new project SMATH which is related to the Oberwolfach References on Mathematical Software (ORMS). SMATH is a joint project by the MFO and 'FIZ Karlsruhe' and it is financed by the Leibniz-Gemeinschaft.

Its aim is to create an extensive open access database SMATH on mathematical software. This will be connected with the huge database of ZBMATH (Zentralblatt Math, FIZ Karlsruhe) with reviews of mathematical publications and with our more specialized database ORMS. The

Zuordnung von Software zu reviewten Veröffentlichungen, die diese zitieren.

main purpose is to provide a direct link between a mathematical software package used in a published and reviewed paper and its representation in SMATH.

Zur Zeit liegt das Hauptaugenmerk bei der Entwicklung von ORMS in SMATH. SMATH wird eine große Rolle für die Zukunft von ORMS spielen, weil dadurch regelmäßig auf sehr systematische Weise Software für ORMS identifiziert werden kann.

The current focus of ORMS lies on the development of SMATH. SMATH will have a substantial impact on ORMS because it should provide a systematic and continuous way of identifying software suitable for ORMS.

Das ORMS-Projekt wird durch Gert-Martin Greuel geleitet und koordiniert; verantwortlich für die Entwicklung ist Michael Brickenstein.

The ORMS project is directed and coordinated by Gert-Martin Greuel, and Michael Brickenstein is responsible for support and development.

ORMS Advisory board

Arjeh M. Cohen	(Computational Algebra, Lie groups, OpenMath)
Iain S. Duff	(Numerical Linear Algebra, Sparse Matrices)
Andreas Griewank	(Nonlinear Optimization, Algorithmic/Automatic Differentiation)
Wolfgang Härdle	(Statistics, Econometrics)
Michael Joswig	(Geometric Combinatorics, Polyhedral Computation, Computational, Geometry, Discrete and Linear Optimization)
Erich Kaltofen	(Straight-line Program/Black-Box Representation, Symbolic Linear Algebra, Symbolic-numeric Computation, Generic Software)
Nobuki Takayama	(Computational Algebraic Analysis, Integration of Mathematical Software Systems)

3.4. Zu Verwaltung und Hauswirtschaft

Aufgrund der Beschlüsse der Gemeinsame Wissenschaftskonferenz GWK (bis 2007 Bund-Länder-Kommission für Bildungsplanung und Forschungsförderung) erstellt das MFO als Mitglied der Leibniz-Gemeinschaft seit dem Haushaltsjahr 2006 ein Programmbudget als Grundlage für die gemeinsame Finanzierung durch Bund und Länder.

Das Tagungsgebäude liegt dem Gästehaus direkt gegenüber und wurde mit Mitteln der VolkswagenStiftung erbaut. Es bietet den Forschungsgästen exzellente Arbeitsmöglichkeiten und umfasst die Bibliothek, mehrere Vortragsräume sowie Computerarbeitsplätze. Ferner ist die wissenschaftliche Verwaltung dort untergebracht. Die Nähe von Tagungsgebäude und Gästehaus erweist sich als sehr effizient, bietet sie den Wissenschaftlern doch rund um die Uhr die Möglichkeit zu kreativer Arbeit, was intensiv genutzt wird.

Der Verwaltungsbereich umfasst derzeit 9,22 besetzte Stellen für die wissenschaftliche Verwaltung (Organisation der Workshops), die Bibliothek, die IT sowie für die allgemeine Verwaltung (Finanzverwaltung, Beschaffungswesen, Personalsachbearbeitung, Vertragswesen, Bausanierung, usw.) und die Gästebetreuung.

Der Hauswirtschaftsbereich des Instituts unterstützt die Durchführung der wissenschaftlichen Programme, indem die Gastforscher im Gästehaus des Instituts Unterkunft und Verpflegung erhalten. Das Gästehaus wurde mit Mitteln der VolkswagenStiftung erbaut und 1967 eingeweiht. Die Wissenschaftler sind überwiegend in Einzelzimmern untergebracht, jedoch gibt es auch 8 größere Appartements sowie 5 Bungalows. Dadurch sind auch längere Aufenthalte im Rahmen des RiP-Programms und des neuen Oberwolfach-Leibniz-Fellows-Programms möglich. Der Hauswirtschaftsbereich umfasst insgesamt 12 Stellen für Küche und Zimmerservice sowie für die Pflege von Gebäuden und Grundstück. Aufgrund ihres Alters ist vor allem die Pflege der Gebäude von größter Bedeutung.

Im Frühjahr 2010 konnten die Sanierungsmaßnahmen im Gästehaus abgeschlossen werden.

3.4. Administration and House-keeping

According to the resolution of the Joint Science Conference (former: Federal State-Länder-committee for education and research), the MFO, as a member of the Leibniz-Gemeinschaft, has established a budget-plan since 2006 as a basis for the common financing by the federation of Germany and the federal states.

The library building is located immediately opposite the guest house and was built with funds from the VolkswagenStiftung. Hosting the library, several lecture halls and numerous computer stations it offers excellent working conditions for scientific research. The offices of the scientific administration are also part of this building. The short distance between the guest house and the library building has proved very convenient as it offers scientists the possibility to work at any time, which is used extensively.

The administration encompasses at the moment 9.22 positions, covering scientific administration (planning and organisation of the scientific programme), library, IT-services and general administration (financial management, purchasing, personnel administration, contracts, renovation measures etc.) as well as guest liaison and support.

Since board and lodging is provided by the Institute, housekeeping is also an important part of the realisation of the scientific programme at the MFO. The guest house was built with funds from the VolkswagenStiftung and inaugurated in 1967. Accommodation of the scientists is mainly provided in single rooms. In addition to that, 8 apartments and 5 bungalows enable a longer stay at the MFO within the Research in Pairs programme and the Oberwolfach-Leibniz-Fellows programme. The housekeeping department comprises 12 positions for kitchen and room service as well as for the maintenance of the buildings and premises. Due to their age, particularly the maintenance of the buildings is of greatest importance.

The renovation measures in the guesthouse have been terminated in spring 2010.

3.5. Finanzielle Übersicht 2010 3.5. Financial Overview 2010

Gesamtübersicht

General Overview

Erlöse 2010

(gerundet auf 1.000 Euro)

Zuwendung Bund/Länder (inkl. Mittel für Bausanierung)

Drittmittel

Spenden

Sonstige Einnahmen

Zweckgebundene Reste aus 2009

Summe Erlöse:

Revenues 2010

(rounded)

Benefits from the federation/federal states (incl. subsidy for renovation measures)

Third party funds

Donations

Other income

Earmarked surpluses

Total revenues:

2.254.000

289.000

79.000

147.000

589.000

3.358.000

Aufwendungen 2010

(gerundet auf 1.000 Euro)

Personalausgaben

Materialaufwand

Aufwand für bezogene Leistungen (inkl. Bausanierungsmaßnahmen Gästehaus und energetischer Sanierung der Bibliothek)

Abschreibungen

Sonstige Aufwendungen (inkl. Sachausgaben Bibliothek)

Rückstellungen für zweckgebundene Reste (Sanierung und Drittmittel)

Investitionen

Summe Aufwendungen:

Expenses 2010

(rounded)

Personnel department

Purchases

Expenses for drawn benefits (incl. renovation of buildings and energetic remediation of the library)

Consumption of fixed capital

Other expenses (incl. material expenses for the library)

Provisions for earmarked surpluses (Renovation an third party funds)

Investments

Total expenses:

1.100.000

299.000

676.000

70.000

992.000

166.000

55.000

3.358.000

Erläuterungen

Die Drittmittel wurden dem Haushaltsjahr zugerechnet, für das sie zugewiesen wurden.

Der Anteil von Drittmitteln, Spenden und sonstigen Einnahmen bezogen auf die Gesamtsumme der Erlöse, liegt im Haushaltsjahr 2010 bei 18 % (unberücksichtigt sind hierbei die übertragenen Mittel aus 2009 für die Bausanierung).

Öffentliche Mittel

Das MFO erhielt im Haushaltsjahr 2010 insgesamt 2,254 Mio. Euro Zuwendung von Bund und Ländern.

Drittmittel

Die projektbezogenen Drittmittel rekrutierten sich im Haushaltsjahr 2010 insbesondere aus Mitteln der Deutschen Forschungsgemeinschaft (DFG), der National Science Foundation (NSF), der Carl Friedrich von Siemens Stiftung und der Japan Association for Mathematical Sciences (JAMS).

Förderverein und Oberwolfach Stiftung

Zweckgebundene Spenden erhielt das MFO auch im Haushaltsjahr 2010 vom Förderverein und der Oberwolfach-Stiftung. Die Gelder wurden für Reisekostenzuschüsse für osteuropäische Wissenschaftler und als Zuschuss für die Sanierungsmaßnahmen verwendet.

3.6. Dank

Ein besonders herzliches Dankeschön gilt den Zuwendungsgebern, insbesondere dem Land Baden-Württemberg und dem Bund für die umfangreichen Mittel, die für die Generalsanierung zur Verfügung gestellt wurden. Weiter gilt unser Dank allen Drittmittelgebern wie der Deutschen Forschungsgemeinschaft (DFG), der Carl Friedrich von Siemens Stiftung, der National Science Foundation (NSF) und der Japan Association of Math. Science (JAMS). Und ein Dankeschön natürlich auch an den Förderverein und die Oberwolfach Stiftung für die großzügige Unterstützung des MFO.

Explanations

The third party funds were attributed to the fiscal year they were assigned to.

The proportion of private resources (own income, third-party-funds and donations) of the total sum of revenues is 18 % (here the earmarked surpluses from 2009 concerning the renovation were disregarded)

Public Funding

In the fiscal year 2010 the MFO received 2.254 million Euro funding from the federation and the federal states.

Third-party funds

Earmarked third party funds in the fiscal year 2010 are mainly composed of the grants from the Deutschen Forschungsgemeinschaft (DFG), the National Science Foundation (NSF), the Carl Friedrich von Siemens Foundation and the Japan Association for Mathematical Sciences (JAMS).

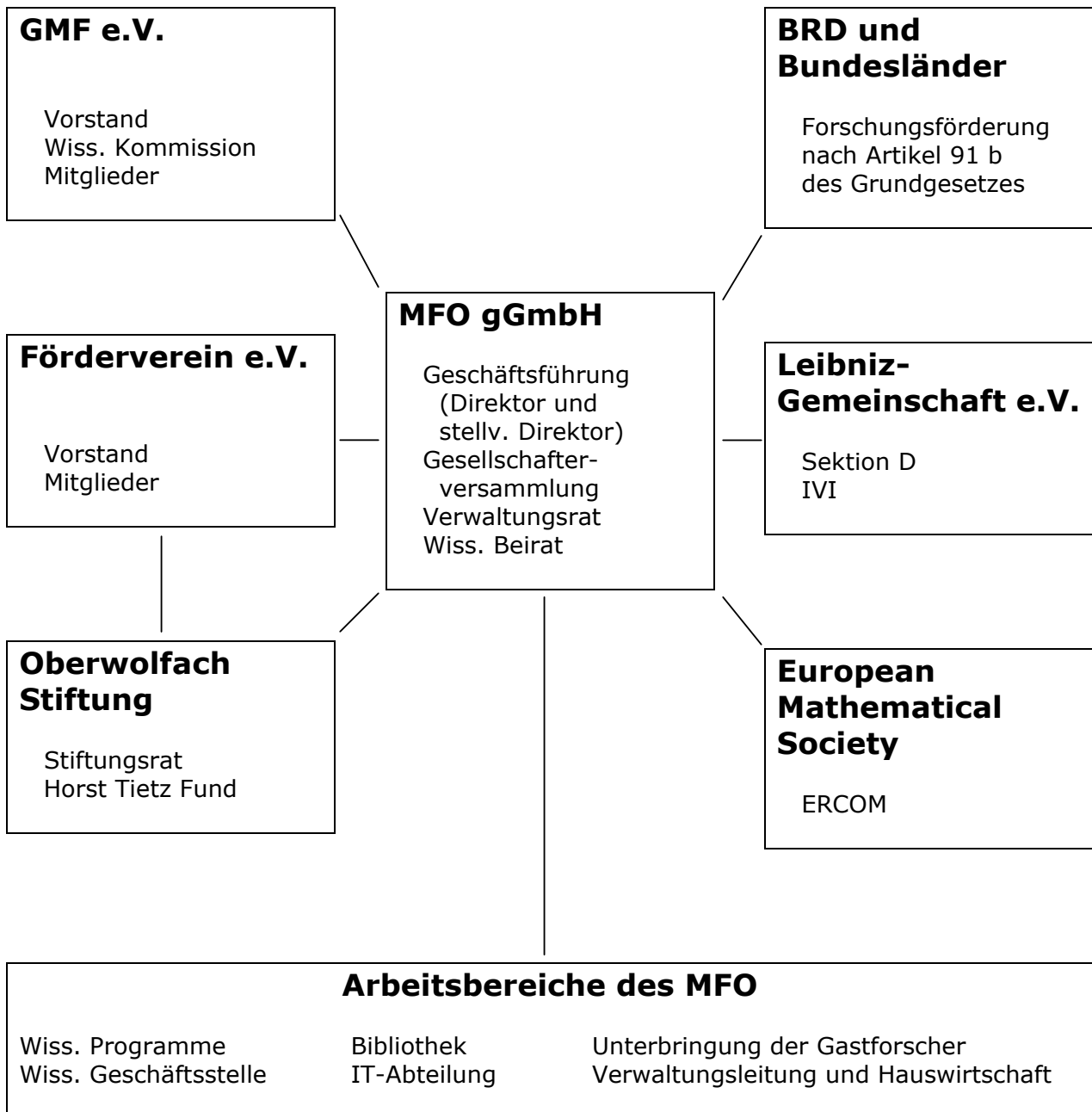
Förderverein und Oberwolfach Stiftung

Earmarked donations have been received by the Förderverein and the Oberwolfach Stiftung. These funds have been used to support Eastern European scientists and as additional support for the renovation measures.

3.6. Acknowledgement

Finally, we would like to express our sincerest thanks to the Federation and the Land of Baden-Württemberg for their considerable financial support for the refurbishment of our Institute. We would also like to thank for the third-party funds received from the Deutsche Forschungsgemeinschaft (DFG), the Carl Friedrich von Siemens Stiftung, the National Science Foundation (NSF) and the Japan Association of Math. Sciences (JAMS). Our special thank you also goes to the Förderverein and the Oberwolfach Foundation for their important support of the MFO.

3.7. Organigramm des Mathematischen Forschungsinstituts Oberwolfach



Erläuterungen

Das Mathematische Forschungsinstitut Oberwolfach (MFO) ist seit April 2005 eine gemeinnützige GmbH. Die Geschäftsführung des MFO besteht aus Direktor und stellvertretendem Direktor. Alleinigere Gesellschafter des MFO ist die Gesellschaft für mathematische Forschung e.V. (GMF), die durch ihren Vorstand vertreten wird. Das MFO wird von der Bundesrepublik Deutschland und den Bundesländern im Rahmen der Forschungsförderung nach Artikel 91b des Grundgesetzes gemeinschaftlich finanziert, wobei das Sitzland Baden-Württemberg eine besondere Rolle einnimmt. Dabei ist die Mitgliedschaft des MFO in der Leibniz-Gemeinschaft Bestandteil der gemeinschaftlichen Finanzierung. Die Zuwendungsgeber sind im Verwaltungsrat des MFO vertreten, der als wichtigstes Aufsichtsgremium über die mittel- und langfristige Finanz- und Budgetplanung entscheidet. Institut und Verwaltungsrat werden dabei vom wissenschaftlichen Beirat des MFO beraten, dem 6 bis 8 international angesehene Mathematiker angehören. Ferner ist das MFO Mitglied in ERCOM (European Research Centres on Mathematics), einem Komitee der European Mathematical Society.

Die Gesellschaft für mathematische Forschung e.V. (GMF) hat ca. 70 Mitglieder, darunter die drei institutionellen Mitglieder DMV (Deutsche Mathematiker-Vereinigung), GAMM (Gesellschaft für angewandte Mathematik und Mechanik) und Förderverein. Die GMF ist Eigentümer des Grundstücks und der Institutsgebäude des MFO. Der Vorstand der GMF besteht aus dem Vorstandsvorsitzenden, dem Schatzmeister und dem Vorsitzenden der wissenschaftlichen Kommission. Die wissenschaftliche Kommission der GMF besteht aus ca. 20 - 25 international angesehenen Mathematikern und ist in Abstimmung mit der Geschäftsführung des MFO zuständig für die Forschungs- und Entwicklungsplanung sowie die aktuelle wissenschaftliche Arbeitsplanung des MFO.

Der Verein zur Förderung des Mathematischen Forschungsinstituts Oberwolfach e.V. (Förderverein) hat mehr als 700 Mitglieder, die das MFO durch Mitgliedsbeiträge zusätzlich finanziell unterstützen. Die Oberwolfach Stiftung, die im Förderverein als nicht rechtsfähige Stiftung gegründet wurde, sammelt Stiftungskapital aus dem wirtschaftlichen und dem privaten Bereich. Dabei spielt der Horst Tietz Fund als Sondervermögen innerhalb der Oberwolfach Stiftung eine besondere Rolle. Die Erträge des Stiftungskapitals kommen dem MFO zu Gute.

Explanations

Since April 2005 the Mathematisches Forschungsinstitut Oberwolfach has been registered as a non-profit corporation (gemeinnützige GmbH). The MFO is headed by a Director supported by a Vice Director. The sole associate of the MFO is the Gesellschaft für Mathematische Forschung e.V. (GMF), represented by its board. Financing of the MFO is shared by the Federal Republic of Germany and the Federal States according to article 91b (research financing) of the Basic Law of the Federal Republic of Germany with emphasis on the local state of Baden-Württemberg. Being a member of the Leibniz-Gemeinschaft is a prerequisite for the common financing. The financial partners are represented in the Administrative Council (Verwaltungsrat) of the MFO, which in its function as most important supervisory panel decides on the medium- and long-term finance- and budget planning. The Institute and the Administrative Council are supported by the Scientific Advisory Board (wissenschaftlicher Beirat) which is composed of 6 to 8 internationally renowned mathematicians. Moreover, the MFO is a member of ERCOM (European Research Centres on Mathematics), a committee of the European Mathematical Society.

The Gesellschaft für mathematische Forschung e.V. (GMF) consists of about 70 members, including three institutional members, namely DMV (Deutsche Mathematiker-Vereinigung), GAMM (Gesellschaft für angewandte Mathematik und Mechanik) and the Förderverein. The GMF is the legal owner of the site and of the buildings of the MFO, and the head of the society is formed by the chairman, the treasurer, and the chairman of the Scientific Committee. The Scientific Committee of the GMF is composed of about 20 to 25 internationally renowned mathematicians and is responsible for the research and development planning, as well as for running decisions on scientific proposals, in agreement with the head of the MFO.

The Verein zur Förderung des Mathematischen Forschungsinstituts Oberwolfach e.V. (Förderverein) has more than 700 members and provides additional financial support for the MFO by its membership fees. The Oberwolfach Foundation (Oberwolfach Stiftung), a foundation of public utility within the Förderverein, provides further financial support by economic and private means. Within the Oberwolfach Stiftung the Horst Tietz Fund plays an important role by providing special funds.

Beschäftigte des MFO**Staff of the MFO****(2010)****Wissenschaftliche Verwaltung**

Direktor
 Stellvertretender Direktor
 Assistent des Direktors
 Externer Assistent
 Sekretärin für Workshops
 Sekretärin für Workshops
 Sekretärin für RiP und Seminare

Scientific Administration

Director
 Vice Director
 Assistant to the Director
 External Assistant
 Secretary for Workshops
 Secretary for Workshops
 Secretary for RiP and Seminars

Prof. Dr. Dr. h.c. Gert-Martin Greuel
 Prof. Dr. Horst Knörrer
 PD Dr. habil. Stephan Klaus
 Dr. Andreas D. Matt
 Silke Okon
 Andrea Schillinger
 Petra Bäsell

Verwaltung

Verwaltungsleitung
 Sekretärin im Gästebüro
 Sekretärin im Gästebüro
 Bibliothekarin
 Sekretärin der Bibliothek
 Systemverwalter
 Systemverwalter
 Software Entwickler

Administration

Head of Administration
 Secretary in the Guest Office
 Secretary in the Guest Office
 Librarian
 Library Secretary
 System Administrator
 System Administrator
 Software Developer

Susanne Riester
 Katrin Breithaupt
 Annette Disch
 Verena Franke/ Ivonne Vetter
 Renate Schmid
 Helmut Kastenholz
 Christoph Weber
 Dr. Michael Brickenstein

Hauswirtschaft

Hauswirtschaftsleiterin
 Hausmeister
 Weitere Beschäftigte

Housekeeping

Housekeeping Manager
 Caretaker
 Further Housekeeping Staff

Charlotte Endres
 Helmut Breithaupt
 (ca. 10 Personen)

Verwaltungsrat des MFO/Administrative Council of the MFO

(Mitglieder/Members 2010)

Tania Bolius	Ministerium für Wissenschaft, Forschung und Kunst, Stuttgart, (Vorsitzende/Chair)
Dr.-Ing. Heike Prasse	Bundesministerium für Bildung und Forschung, Bonn, (stellvertretende Vorsitzende/Vice Chair)
Prof. Dr. Jean-Pierre Bourguignon	Director of the Institut des Hautes Études Scientifiques, Bures-sur-Yvette
Prof. Dr. Dr. h.c. mult. Willi Jäger	Interdisziplinäres Zentrum für wiss. Rechnen und Institut für angewandte Mathematik, University of Heidelberg
Prof. Dr. Hanspeter Kraft	Mathematisches Institut, University of Basel
Prof. Dr. Stefan Müller	Max Planck Institute for Mathematics in the Sciences, Leipzig
Friedrich Simson	Ministerium für Wirtschaft und Wissenschaft, Saarbrücken
Dr. h.c. Klaus Tschira	Geschäftsführer der Klaus Tschira Stiftung gGmbH, Heidelberg
Dr. Ina Willms-Hoff	VolkswagenStiftung, Hannover

Wissenschaftlicher Beirat des MFO/Scientific Advisory Board of the MFO

(Mitglieder/Members 2010)

Prof. Dr. Stefan Müller, Leipzig (Chair)
 Prof. Dr. Frances C. Kirwan, Oxford (Vice Chair)
 Prof. Dr. Ingrid Daubechies, Princeton
 Prof. Dr. Björn Engquist, Austin/Stockholm
 Prof. Dr. Gerd Faltings, Bonn
 Prof. Dr. Madhu Sudan, MIT Cambridge

Gesellschaft für Mathematische Forschung e.V. (GMF)

Vorstand der GMF/Head of the GMF

(Mitglieder/Members 2010)

Prof. Dr. Dr. h.c. Willi Jäger, Heidelberg

Vorstandsvorsitzender der GMF/
Chair of the GMF

Prof. Dr. Hanspeter Kraft, Basel

Vorsitzender der Wissenschaftlichen Kommission/
Chair of the Scientific Committee

Prof. Dr. Friedrich Götze, Bielefeld

Schatzmeister/
Treasurer

Wissenschaftliche Kommission der GMF/Scientific Committee of the GMF

(Mitglieder/Members 2010)

Prof. Dr. Hanspeter Kraft, Basel (Chair)

Prof. Dr. Günter M. Ziegler, Berlin (Vice Chair)

Prof. Dr. Werner Ballmann, Bonn

Prof. Dr. Hélène Esnault, Essen

Prof. Dr. Klaus Fredenhagen, Hamburg

Prof. Dr. Uffe Haagerup, Odense

Prof. Dr. Gerhard Huisken, Golm

Prof. Dr. Rupert Klein, Berlin

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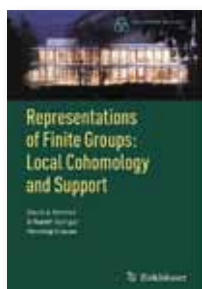
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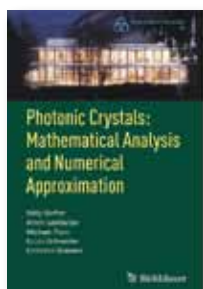


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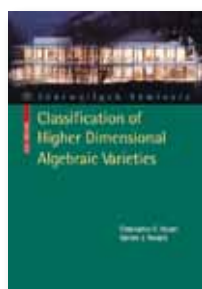


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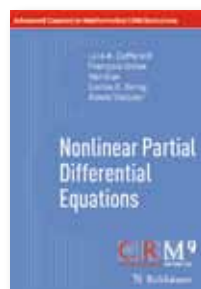


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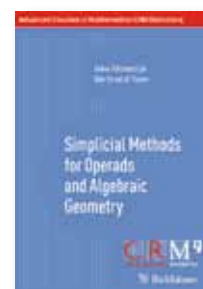


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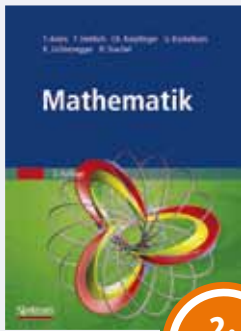
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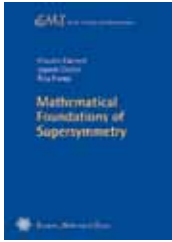
Die verflixte Mathematik der Demokratie

G. G. Szpiro, Neue Zürcher Zeitung, Jerusalem, Israel,
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Stimmen erhielt? Die Erklärung beginnt in der Antike, führt über mittelalterliche Kirchenherren, Helden der Französischen Revolution und amerikanischen Gründungsväter bis zu heutigen Nobelpreisträgern.

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Claudio Carmeli (University of Genova, Italy), Lauren Caston (RAND Corporation, Santa Monica, CA, USA) and Rita Fioresi (University of Bologna, Italy)
Mathematical Foundations of Supersymmetry (EMS Series of Lectures in Mathematics)

ISBN 978-3-03719-097-5. 2011. 301 pages. Softcover. 17 x 24 cm. 42.00 Euro

Supersymmetry is a highly active area of considerable interest among physicists and mathematicians. It is not only fascinating in its own right, but there is also indication that it plays a fundamental role in the physics of elementary particles and gravitation.

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Ronald Brown (Bangor University, UK), Philip J. Higgins (Durham University, UK) and Rafael Sivera (Universitat de València, Spain)
Nonabelian Algebraic Topology. Filtered spaces, crossed complexes, cubical homotopy groupoids (EMS Tracts in Mathematics, Vol. 16)

ISBN 978-3-03719-083-8. 2011. 703 pages. Hardcover. 17 x 24 cm. 98.00 Euro

The main theme of this book is that the use of filtered spaces rather than just topological spaces allows the development of basic algebraic topology in terms of higher homotopy groupoids; these algebraic structures better reflect the geometry of subdivision and composition than those commonly in use.

The structure of the book is intended to make it useful to a wide class of students and researchers for learning and evaluating these methods, primarily in algebraic topology but also in higher category theory and its applications in analogous areas of mathematics, physics and computer science. Part I explains the intuitions and theory in dimensions 1 and 2, with many figures and diagrams, and a detailed account of the theory of crossed modules. Part II develops the applications of crossed complexes. The engine driving these applications is the work of Part III on cubical ω -groupoids, their relations to crossed complexes, and their homotopically defined examples for filtered spaces. Part III also includes a chapter suggesting further directions and problems, and three appendices give accounts of some relevant aspects of category theory. Endnotes for each chapter give further history and references.



Marek Jarnicki (Jagiellonian University, Kraków, Poland) and Peter Pflug (University of Oldenburg, Germany)
Separately Analytic Functions (EMS Tracts in Mathematics, Vol. 16)

ISBN 978-3-03719-098-2. 2011. 306 pages. Hardcover. 17 x 24 cm. 58.00 Euro

The story of separately holomorphic functions began about 100 years ago. During the second half of the 19th century, it became known that a separately continuous function is not necessarily continuous as a function of all variables. At the beginning of the 20th century, the study of separately holomorphic functions started due to the fundamental work of Osgood and Hartogs.

This book provides the first self-contained and complete presentation of the study of separately holomorphic functions, starting from its birth up to current research. Most of the results presented have never been published before in book form. The text is divided into two parts. A more elementary one deals with separately holomorphic functions "without singularities", another addresses the situation of existing singularities. A discussion of the classical results related to separately holomorphic functions leads to the most fundamental result, the classical cross theorem as well as various extensions and generalizations to more complicated "crosses".



Jochen Blath (Technische Universität Berlin, Germany), Sylvie Roelly (Universität Potsdam, Germany) and Peter Imkeller (Humboldt-Universität zu Berlin, Germany), Editors
Surveys in Stochastic Processes (EMS Series of Congress Reports)

ISBN 978-3-03719-072-2. 2011. 264 pages. Hardcover. 17 x 24 cm. 78.00 Euro

The 33rd Bernoulli Society Conference on "Stochastic Processes and Their Applications" was held in Berlin from July 27 to July 31, 2009. It brought together more than 600 researchers from 49 countries, who communicated recent progress in the mathematical research related to stochastic processes, with applications ranging from biology to statistical mechanics, finance and climatology.

The present volume collects survey articles highlighting new trends and focal points in the area written by plenary speakers of the conference, all of them outstanding international experts. A particular aim of this collection is to inspire young scientists in setting up research goals within the wide scope of fields represented in this volume.



Andrzej Skowroński (Nicolaus Copernicus University, Toruń, Poland) and Kunio Yamagata (Tokyo University of Agriculture and Technology, Japan), Editors
Representations of Algebras and Related Topics (EMS Series of Congress Reports)

ISBN 978-3-03719-101-9. 2011. 744 pages. Hardcover. 17 x 24 cm. 98.00 Euro

This book is concerned with recent trends in the representation theory of algebras and its exciting interaction with geometry, topology, commutative algebra, Lie algebras, combinatorics, quantum algebras, and theoretical physics. The collection of articles, written by leading researchers in the field, is conceived as a sort of handbook providing easy access to the present state of knowledge and stimulating further development.

The book consists of thirteen self-contained expository survey and research articles and is addressed to researchers and graduate students in algebra as well as a broader mathematical community. They contain a large number of examples and open problems and give new perspectives for research in the field.



Jean-Yves Girard (CNRS, Marseille, France)
The Blind Spot. Lectures on Logic

ISBN 978-3-03719-088-3. 2011. 552 pages. Hardcover. 16.5 x 23.5 cm. 68.00 Euro

These lectures on logic, more specifically proof theory, are basically intended for postgraduate students and researchers in logic.

The question at stake is the nature of mathematical knowledge and the difference between a question and an answer, i.e., the implicit and the explicit. The problem is delicate mathematically and philosophically as well: the relation between a question and its answer is a sort of equality where one side is "more equal than the other", and one thus discovers essentialist blind spots.

Starting with Gödel's paradox (1931) – so to speak, the incompleteness of answers with respect to questions – the book proceeds with paradigms inherited from Gentzen's cut-elimination (1935). Various settings are studied: sequent calculus, natural deduction, lambda calculi, category-theoretic composition, up to geometry of interaction (Gol), all devoted to explicitation, which eventually amounts to inverting an operator in a von Neumann algebra.



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