Mathematisches
Forschungsinstitut
Oberwolfach

Mitglied der Leibniz-Gemeinschaft

Jahresbericht 2014
Annual Report

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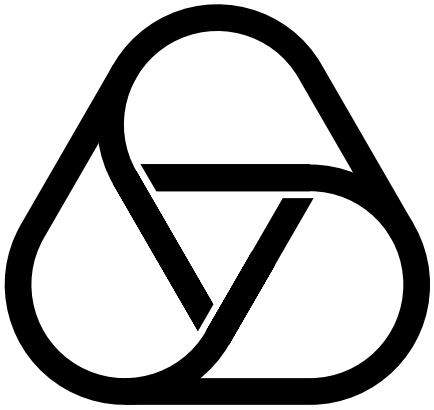

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Das Mathematische Forschungsinstitut Oberwolfach ist Mitglied der Leibniz-Gemeinschaft.

Jahresbericht 2014 – Annual Report 2014

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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.

Gerhard Huisken

Vorwort des Direktors

Unser Bericht für das Jahr 2014 gibt einen Überblick über die Aktivitäten des Mathematischen Forschungsinstituts Oberwolfach, insbesondere das wissenschaftliche Programm. Auch über die finanzielle Situation des Instituts, Baumaßnahmen und besondere Ereignisse haben wir viele Informationen zusammengestellt.

Auch im Berichtsjahr 2014 war das wissenschaftliche Programm am Mathematischen Forschungsinstitut Oberwolfach eine spannende Mischung aus Workshops, Miniworkshops, Seminaren und Gastaufenthalten, die im Wettbewerb der Anträge von der wissenschaftlichen Kommission begutachtet und festgelegt wurden. Wieder nahmen fast 3000 Wissenschaftler aus aller Welt während 50 Wochen an den Forschungsprogrammen teil:

1. Workshops mit 50-53 Teilnehmern (ca. 40 Wochen)
2. Miniworkshops mit 16-17 Teilnehmern (4 Wochen, je 3 Miniworkshops)
3. Oberwolfach Seminare mit 25 Teilnehmern (3 Wochen, je 2 Seminare)
4. Arbeitsgemeinschaft mit etwa 50 Teilnehmern (2 Wochen)
5. Research in Pairs Programm (RiP) mit je 2-4 Teilnehmern (kontinuierlich)
6. Oberwolfach Leibniz Fellows (OWLF, kontinuierlich)

Erstmals waren 2014 insgesamt 23 „Simons Visiting Professors" an unserem Institut zu Gast, die von der Simons Foundation (USA) eine

Director's foreword

Our report for 2014 gives an overview of the activities of the Mathematisches Forschungsinstitut Oberwolfach, with an emphasis on the scientific programs. Other information includes the financial situation, building activities and special events that took place during the year.

The scientific program of the MFO in 2014 continued to comprise an inspiring mixture of Workshops, Mini-Workshops, Seminars and research visits that have been refereed and decided by the Scientific Committee. Again almost 3,000 scientists took part in these programs during 50 weeks of operation:

1. Workshops with 50-53 participants (approx. 40 weeks)
2. Mini-Workshops with 16-17 participants (4 weeks, 3 Mini-Workshops/week)
3. Oberwolfach Seminars with 25 participants (3 weeks, 2 Seminars/week)
4. Arbeitsgemeinschaft with 50 participants (2 weeks)
5. Research in Pairs program (RiP) with 2-4 participants (continuing)
6. Oberwolfach Leibniz Fellows (OWLF, continuing)

In 2014 the first 23 "Simons Visiting Professors" came to our Institute, supported by the Simons Foundation (USA) in a combined visit to

Förderung für einen kombinierten Besuch des MFO und eines anderen Europäischen Instituts erhalten. Diese Verbindung einer Workshop-Einladung mit einem Forschungsaufenthalt an einer Universität oder anderen Europäischen Forschungseinrichtung spart finanzielle und zeitliche Ressourcen der Wissenschaftler und stärkt die Einbindung des MFO in unserem wissenschaftlichen Umfeld.

Oberwolfach and some other European research institution. The combination of a workshop invitation to Oberwolfach with a research stay at a university or other European institution saves time and resources for the scientists and strengthens institutional links between the MFO and participating host institutions throughout Europe.

Zusätzlich zu dem oben beschriebenen Programm konnte das Institut Prof. Ernst Kuwert (Freiburg) mit seinen Mitarbeitern für eine Lehrerfortbildung über „Differentialgleichungen" gewinnen.

In addition to the programs described above the Institute hosted a training week for highschool teachers offered by Prof. Ernst Kuwert and his team from Freiburg University.

Einen Höhepunkt des Jahres bildeten ohne Zweifel die Verleihung des Oberwolfachpreises an Prof. Hugo Duminil-Copin (Genève) für herausragende Leistungen im Gebiet „Stochastik und Statistik" am 5. Juni 2014 sowie die Verleihung des John Todd Award an Dr. Markus Bachmayr (Aachen) für herausragende Leistungen im Gebiet „Numerische Analysis" am 15. Mai 2014.

Highlights of the year were the award of the Oberwolfach Prize to Prof. Hugo Duminil-Copin (Genève) for excellent achievements in Stochastics and Statistics on June 5, 2014, and the award of the John Todd Award to Dr. Markus Bachmayr (Aachen) for excellent achievements in Numerical Analysis on May 15, 2014.

Während der Jahresversammlung der Gesellschaft für Mathematische Forschung im Oktober 2014 wurde die öffentliche Oberwolfach Vorlesung diesmal von Professor Martin Hairer (Warwick) gehalten. Für den Vortrag und für den Abstrakt in diesem Jahresbericht ein herzliches Dankeschön!

The public Oberwolfach Lecture during the annual meeting of the Gesellschaft für Mathematische Forschung was held this time by Professor Martin Hairer (Warwick) – thank you very much for the lecture and the abstract in this report!

Detaillierte Informationen zu den einzelnen Programmen und Veranstaltungen finden Sie im Innern dieses Jahresberichts.

Detailed reports to scientific programs and special events can be found in the following sections of this report.

Im Baubereich konnte 2014 die neue Holzhackschnitzel-Heizungsanlage erfolgreich in Betrieb genommen werden. Sie hat inzwischen bei der Beheizung und Warmwasserversorgung des Instituts erste Einsparungen erwirtschaftet. Ein neuer Fahrradunterstand und ein neu eingerichtetes Hausmeisterbüro zusammen mit einer den bestehenden Bauten angepassten Holzverkleidung werden dieses Bauvorhaben abrunden. Im Bibliotheksgebäude sind die Renovierung der Sanitärräume und des Getränkebereiches in Angriff genommen und teilweise schon abgeschlossen worden. Gegenüber dem großen Hörsaal entsteht durch den Ersatz einer festen Wand durch eine Faltwand zwischen den zwei dort liegenden Räumen die Möglichkeit, bei Bedarf einen weiteren, dritten Hörsaal bereitzustellen. Für die Zukunft steht eine Umgestaltung der Bibliothek an, die dem in sorgfältigen Umfragen festgestellten geänderten Nutzerverhalten Rechnung trägt und durch kompakte Speicherung der gedruckten Zeitschriften zusätzliche Diskussionsräume schaffen soll.

In 2014 the new heating facility based on woodchips was successfully put into operation, already providing some savings in heating and hot water services. A new bicycle shed, office space for our caretaker and well adapted wooden facades for all new buildings complete this long running project. In the library building the renovation of restrooms and coffee areas were began and partially completed. Opposite to the main lecture hall a fixed wall between two smaller rooms was replaced by a folding wall, providing the Institute with the option of a third lecture room when needed. Looking towards the future we plan a restructuring of the library to accommodate changing user priorities that became apparent in a recent survey: A compact storage facility for printed journals will save space and create more discussion places for the scientists.

Das volle wissenschaftliche Programm und die Fortführung der Baumaßnahmen waren nur möglich in weiterhin gesunden finanziellen Rahmenbedingungen: Dafür gilt dem Bund und den Ländern, insbesondere dem Land Baden-Württemberg unser Dank, die mit der Leibniz-Gemeinschaft den Hauptteil der Haushaltsmittel bereitstellen.

The full scientific program in 2014 was possible only due to continued stable financial conditions. Our thanks go to the federal and state governments, in particular the state of Baden-Württemberg who provided the bulk of funding through the Leibniz-Society.

Neben dem wissenschaftlichen Programm war das Institut wieder in mehreren Drittmittelprojekten und in der Zusammenarbeit mit anderen Institutionen engagiert: Das von der Klaus Tschira Stiftung geförderte Projekt „IMAGINARY – open source Plattform für interaktive Mathematik-Vermittlung" hatte mit seiner großen Ausstellung mit über 14000 Besuchern beim ICM in Seoul eine Sternstunde. Die Mathematikvermittlung durch die „Schnappschüsse moderner Mathematik aus Oberwolfach" startete in 2014 mit den ersten Artikeln und liefert so neue Einblicke in die Forschungsinhalte des Instituts. In den kommenden Jahren soll so eine Sammlung von Essays entstehen für beginnende Studenten, Gymnasiallehrer sowie für an Mathematik interessierte Abiturienten und ihre Eltern. Die Inhalte von IMAGINARY waren auch wieder in vielen anderen Ausstellungen weltweit zu sehen und standen im Museum für Mineralien und Mathematik „MiMa" in Oberwolfach den Besuchern und Schulklassen der Region zur Verfügung.

In addition to the scientific programs above the MFO was engaged in several third party projects and collaborations with other institutions: The project "IMAGINARY-open source platform for interactive mathematics communication" supported by the Klaus Tschira Foundation enjoyed extensive international attention during an exhibition highlight at the ICM in Seoul, attracting 14,000 visitors. The new outreach initiative "Snapshots of modern mathematics from Oberwolfach" started in 2014 with a first set of articles offering accessible insights into the research topics investigated at the MFO. In the coming years we hope to create a broad collection of such essays aimed at beginning students, science journalists, high-school teachers, advanced high-school students and their parents. The contents of IMAGINARY were visible at many exhibitions worldwide as well as in the museum "MiMa" in Oberwolfach where it serves visitors and schools from the local region.

Wichtige Unterstützung kam wie in den Vorjahren von der Carl Friedrich von Siemens Stiftung für die Teilnehmer der Oberwolfach Seminare und für die Bibliothek. Auch die National Science Foundation der USA hat Nachwuchswissenschaftler bei den Reisekosten wieder wesentlich unterstützt.

Highly valuable support for participating graduate students at Oberwolfach Seminars as well as support for the library monograph collection came again from the Carl Friedrich von Siemens Stiftung. The National Science Foundation NSF (US) has as in the past generously supported travel expenses of American junior scientists.

Das Institut bemüht sich sehr, mehr Frauen für die wissenschaftlichen Programme zu gewinnen und familienbedingte Hindernisse für eine Teilnahme zu beseitigen, z.B durch die Vermittlung und finanzielle Unterstützung von Babysittern. Diese und andere Bemühungen, auch mit Bezug auf die Belegschaft des MFO, wurden durch die Verleihung des Total E-Quality Prädikats gewürdigt. Ein besonderer Dank geht hier an Frau Riester.

The Institute tries to increase the number of female mathematicians participating in its scientific programs and makes efforts to alleviate family related impediments, e.g. by providing access and financial support to babysitting services. The efforts of the Institute in this direction, also with regard to the staff of the MFO, were recognized by the award of a "Total E-quality Certificate", here special thanks are due to Ms Riester.

Ganz wichtig war wie immer die Unterstützung durch die Oberwolfach Stiftung und den Förderverein, die dem Institut neben der finanziellen Hilfe auch weithin sichtbare, wichtige ideelle Rückendeckung bedeutet. Ein herzlicher Dank an alle, die hier gespendet oder sich engagiert haben!

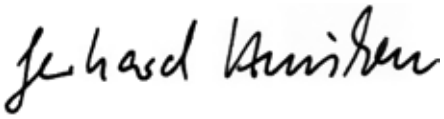
Again very important was the support by the Oberwolfach Foundation and the Friends of Oberwolfach – together with the financial support they provided invaluable moral support and backing. A sincere thank-you to all who donated or lend their support in other ways!

Auch in 2014 lebte das Mathematische Forschungsinstitut Oberwolfach ganz wesentlich vom Engagement seiner Mitarbeiterinnen und Mitarbeiter und von der Mitwirkung vieler Mitglieder in seinen Gremien und Kommissionen. Wieder konnten neue Mitglieder für den wissenschaftlichen Beirat und die wissenschaftliche Kommission gewonnen werden, die ehrenamtlich die wissenschaftliche Exzellenz des Instituts durch die Evaluation und Gestaltung des Programms sichern. Die Gesellschaft für Mathematische Forschung und der Verwaltungsrat sichern dabei die langfristigen Rahmenbedingungen. Ihnen allen sowie den Tagungsleitern und Teilnehmern gilt unser Dank für die erfolgreiche und bereichernde Zusammenarbeit.

Wir freuen uns in Oberwolfach auf Ihre Mitwirkung auch im kommenden Jahr!

As in previous years the Mathematisches Forschungsinstitut Oberwolfach relied in a crucial way on the commitment and efforts of its staff and on the engagement of volunteers for the many scientific and administrative tasks. New members joined the Scientific Advisory Board and the Scientific Committee that guarantee the scientific excellence of the Institute through the careful evaluation and formation of the scientific program. The Gesellschaft für Mathematische Forschung and the Administrative Council oversee and secure the longterm funding of the Institute. I wish to thank all of them as well as the organizers and participants of the scientific programs for their support and the stimulating cooperation.

Mathematisches Forschungsinstitut Oberwolfach is looking forward to your cooperation next year!



Gerhard Huisken

1. Besondere Beiträge

1.1. John Todd Award

Markus Bachmayr erhielt den John Todd Award 2013. Die Preisverleihung fand am 15. Mai 2014 statt.

Die Oberwolfach Stiftung und das Mathematische Forschungsinstitut Oberwolfach verleihen den John Todd Award circa alle drei Jahre an exzellente junge Forscher auf dem Gebiet der Numerischen Analysis. Über die Vergabe entscheidet die wissenschaftliche Kommission der Gesellschaft für Mathematische Forschung.

Der Preis ist nach dem britischen Mathematiker John Todd benannt, der sich nach dem Ende des Zweiten Weltkriegs für den Erhalt des Mathematischen Forschungsinstituts Oberwolfach einsetzte. Seine Lebensgefährtin, Rosemary Lonergan, spendete dem Institut im Jahr 2005 einen Betrag in Höhe von 50.000 €. Dieser Betrag wird zur Finanzierung des John Todd Award verwendet. Der Preis ist mit einem Preisgeld in Höhe von 1.000 € dotiert.

Der Festakt begann mit den Grußworten von Dietmar Kröner, stellvertretender Direktor des MFO, und Harry Yserentant als Vertreter der Oberwolfach Stiftung. Die Laudatio wurde von Wolfgang Dahmen, Markus Bachmayrs früherem Doktorvater, gehalten. Anschließend präsentierte der Preisträger vor fachkundigem Publikum einen Ausschnitt seiner aktuellen Forschungsarbeit, die mit viel Beifall und einigen interessierten Nachfragen und Anregungen bedacht wurde. Der Festakt endete mit der offiziellen Preisübergabe durch Dietmar Kröner und Harry Yserentant.

1. Special contributions

1.1. John Todd Award

The John Todd Award 2013 was awarded to Markus Bachmayr. The award ceremony took place on 15 May 2014.

The Oberwolfach Foundation and the Mathematisches Forschungsinstitut Oberwolfach award this prize approximately every three years to excellent young researchers in the field of numerical analysis. The decision is made by the Scientific Committee of the Gesellschaft für Mathematische Forschung.

The award is named after the British mathematician John Todd. After the end of World War II he engaged in the survival of the Mathematisches Forschungsinsitut Oberwolfach. In 2005, his spouse, Rosemary Lonergan, donated an amount of 50,000 € to the Institute, which is used for the financing of the John Todd Award. The prize is endowed with 1,000 €.

The ceremony started with the welcome speeches by Dietmar Kröner, Vice Director of the MFO, and Harry Yserentant, representative of the Oberwolfach Foundation. The laudatory speech was given by Wolfgang Dahmen, former PhD supervisor of Markus Bachmayr, who then presented a part of his current research to a qualified audience, receiving great applause and some interested inquiries and suggestions. The ceremony ended with the official awarding by Dietmar Kröner and Harry Yserentant.

Dietmar Kröner übergibt die Urkunde und das Preisgeld an Markus Bachmayr / Dietmar Kröner delivers the certificate and the prize money to Markus Bachmayr.

W. Dahmen, M. Bachmayr, H. Yserentant, D. Kröner

Laudation for Dr. Markus Bachmayr
by Prof. Dr. Wolfgang Dahmen


Markus Bachmayr

When trying to appraise scientific achievements perhaps the following criteria deserve to be weighed highly: the level of genuine novelty, the conceptual and technical obstructions that had to be overcome, and last but not least, in the particular context of numerical analysis, the selection of the particular problem area and its impact in applications. I would like to argue in what follows that Markus Bachmayr's contributions meet all these criteria in a superb way.

Let me begin with a brief look at Markus Bachmayr's scientific career. In 2007 he received his Master's degree after completion of the *Industrial Mathematics Programme* at the Johannes Kepler University in Linz. His Master's Thesis earned him the *Erwin Wenl Prize* and already resulted in a publication on *Iterative total variation schemes for nonlinear inverse problems*. Already during his studies as well as right after graduating he worked as a software developer in industry, a fact that is actually indicative of his current scientific profile.

It would have been most natural to use the gained momentum and further pursue his research on inverse problems. But he decided to undertake a radical topic change, in favor of a subject that is conceptually overall less established from a mathematical perspective, when taking up his doctoral studies at RWTH Aachen. This step was solely based on his own decision and demonstrates a high level of independence already at a very early stage of his career. At RWTH he was funded by the Graduate School AICES and then became a research assistant at the Institut für Geometrie und Praktische Mathematik.

During his doctoral studies, in a very independent manner, Markus Bachmayr was quickly able to learn the ropes of a totally different research topic centering on the numerical solution of the *Electronic Schrödinger Equation* and finished his PhD on this topic in fall 2012 with summa cum laude.

To put his thesis and its role for his subsequent work into proper perspective, a few words on the subject background are in order. The by far most serious obstruction to ab initio calculations based on the Schrödinger equation is the *high dimensionality* of the problem, namely the proportionality of the total spatial dimension to the number of electrons. This is one of many examples of problems in *high spatial dimensions* which have been attracting a rapidly increasing attention over the past few years. Other examples are Fokker-Planck equations, also describing the evolution of typically high-dimensional probability distributions, or parameter dependent families of PDEs whose solutions become functions not only of space and time but also of the parameters. In particular, the parametric families resulting from Karhunen-Loew or Polynomial Chaos expansions of the random fields arising in stochastic PDEs, involve, in principle, *infinitely* many parameters. Problems of the latter type arise in Uncertainty Quantification which marks a currently extremely important research area from both theoretical and practical perspectives. So, on the one hand, the interest in such high-dimensional problems stems from a variety of important and topical applications in science and technology. On the other hand, such problems pose an immense challenge to numerical simulation methodologies, due to the so called "*curse of dimensionality*". Roughly, this expresses the fact that the computational complexity encountered in such problems scales *exponentially* in the spatial dimension. As a consequence the wealth of numerical methods developed for the classical low-dimensional continuum mechanical setting of applications is essentially useless in the high-dimensional regime. To put it differently, the issue is not to speed up a given method or simply scale up computational resources, but to develop genuinely new methodologies to cope with high spatial dimensionality. In particular, this requires finding some sort of "mathematical shortcuts".

Markus Bachmayr's scientific work can be viewed as unveiling just such shortcuts. The core idea is, instead of relying on classical regularity of the searched functions in terms of differentiability – he shows in his thesis that for the Schrödinger equation solutions exhibit only limited regularity – to approximate solutions in terms of *problem dependent basis functions* whose determination then

becomes part of the solution process and is a highly nonlinear version of solution adaptation. Specifically, such function systems are supposed to consist of rank-one tensors, i.e., of products of functions of a single or low number of variables. Such attempts by themselves are not new. In fact, research on low-rank tensor approximation is also a highly topical attempt to break or mitigate the curse of dimensionality for problems of the type mentioned above. However, Bachmayr's work differs from all remaining approaches in several essential respects. The previously known methods start from some fixed *background discretization* and all subsequent low-rank approximations refer to this discrete problem and inevitably detach themselves from the underlying continuous infinite dimensional problem. As a consequence, the actual problem relevant metrics and topologies can no longer be properly respected in the discrete framework. In contrast Bachmayr's approach, already shaped in his thesis, is based on a systematic embedding of the problem in an *infinite dimensional framework*. To do so he had to draw on a wide scope of concepts so as to eventually transform the problem into an equivalent one formulated over the space of square summable sequences, now viewed as tensors. This has several important consequences. First, resorting to concepts from adaptive wavelet methods, allows one to exploit the mapping properties of the underlying continuous operator equation. Hence, errors can be related to residuals opening the way to a rigorously founded a posteriori error control and adaptive techniques. Second, the sequence space topology allows one to employ so called *stable subspace based tensor formats* wich are also essential for realizing stable nearly minimal rank approximations. Initialized in his thesis and further developed in subsequent papers Markus Bachmayr has succeeded to contrive a framework centering on a completely new iterative adaptive solver for a class of high dimensional operator equations that is rigorously proven to converge in the problem relevant norms and, under natural assumptions, is shown to exhibit nearly optimal complexity both with respect to the rank growth as well as sparsity of the low-dimensional tensor factors. These results are the first of this type ever since for none of the previously known methods the obtained accuracy (usually unknown in the relevant norm) could be related to the computational complexity, let alone any statement concerning optimality. The development of the scheme and its analysis required the conception of numerous new tools and techniques whose value goes far beyond their immediate applications.

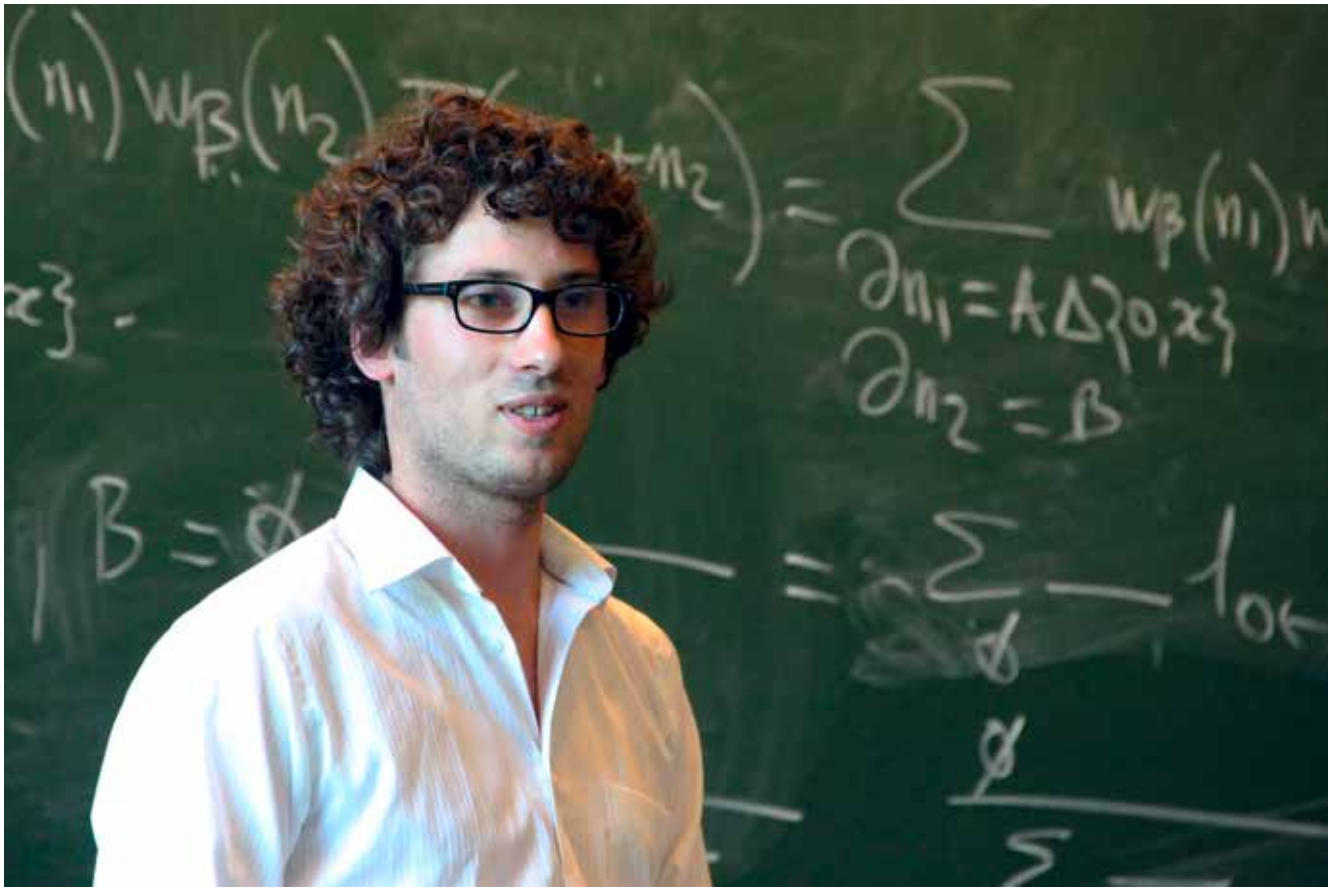
There is, however, one more principal point that deserves to be stressed. Embedding the problem into an infinite dimensional framework reveiled a serious obstruction for elliptic problems that have been essentially ignored in all prior work in the fully discrete setting, namely the fact that the underlying operator is an isomorphism only when viewed as a mapping between the corresponding energy space and its dual. These spaces are, however, not endowed with *cross-norms*, i.e., norms that factor, when applied to a rank-one tensor, into the product of the norms of the low-dimensional tensor factors. As a consequence, as can also be seen from the spectrum of elliptic operators, such operators have infinite tensor rank when acting between the energy space and its dual. Unfortunately, only then is it possible to relate errors to residuals which is the basis for error control and convergence. On the other hand, the infinite rank of the operator impedes on a rank control in the context of an iterative scheme which requires a repeated application of the operator. Finding ways of resolving such principal problems, e.g. by developing adaptive – finite rank preconditioners for the infinite dimensional problem, accounts for Markus Bachmayr's outstanding contributions.

From the point of view of complexity theory the results can be interpreted as establishing "tractability" without requiring too stringent regularity properties or imposing strong restrictions on how the recovered function may depend on most of the variables. So, in summary, Markus Bachmayr's results open new exciting future research perspectives concerning "how to compute and how to analyze" problems in high spatial dimensions. The impressive conceptual novelty and the high level of technical sophistication of his work as well as the choice of challenging application areas very well meet in my opinion the quality criteria mentioned at the beginning.

The above comments primarily address theoretical and foundational aspects of Bachmayr's work. Leaving it at that would, however, do a great injustice to his specic scientfic profile. In fact, he has never been content with an asymptotic result without a quantitative algorithmic validation. He has complemented virtually all his theoretical findings by numerical implementations showing a level of coding skills which are on par with his analytic abilities, perhaps partly a yield of his early experiences as a programmer in industry. So overall, his scientific profile as a numerical analyst exhibits an ideal balance – quite in the spirit of the John Todd Award.

1.2. Oberwolfach Preis

1.2. Oberwolfach Prize



Hugo Duminil-Copin, Mathematiker an der Universität in Genf, erhielt den Oberwolfach Preis 2013 für seine herausragenden Leistungen auf dem Gebiet der Stochastik und Statistik. Die Preisverleihung fand am 5. Juni 2014 im Mathematischen Forschungsinstitut Oberwolfach statt.

Die Oberwolfach Stiftung und das Mathematische Forschungsinstitut Oberwolfach verleihen den Oberwolfach Preis circa alle drei Jahre an exzellente junge Mathematiker aus unterschiedlichen Forschungsbereichen. Über die Vergabe entscheidet die wissenschaftliche Kommission der Gesellschaft für Mathematische Forschung. Der Preis ist mit einem Preisgeld in Höhe von 10.000 € dotiert.

Hugo Duminil-Copin studierte Mathematik an der Université Paris XI sowie an der Ecole Normale Supérieure de Paris und promovierte 2011 an der Universität in Genf. Er beschäftigt sich mit mathematischer Physik, Wahrscheinlichkeitstheorie, stochastischer Analysis und Kombinatorik. Innerhalb seines Forschungsgebiets gilt der junge französische Mathematiker bereits als bedeutende Persönlichkeit. Insbesondere in der Analyse und Grenzwertbetrachtung von Zufallsbewegungen auf Gitterstrukturen gelangen ihm

Hugo Duminil-Copin, a mathematician at the University of Geneva, received the Oberwolfach Prize for his outstanding achievements in the field of stochastics and statistics. The award ceremony took place at the Mathematisches Forschungsinstitut Oberwolfach on 5 June 2014.

The Oberwolfach Foundation and the Mathematisches Forschungsinstitut Oberwolfach award the Oberwolfach Prize approximately every three years to outstanding young mathematicians from different areas. The decision is made by the Scientific Committee of the Gesellschaft für Mathematische Forschung. The prize is endowed with 10,000 €.

Hugo Duminil-Copin studied mathematics at the Université Paris XI and at the Ecole Normale Supérieure de Paris and received his doctorate in 2011 at the University of Geneva. He deals with mathematical physics, probability theory, stochastic calculus and combinatorics. Within his area of research, the young French mathematician has already established himself as a major figure. In particular in the analysis and determination of critical values for random walks on lattice structures he achieved substantial progress.

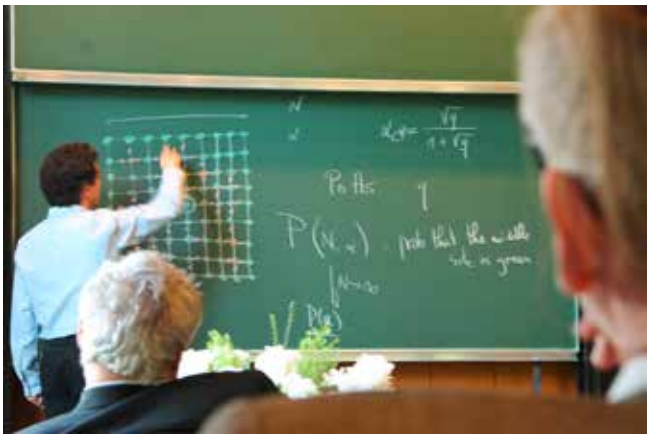
wesentliche Fortschritte. So berechnete er zum Beispiel erstmals die asymptotische Zusammenhangskonstante für das unendliche Bienenwabengitter. Diese mathematischen Methoden spielen eine wichtige Rolle in der statistischen Physik, Thermodynamik und Festkörperphysik.

For example, he calculated the asymptotic relation constant for the infinite honeycomb lattice for the first time. These mathematical methods play an important role in statistical physics, thermodynamics, and solid state physics.

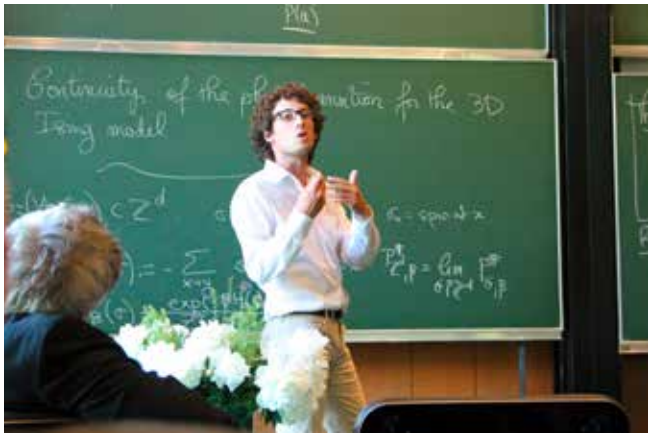
Gerhard Huisken begrüßt das Publikum.

Gerhard Huisken welcomes the audience.

Wendelin Werner hält die Laudatio.



Wendelin Werner gives the laudatory speech.



Hugo Duminil-Copin hält seine Vorlesung.

Hugo Duminil-Copin gives his lecture.

Laudation for Prof. Dr. Hugo Duminil-Copin
by Prof. Dr. Wendelin Werner

Hugo Duminil-Copin has already established himself as a major figure in the study of probabilistic models that are motivated or inspired by physics, by providing brilliant solutions to several notorious landmark problems:

One can for instance mention the following three striking results: Together with Stas Smirnov, he proved that the connective constant of the hexagonal lattice is equal to

$$\sqrt{(2+\sqrt{2})}.$$

In other words, the number of self-avoiding paths of length N on this lattice that start at the origin grows like

$$(2+\sqrt{2})^{N/2+o(N)}$$

when N tends to infinity.

Together with Vincent Beffara, he determined the critical value for the random cluster models and the Potts models on the square lattice. Together with Alan Hammond, he proved that the self-avoiding walk is sub-ballistic.

Hugo Duminil-Copin possesses a particularly broad vision of his research field and has also made important contributions on topics as diverse as Gibbs states for Potts models, bootstrap percolation or random walks in random environment. For this impressive body of results achieved at such an early stage in his carreer, Hugo Duminil-Copin from the university of Geneva is being awarded the 2013 Oberwolfach prize by the Oberwolfach Foundation.

G. Huisken, H. Duminil-Copin, G. Rupprecht

1.3. Total E-Quality Prädikat

Das MFO wurde im Jahr 2014 für seine chancengerechte Personal- und Organisationspolitik mit dem Prädikat Total-E-Quality ausgezeichnet. Das Prädikat gilt als eines der wichtigsten Gleichstellungsinstrumente in Wirtschaft, Wissenschaft und Verwaltung. Es wird mit der Unterstützung des Bundesfamilienministeriums vom Verein Total E-Quality Deutschland e.V. vergeben. Organisationen mit mindestens 15 Beschäftigten können sich dafür bewerben.

Das MFO beschäftigt derzeit etwa 35 Personen in den Bereichen wissenschaftliche Verwaltung, Verwaltung und Hauswirtschaft. Mehr als 80 % der Beschäftigten sind weiblich. „Wir engagieren uns nun schon so lange für chancengerechte Arbeitsbedingungen unserer Mitarbeiterinnen und Mitarbeiter, dass eine Bewerbung für das Prädikat nur folgerichtig war", so Susanne Riester, die Verwaltungsleiterin des Instituts.

1.3. Total E-Quality Award

In 2014 the MFO received the Total E-Quality-Award for its personnel and administrative policies aiming at equal opportunities for the employees. The award is considered one of the most important tools for gender equality in business, science and administration. It is awarded with the support of the Federal Ministry for Family Affairs by the association Total E-Quality Germany. Organizations with at least 15 employees may apply for this award.

The MFO currently employs about 35 people in the fields of scientific administration, administration and housekeeping. More than 80 % of the employees are female. "We are committed to equal opportunities and working conditions for our employees for quite a long time now. The application for the award was a logical consequence," said Susanne Riester, head of administration of the Institute.

Preisverleihung/Award ceremony

Susanne Riester (Verwaltungsleiterin/Head of Administration)

In der Begründung der Jury zur Vergabe des Prädikats an das MFO heißt es unter anderem: „Das MFO hat ein starkes Interesse daran, neben der Erhöhung des Frauenanteils in den Entgeltgruppen, in denen Frauen bisher unterrepräsentiert sind, vor allem die Vereinbarkeit von Beruf und Familie zu ermöglichen." Die flexiblen Arbeitszeiten wurden dabei besonders hervorgehoben.

Die feierliche Übergabe der Prädikats-Urkunde fand am 24. Oktober 2014 in Dortmund statt.

Among other things the jury stated: "The MFO has a strong interest to foster the reconciliation of work and family, in addition to increasing the proportion of women in the pay groups, in which women are under-represented." Special attention was given to the flexible working hours.

The formal presentation of the award took place in Dortmund on 24 October 2014.

1.4. MiMa – Museum für Mineralien und Mathematik

Das MiMa, Museum für Mineralien und Mathematik Oberwolfach wurde im Januar 2010 eröffnet. Es vereint zwei Alleinstellungsmerkmale der Region in einem interaktiven Museum: die einzigartigen Exponate des Mineralienmuseums Oberwolfach und das Wissen des Mathematischen Forschungsinstituts Oberwolfach.

In der mineralogischen Abteilung sind Mineralien und Bergbauzeugnisse aus dem gesamten Schwarzwald ausgestellt. Aus der Mathematik werden Multimedia-Installationen zu den Themen Kristallographie und Symmetrien gezeigt, sowie virtuelle 3D- Flüge, Filme und Skulpturen, darunter auch die Highlights der mathematischen Wanderausstellung IMAGINARY. 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, denen Sonderführungen angeboten werden.

Wesentliche Neuerungen im Jahr 2014 betrafen vor allem die Mineralienausstellung. Die Vitrinen erhielten eine neue Innenverkleidung und eine LED-Beleuchtung. Außerdem wurde eine Mineraliendatenbank, ein Online-Katalog der im Museum vorhandenen Mineralien, installiert.

Etwa 6000 Menschen besichtigten im Jahr 2014 das MiMa.

Sonderveranstaltungen

Im Jahr 2014 wurde die erfolgreiche Veranstaltungsreihe „Kultur im MiMa" fortgesetzt.

Am 9. Februar wurde eine Bilderausstellung mit Werken des Gutacher Künstlers Werner Kenngott eröffnet. Angeregt von den klaren Formen und der Farbenpracht der Kristalle sowie der ästhetischen mathematischen Kunstwerke, die im Museum präsentiert werden, verarbeitete Werner Kenngott seine Eindrücke künstlerisch in mehreren großformatigen Bildern. Die Vernissage wurde musikalisch von Marco Pereira begleitet.

Manfred Lettau, der frühere Obersteiger der Grube Clara, wiederholte aufgrund großer Nachfrage am 10. Juli seinen speziellen Vortrag „Ein Bergmannsleben – von der Kohle zum Erz".

Am 28. September feierte das MiMa sein 25-jähriges Bestehen. 1989 wurde es zunächst als Bergbau- und Mineralienmuseum eröffnet,

1.4. MiMa – Museum for Minerals and Mathematics

The MiMa, Museum for Minerals and Mathematics Oberwolfach opened in January 2010. It combines two unique features of the region in an 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 one can find multimedia installations of crystallography and symmetries, virtual 3D-flights, films and sculptures, among them the highlights of the mathematical travelling IMAGINARY exhibition. 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 are provided.

Changes in 2014 mainly related to the mineral exhibition. The display cases were given a new interior design with LED lighting. In addition, a minerals database, an online catalog of all minerals of the museum, was installed.

In 2014, about 6000 visitors enjoyed the MiMa museum.

Special events

The successful event series "Kultur im MiMa" also continued in 2014.

On the 9th of February a picture exhibition of the artist Werner Kenngott from Gutach opened up at the MiMa. Inspired by clear forms and the colourful beauty of crystals as well as the mathematical art objects presented in the museum, he transformed his impressions into large scale pictures. The opening of the exhibition was accompanied with music by Marco Pereira.

Due to popular demand, Manfred Lettau, former mine foreman of the mine "Clara" in Oberwolfach, gave his special talk "On the life of a mine worker" once again on the 10th of July.

On the 28th of September the MiMa celebrated its 25th anniversary. In 1989 it began as a mining and mineral museum. In 2010, the museum

bevor es 2010 nach umfangreichen Sanierungsmaßnahmen erweitert und als Mineralien- und Mathematikmuseum neu eröffnet wurde. Unter anderem gratulierten die Bundestagsabgeordneten Kordula Kovac und Thorsten Frei sowie die Landtagsabgeordneten Sandra Boser und Helmut Rau der Gemeinde Oberwolfach zu ihrem einzigartigen Museum. Die Feier wurde von einer Abordnung der Trachtenkapelle musikalisch umrahmt.

was expanded and now includes in addition to the minerals of the Black Forest interactive mathematical installations. Among others, the members of the Bundestag Kordula Kovac and Thorsten Frei and the members of the Landtag Sandra Boser and Helmut Rau congratulated Oberwolfach for its unique museum. The event was given a musical accompaniement by the Trachtenkapelle Oberwolfach.

Jean Philippe Naudet führt die Besucher der Vernissage in das Werk von Werner Kenngott ein / Jean Philippe Naudet introducing the work of Werner Kenngott.

Stephan Klaus demonstriert den Besuchern der Vernissage die mathematische Installation Cinderella / Stephan Klaus demonstrating the mathematical installation Cinderella.

Am 14. Dezember wurde in einer Vernissage eine weitere Bilderausstellung des Gutacher Künstlers Werner Kenngott eröffnet. Der Vorsitzende des Kunstvereins Hasemann-Liebich, Jean Philippe Naudet, stellte den Künstler und dessen Werk vor. Leon Marc Fehrenbacher umrahmte die Veranstaltung am E-Piano mit Werken der Klassik.

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

On the 14th of December 2014 another picture exhibtion of Werner Kenngott opened at the MiMa. The artist from Gutach presented his new images on crystalline structures. The vernissage started with an introduction of Jean Philippe Naudet from the art association Hasemann-Liebich. Leon Marc Fehrenbacher accompanied the event with some classical music on the piano.

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

1.5. IMAGINARY 2014

IMAGINARY – open source Plattform für interaktive Mathematikkommunikation

IMAGINARY begann im Jahr der Mathematik 2008 als interaktive Wanderausstellung, die mathematische Forschung auf attraktive und verständliche Weise durch Visualisierungen, interaktive Installationen, virtuelle Welten, 3D-Objekte mit ihren mathematischen Hintergründen präsentiert. Ab 2011 entwickelte IMAGINARY zusätzlich zu Ausstellungen eine open source Plattform für interaktive Mathematikvermittlung. Das Projekt wird von 2013 bis 2016 unter dem Titel „Oberwolfach trifft IMAGINARY" von der Klaus Tschira Stiftung gefördert.

1.5. IMAGINARY 2014

IMAGINARY – open source platform for interactive mathematics communication

In 2008 IMAGINARY started as an interactive travelling exhibition presenting visualisations, interactive installations, virtual worlds, 3D-objects and their mathematical background in an attractive and understandable way. Starting 2011, and in addition to its exhibitions, Imaginary has developed an open source platfrom for interactive and participative math communication. From 2013 to 2016 IMAGINARY is supported by the Klaus Tschira Stiftung under the name "Oberwolfach meets IMAGINARY".

Die Plattform „IMAGINARY – open mathematics" bietet einen Ort für die Präsentation und Entwicklung interaktiver Mathematikexponate und -ausstellungen. Alle IMAGINARY Aktivitäten werden dort dokumentiert und alle IMAGINARY-Inhalte werden unter einer freien Lizenz zur Verfügung gestellt und können so leicht für eigene Ausstellungen und Veranstaltungen verwendet werden. Darüber hinaus bietet die Plattform allen Benutzerinnen und Benutzern die Möglichkeit, mit eigenen Inhalten beizutragen, und dient so als Basis für den Austausch innerhalb der mathematischen Community besonders in der Mathematikvermittlung. Im Januar 2014 ging die deutsche Version der Plattform online, nach Englisch und Spanisch die dritte Sprache. Alle wichtigen IMAGINARY-Exponate stehen bereits auf Koreanisch zur Verfügung, das Programm SURFER zusätzlich auch auf Chinesisch. Das Arnold-Buch „Denkaufgaben für Kinder von 5 bis 15!" ist weiterhin sehr beliebt, es wurde inzwischen ins Türkische, Spanische, Vietnamesische und ins Italienische übersetzt.

The platform "IMAGINARY – open mathematics" provides a space for the presentation and development of interactive math exibits and exhibitions. All contents of IMAGINARY are made available to a broad audience under a free licence and can thus be reproduced and used for individual exhibitions and events. Moreover, the platform provides an opportunity for everyone interested to contribute with their own material and serves as a hub for exchange of ideas in the field of math communication. In January 2014, the German version of the platform was launched, after English and Spanish the third language. All major IMAGINARY exhibits are already available in Korean, the SURFER-software is additionally availble in Chinese. The Arnold-book "School Taskbook: From 5 to 15" is still very popular and was additionally translated into Turkish, Spanish, Vietnamese, and Italian.

Schnappschüsse moderner Mathematik aus Oberwolfach

Ein wichtiger Teil von „Oberwolfach trifft IMAGINARY" sind die „Schnappschüsse moderner Mathematik aus Oberwolfach". Darin werden hochwertige Inhalte für die Mathematik-Kommunikationsplattform IMAGINARY über die Teilnehmerinnen und Teilnehmer des wissenschaftlichen Programms am MFO gesammelt. Die von den Organisatorinnen und Organisatoren ausgewählten Schnappschüsse beschreiben ein wissenschaftliches Thema eines Workshops am MFO. Sie sind ca. 8-12 DIN A5-Seiten lang und werden in deutscher oder englischer Sprache verfasst. Der Direktor des MFO spricht die Tagungsleiterinnen und -leiter während der Workshops auf die Schnappschüsse an. Das Projekt wird von Carla Cederbaum koordiniert. Sie ist auch als Chefeditorin für das Editieren der Texte verantwortlich. 2014 haben Sophia Jahns, Daniel Kronberg, Lea Renner und Sabiha Tokus als Editoren Schnappschüsse überarbeitet. Zielpublikum der Schnappschüsse sind Mathematiklehrkräfte, Wissenschaftsjournalistinnen und -journalisten, Studierende und begabte Schülerinnen und Schüler und andere Interessierte.

Snapshots of modern mathematics from Oberwolfach

An important part of "Oberwolfach meets IMAGINARY" is called "snapshots of modern mathematics from Oberwolfach". Within this project, high-quality content for the mathematics communication platform IMAGINARY is collected from the participants of the Oberwolfach scientific programs. Snapshots selected by the organizers of the scientific programs address a topic that is related to the research topic of the program at the MFO. They are 8-12 DIN A5 pages long and are written in English or German. The director of the MFO addresses the workshop organizers with respect to the snapshots. The project is coordinated by Carla Cederbaum. As senior editor, she is also responsible for the editing process of the snapshots. In 2014, Sophia Jahns, Daniel Kronberg, Lea Renner, and Sabiha Tokus acted as junior editors. The targeted readership consists of mathematics teachers, science journalists, undergraduate, advanced high school students, and the interested public.

Das Schnappschuss-Projekt hat zum Ziel, Verständnis und Wertschätzung für moderne Mathematik und mathematische Forschung bei einem breiten Interessentenkreis weltweit zu fördern. Im Laufe des Jahres 2014 wurden zehn Schnappschüsse sowohl auf der IMAGINARY-Plattform als auch auf der Webseite des MFO publiziert.

The snapshot project is designed to promote the understanding and appreciation of modern mathematics and mathematical research in the general public world-wide. In 2014, ten snapshots were published at the IMAGINARY platform as well as at the MFO website.

IMAGINARY-Ausstellungsaktivitäten

Im Jahr 2014 hat IMAGINARY 45 Ausstellungsaktivitäten organisiert, welche alle auf der Plattform für jeden einfach zugänglich und übersichtlich gespeichert sind. Neben einer Beschreibung gibt es zu jedem Event Fotos (für einige Ausstellungen auch Videos). Zwei Ausstellungshöhepunkte fanden in Heidelberg und in Seoul, Südkorea, statt.

Heidelberg. Die Ausstellung im Heidelberger Karlstorbahnhof wurde gemeinsam mit der Heidelberg Laureate Forum Foundation konzipiert und organisiert. Sie war ein großer Erfolg mit vielen Besucherinnen und Besuchern, positivem Feedback und über 30 Schulklassen-Führungen. Im September wurde eine kleinere Version der Ausstellung beim Heidelberg Laureate Forum gezeigt.

Südkorea. Die NIMS-IMAGINARY Ausstellung während des International Congress of Mathematicians (ICM) 2014 in Seoul, Südkorea, zeigte die besten aller IMAGINARY-Module, zusätzlich neue Software, Bilder, Filme und 3D-Skulpturen. Inhaltlich war es bisher die größte IMAGINARY-Ausstellung, und es kamen mehr als 1000 Besucher pro Tag (etwa 13000 insgesamt). Ein großer Teil des IMAGINARY-Teams war während des ICM vor Ort.

Auf Einladung der Organisatoren organisierte IMAGINARY zum Tag der Mathematikpopularisierung des ICM ein Panel, das aus einem Mathematik-Visions-Slam mit dem Titel „Math communication for the future" (veröffentlicht in den Proceedings of the ICM Seoul, Vol. I (2014)) und einer Sonderführung durch die Ausstellung bestand.

In Fortsetzung der NIMS-IMAGINARY-Ausstellung richtete das National Institute for Mathematical Sciences (NIMS) eine Dauerausstellung in Daejeon ein, und damit die erste IMAGINARY-Vertretung in Südkorea. Gezeigt werden

The IMAGINARY exhibition events

In 2014, IMAGINARY organized 45 exhibition events, which are all easily accessible for everyone via the data base of the platform and clearly arranged. Besides descriptions, there are photographs (and in some cases also videos) presented for each event. Two exhibition highlights took place in Heidelberg, Germany, and Seoul, South Korea.

Heidelberg. The exhibition at the Heidelberg Karlstorbahnhof was designed and organized together with the Heidelberg Laureate Forum Foundation. It was a big success, many visitors came, including 30 school classes and the feedback was very positive. In September, a smaller version of the exhibition was presented at the Heidelberg Laureate Forum.

South Korea. The NIMS-IMAGINARY exhibition took part during the International Congress of Mathematicians (ICM) 2014 in Seoul, South Korea. The best of all IMAGINARY modules were shown, also new software, images, films, and 3D sculptures. Content-wise, it was the biggest IMAGINARY exhibition shown so far, more than 1,000 people visited per day (about 13,000 in total). Most of the IMAGINARY team was present.

As part of the math popularization activities of the ICM, IMAGINARY organized a panel consisting of a mathematics vision slam titled "Mathematics communication for the future" (published in the proceedings of the ICM Seoul, Vol I (2014)) and a special guided tour through the exhibition.

Continuing from the big success of NIMS-IMAGINARY exhibition, the National Institute for Mathematical Sciences (NIMS) provided a permanent exhibition at Daejeon, which is the first IMAGINARY branch in South Korea. It features 6

6 Touchscreen-Panels mit einer Vielzahl von Mathematikprogrammen, flankiert von wunderschönen Postern und Skulpturen.

touchscreen panels with a wide variety of mathematical programs together with gorgeous posters and sculptures.

Berlin. Im Deutschen Technikmuseum Berlin wird seit März 2014 eine neu-gestaltete „Mathematik des Planeten Erde (MPE)"-Ausstellung gezeigt, bestehend aus drei interaktiven Stationen über Gletscher, Vulkanasche und Tsunamis. Die Ausstellung war ursprünglich bis Juni 2014 geplant, wurde aber bis zum Frühjahr 2015 verlängert.

Berlin. The German Technikmuseum in Berlin presents a newly designed exhibition on "Mathematics of Planet Earth" (MPE). Three interactive stations on glaciers, volcanoes and tsunamis are shown. The exhibition was originally planned to last until June 2014, however it was extended until spring 2015.

Norwegen. IMAGINARY wurde 2014 zum ersten Mal in Norwegen ausgestellt. Der Start war in Trondheim und im Anschluss reiste die Ausstellung durch das Land und wurde in weiteren Wissenschaftsmuseen gezeigt, z.B. in Arendal.

Norway. In 2014, IMAGINARY was presented in Norway for the first time. It started in Trondheim and afterwards the exhibition toured the country visiting more science museums, for example in Arendal.

Ausgewählte IMAGINARY-Kooperationen

Neben reinen Ausstellungsaktivitäten ist IMAGINARY auch Initiator oder Partner von verschiedenen Projekten, die die Verbreitung von Mathematik-Kommunikation unterstützen.

Uruguay. Als Teil der Initiative „Plan Ceibal" in Uruguay, die mit der Verteilung von kostenlosen Laptops an alle Schülerinnen und Schüler im Land beauftragt wurde, wurden 24.000 Notebooks mit den IMAGINARY-Programmen SURFER und Morenaments bereits installiert an Schülerinnen und Schüler verteilt. Des weiteren sind diese beiden Programme Teil eines kostenlosen Updates für mehr als 150.000 Schüler-Laptops.

Frankreich. Cap'Maths hat die Ausgründung einer autonomen IMAGINARY-Einheit in Frankreich ermöglicht: "IMAGINARY France". "IMAGINARY France" wurde im Dezember 2014 gestartet und das Hauptziel dieser Initiative ist, den bisherigen Inhalt der Webseite ins Französische zu übersetzen und weitere französische Mathematikerinnen und Mathematiker zu Beiträgen in Form von Ausstellungen und Veranstaltungen zu motivieren.

Afrika. Des weiteren wurde die Zusammenarbeit zwischen IMAGINARY und dem African Institute for Mathematical Sciences (AIMS) gestärkt durch einen Ausstellungsstand als Beitrag zum 10. Jubiläum der Pi-Tag Feierlichkeiten am 13. und 14. März in Tansania. Dies war auch das erste Mal, dass IMAGINARY auf dem afrikanischen Kontinent ausgestellt wurde. Darauf folgte eine Ausstellung in Marokko im Oktober 2014 anlässlich des Bildungsminister-Forums zu Wissenschaft, Technologie und Innovation in Afrika. Und schließlich hat IMAGINARY zusammen mit dem African Institute of Mathematical Sciences (AIMS) eine Ausstellung und einen Workshop zum Thema der Mathematikkommunikation in Kapstadt in Südafrika im November 2014 realisiert.

Selected IMAGINARY collaborations

Besides pure exhibition activities, IMAGINARY also organized different projects together with other partners and collaborators, to foster math communication.

Uruguay. As part of the initiative "Plan Ceibal" in Uruguay, which organized the distribution of free laptops for every school kid in the country, 24,000 laptops were distributed with preinstalled IMAGINARY software such as SURFER and Morenaments. These two software programs are also part of a free update for more than 150,000 additional student laptops

France. IMAGINARY received funding by Cap'Maths to establish an autonomous unit "IMAGINARY France", which started in December 2014. Its purpose is to translate all existing content into French, to have more contributions from French mathematicians and organize exhibitions and events in France.

Africa. Furthermore, the collaboration between IMAGINARY and the African Institute for Mathematical Sciences (AIMS) is strenghtening. An interactive exhibit of SURFER was displayed at the 10th anniversary of the Pi-Day celebrations on the 13th and 14th of March in Tanzania. This was also the first time IMAGINARY was presented on the African continent. It was followed by an exhibition in Morocco in October 2014, on the occasion of the Ministerial Forum on Science, Technology and Innovation in Africa. A further collaboration together with AIMS was an exhibition and workshop on the topic of math communication on the African continent in Cape Town, South Africa, in November 2014.

Wissenschaftsjahr. IMAGINARY nahm mit der Ausstellung „Mathematik des Planeten Erde" am deutschen Wissenschaftsjahr „Digitale Gesellschaft" teil. Außerdem gab es eine Aktion im Zuge des Internationalen Jahres der Kristallographie: In Kooperation mit der Philatelie Liechtenstein entstand eine Briefmarkenserie, die 13 Standbilder einer SURFER-Animation zeigt. Zusätzlich wurde eine kostenlose Smartphone-App entwickelt, die mittels Augmented-Reality-Technologie die Briefmarken identifiziert und dann den gesamten Animations-Film abspielt, der eine künstlerische Kristall-Metamorphose zeigt.

Science Year. IMAGINARY's exhibition "Mathematics of Planet Earth" took part in the German Science Year "Digital Society". Furthermore, for the International Year of Crystallography, a stamp series was produced in cooperation with Philatelie Liechtenstein: 13 still frames taken from a SURFER-animation are shown. Additionally, a smartphone application was developed, which identifies the stamps via augmented-reality-technology and the full animation is played, which shows an artistic interpretation of a crystal metamorphosis.

Die IMAGINARY-Netzwerkinitiativen

Netzwerk. Das neue Netzwerk für Mathematik-Kommunikation „Math communication network" ist gestartet. Der Austausch von Erfahrungen und Ideen zwischen den Teilnehmerinnen und Teilnehmern ist in regem Gange. Gemeinsam wurde eine Datenbank sowie eine globale interaktive Karte von weltweiten Mathematik-Museen erstellt, die ständig vervollständigt wird und zu jedem Museum Hintergrundinformationen enthält. Ein spezieller Netzwerk-Newsletter erscheint alle zwei Monate. Außerdem wird an einer gemeinsamen Ideensammlung für Mathematik-Kommunikation-Services gearbeitet. Als nächster Schritt ist eine Datenbank aller Aktivitäten im Bereich Mathematik-Kommunikation geplant, die von der Community gepflegt werden soll.

MaTiE. Das Projekt Mathematics Translations in Europe (MaTiE) ist eine gemeinschaftliche Initiative von Mathematikkommunikatorinnen und -kommunikatoren in Europa. Es wird daran gearbeitet, ein Mediennetzwerk aufzubauen, ausgewählte Fachartikel, die von den Netzwerkpartnern publiziert wurden, in europäische Sprachen zu übersetzen, sowie die übersetzten Artikel mit den anderen Partnern zu teilen.

The IMAGINARY network initiatives

Network. The new IMAGINARY math communication network started in 2014 as well. The exchange of experiences and ideas between the participants is in good progress. A data base as well as an interactive map of worldwide math museums including background information on each museum was jointly developed and will be further extended. A special network newsletter is published every other month. Furthermore, a joint collection of ideas about math communication services is under development. The next step will be a database of all activities in the field of math communication which will be maintained by the community.

MaTiE. The Mathematics Translations in Europe (MaTiE) project is a collaborative project of popular mathematics communicators within Europe. It works on establishing a network of media, translating selected articles published by the network partners into European languages and sharing the translated articles within the network partners.

Online-Aktivitäten

Spiel 2048. In Anlehnung an das Online-Puzzlespiel 2048 von Gabriele Cirulli hat IMAGINARY Anfang April 2014 eine eigene Version des Spiels herausgebracht. Statt Zahlen wurden hier animierte Versionen algebraischer Flächen mit steigendem Grad und steigender Anzahl an Singularitäten verwendet. Das Spiel erhielt in nur wenigen Tagen mehrere tausend User, die es noch wochenlang weiterspielten.

Online achievements

Game 2048. Based on the online puzzle game 2048 by Gabriele Cirulli, IMAGINARY produced its own version in April last year. Instead of numbers animated versions of algebraic surfaces with increasing degree and increasing number of singularities were used. Several thousands of users played the game within just a couple of days, and kept playing it for weeks after.

Film. Der Film ‘Glacial Mystery’ hat den ersten Preis des Fast Forward Science Wettbewerbs in der Kategorie ‘Substanz’ gewonnen, in der neben dem Unterhaltungsfaktor besonders auf fundierte Vermittlung von Wissenschaft und Forschung Wert gelegt wird. Der Film steht in deutscher und englischer Sprache zur Verfügung.

Film. The film ‘Glacial Mystery’ won the first prize of the Fast Forward Science competition within the category ‘substance’, which focuses on transfer of scientific knowledge, thorough research and systematic investigation - besides entertainment of course. The film is available in English and German.

Das Team

Hinter dem Projekt IMAGINARY steht ein internationales Team, das an der Umsetzung der einzelnen Projekte arbeitet. Besonderer Dank gilt daher (in alphabetischer Reihe): Andreas Matt, Antonia Mey, Bianca Violet, Carla Cederbaum, Christian Stussak, Daniel Ramos, David Grünberg, Gert-Martin Greuel, Guillaume Jouvet, Lea Renner und Sophia Jahns.

Die Hilfe der lokalen Partner in den verschiedenen Ländern sowie die immer weiter wachsende IMAGINARY-Gemeinschaft machen das Projekt überhaupt möglich.

The Team

Behind the project IMAGINARY, there is an international team realizing the different projects. Special thanks go to (in alphabetical order): Andreas Matt, Antonia Mey, Bianca Violet, Carla Cederbaum, Christian Stussak, Daniel Ramos, David Grünberg, Gert-Martin Greuel, Guillaume Jouvet, Lea Renner and Sophia Jahns.

However, only with the help of the local partners in the different countries as well as of the fast-growing IMAGINARY community, this project has been made possible in the first place.

Taming Infinities

M. Hairer

Mathematics Institute, University of Warwick

1 What is renormalisation?

In its most abstract form, a physical theory consists of a collection Φ of possible experimental setups to which it applies, together with a map M, depending on finitely many parameters λ, and assigning to each experiment $\varphi \in \Phi$ a numerical prediction $M_\lambda(\varphi)$ (or, more generally, a recipe for producing such a prediction) for its outcome. The standard *modus operandi* is to first calibrate the theory by performing sufficiently many experiments to determine unambiguously the correct physical values for all the parameters λ, which then allows one to make further predictions. Here, the fact that a theory depends only on finitely many parameters is crucial, for otherwise we could never hope to be able to determine all of them, which would fatally undermine the theory's predictive power.

Unfortunately, some physical theories are plagued with infinities: the theory produces a recipe which, for many experiments, predicts the nonsensical value ∞ for their outcome. Historically, this situation was first encountered by Oppenheimer in 1930, around the time quantum electrodynamics was being developed [Opp30]. When faced with such a conundrum, one reaction may be to simply discard the theory completely and look for a replacement. There is however in many cases a much better alternative. The idea, first developed by Bethe, Dyson, Feynman, Schwinger, Tomonaga, etc in the 1940's, is to replace M_λ by a "regularised" version $M^{(\varepsilon)}_{\lambda,\eta}$ where the singularities leading to the infinite outcomes in M_λ have been removed and such that, at some purely formal level, one has $\lim_{\varepsilon\to 0} M^{(\varepsilon)}_{\lambda,\eta} = M_\lambda$. The new additional parameter set η describes the details of this regularisation procedure, which no longer appears in the limit and which does not need to have any physical interpretation. Of course, one would still expect that, if $M_\lambda(\varphi) = \infty$, then one would also have $\lim_{\varepsilon\to 0} M^{(\varepsilon)}_{\lambda,\eta}(\varphi) = \infty$, so it is not clear what one actually gained by doing this.

It turns out that, in many situations of interest, it is possible to fine-tune the parameters λ as $\varepsilon \to 0$ in such a way that the limit $\lim_{\varepsilon\to 0} M^{(\varepsilon)}_{\lambda(\varepsilon,\eta),\eta}(\varphi)$ exists and is finite for every possible experimental setup $\varphi \in \Phi$. Furthermore, it happens that it is often possible to perform this fine-tuning in such a way that the above limit is actually independent of the "unphysical" parameters η, which is a desirable feature. When this is the case, we say that our theory exhibits "universality". Of course, even when universality holds, the way in which one performs the fine-tuning $(\varepsilon, \eta) \mapsto \lambda$ in order to obtain finite outcomes is typically not unique. In order to keep track of this lack of uniqueness, one introduces a new set of parameters $\hat\lambda$ which parametrises the possible ways to fine-tune the original parameters λ in order for the theory to produce finite outcomes that are independent of η. Provided that universality holds, we can now define

a *renormalised* theory $\hat{M}$ by setting

$$\hat{M}_{\hat{\lambda}}(\varphi) := \lim_{\varepsilon \to 0} M^{(\varepsilon)}_{\lambda(\varepsilon,\eta,\hat{\lambda}),\eta}(\varphi) \, .$$

In the physics literature, the original parameters λ are usually referred to as the "bare" parameters and the new parameters $\hat{\lambda}$ are referred to as the "renormalised" parameters.

1.1 A simple example

Let us now give a very simple example of this phenomenon. In this example, which does not at all have the pretence to be connected to physical reality in any sense, the set Φ is given by the set of Schwartz test functions on $\mathbf{R}$ and a "theory" is given by a Schwartz distribution, i.e. a continuous linear map $M\colon \Phi \to \mathbf{R}$. Assume now that we have reasons to believe that the outcomes of our "experiments" are described by a Schwartz distribution formally given by $M_\lambda(x) = \frac{\lambda_1}{|x|} - \lambda_2 \delta_0(x)$. This is of course nonsensical since, for every test function φ with $\varphi(0) \neq 0$, one would then have

$$M_\lambda(\varphi) = \int_{\mathbf{R}} \lambda_1 \frac{\varphi(x)}{|x|} \, dx - \lambda_2 \varphi(0) = \infty \, , \tag{1.1}$$

so that M_λ really isn't a Schwartz distribution at all!

Given a continuous function $\eta\colon [-1,1] \to \mathbf{R}$ with $\eta(-1) = \eta(1) = 1$, we have a natural way of regularising this theory by replacing the function $1/|x|$ by

$$\frac{1}{|x|_\varepsilon} := \begin{cases} 1/|x| & \text{if } |x| \geq 1, \\ \varepsilon^{-1}\eta(x/\varepsilon) & \text{otherwise.} \end{cases}$$

This regularisation procedure then yields a family $M^{(\varepsilon)}_{\lambda,\eta}$ of well-defined Schwartz distributions by simply replacing $|x|$ by $|x|_\varepsilon$ in (1.1). In order to obtain finite quantities in the limit $\varepsilon \to 0$, we then set

$$\lambda_1 = \hat{\lambda}_1 \, , \qquad \lambda_2 = \hat{\lambda}_1 \int_{-1}^{1} \frac{dx}{|x|_\varepsilon} + \hat{\lambda}_2 = \hat{\lambda}_1 (\textstyle\int \eta(x) dx - 2\log\varepsilon) + \hat{\lambda}_2 \, .$$

In this way, we have

$$M^{(\varepsilon)}_{\lambda(\varepsilon,\eta,\hat{\lambda}),\eta}(\varphi) = \hat{\lambda}_1 \int_{|x|\geq 1} \frac{\varphi(x)}{|x|} \, dx + \hat{\lambda}_1 \int_{|x|<1} \frac{\varphi(x) - \varphi(0)}{|x|_\varepsilon} \, dx - \hat{\lambda}_2 \varphi(0) \, .$$

It is now immediate that this expression does indeed have a limit as $\varepsilon \to 0$ and that this limit is indeed independent of the choice of regularisation function η:

$$\hat{M}_{\hat{\lambda}}(\varphi) = \hat{\lambda}_1 \int_{\mathbf{R}} \frac{\varphi(x) - \mathbf{1}_{|x|<1}\varphi(0)}{|x|} \, dx - \hat{\lambda}_2 \varphi(0) \, .$$

(But for this we had to adjust the bare parameter λ_2 in an η-dependent way!)

2 Interface growth models

One physically relevant situation where the above considerations apply is that of fluctuations of interface growth models in $1+1$ dimensions (i.e. one considers one-dimensional interfaces moving through a two-dimensional medium). A typical example of interface growth model is the Eden model, which can be described in the following way. A

state of the system is a map $\eta\colon \mathbf{Z}^2 \to \{0,1\}$ with 1 interpreted as "occupied" and 0 as "empty". Each empty site is then assigned an independent clock which rings at an exponentially distributed time. When a clock rings and some neighbouring site is occupied, then the corresponding site becomes occupied. If however all neighbouring sites are empty, a new clock is started. We can then start with the initial state η_0 such that $\eta_0(x,y) = \mathbf{1}_{y\le 0}$, i.e. the lower half space is occupied, and define a height function $h(t,x)$ by

$$h(t,x) = \sup\{y \in \mathbf{Z} \,:\, \eta_t(x,y) = 1\}\;,$$

where η_t denotes the state at time t under the evolution we just described. The analysis given in the seminal article [KPZ86] then suggests the following conjecture:

Conjecture 1 *There exist a constant c and a continuous space-time random field h_{KPZ} such that the convergence in law*

$$\lim_{\varepsilon\to 0}\big(\varepsilon h(\varepsilon^{-3}t, \varepsilon^{-2}x) - c\varepsilon^{-2}t\big) = h_{\text{KPZ}}(t,x) \tag{2.1}$$

holds simultaneously for any finite number of space-time points (t,x).

It is furthermore conjectured that, by universality, an analogous result holds for virtually *any* model of interface growth under very mild assumptions, and with the *same* limit h_{KPZ} (modulo rescaling). Unfortunately, this conjecture is still very far from being a mathematical theorem, despite spectacular recent progress, see [QS15] for a recent overview. In particular, no full characterisation of h_{KPZ} exists and there exists *no* model of interface growth for which Conjecture 1 can be shown as stated. The state of the art is to show such a convergence simultaneously for different values of x and a fixed value of t for certain models exhibiting a form of "stochastic integrability" (see [PS02] for the first such result).

The situation is slightly less dire for symmetric interface fluctuation models. These are models where, instead of the interface separating one phase invading another one (in the above example, "occupied sites" are invading "empty" sites), the two phases play completely symmetric roles. In this case, one expects a statement analogous to Conjecture 1, but with (2.1) replaced by

$$\lim_{\varepsilon\to 0} \varepsilon h(\varepsilon^{-4}t, \varepsilon^{-2}x) = h_{\text{EW}}(t,x)\;,$$

for some Gaussian process h_{EW} that can be described explicitly. This naturally begs the question as to how the crossover between h_{EW} and h_{KPZ} happens. In other words, if we consider an interface fluctuation model which is weakly asymmetric (i.e. with an ε-dependent asymmetry which vanishes as $\varepsilon \to 0$), then we would expect to see a large-scale behaviour governed by h_{EW} for sufficiently "small" asymmetries and h_{KPZ} for sufficiently "large" ones. It turns out that the crossover occurs at asymmetries of order $\sqrt{\varepsilon}$ and, for one specific such model, it was shown in [BG97] that the large-scale behaviour at the crossover regime is described by the KPZ equation, a nonlinear stochastic PDE formally given by

$$\partial_t h = \partial_x^2 h + (\partial_x h)^2 + \xi\;, \tag{2.2}$$

where ξ denotes space-time white noise, i.e. the generalised Gaussian process with covariance $\mathbf{E}\xi(t,x)\xi(s,y) = \delta(t-s)\delta(x-y)$. Again, one expects that universality holds: the process determined by (2.4) should describe the crossover regime for any family of weakly asymmetric interface fluctuation models under very weak assumptions.

One problem with obtaining such a results is that (2.4) is severely ill-posed: the solution h is only Hölder continuous, so that $(\partial_x h)^2$ actually diverges everywhere! Bertini and Giacomin circumvented this problem by considering the Hopf-Cole solution: one *defines* h by $h = \log Z$, where Z solves the stochastic heat equation

$$\partial_t Z = \partial_x^2 Z + Z\xi \, , \tag{2.3}$$

with the product $Z\xi$ interpreted after integration as an Itô integral. The particular model considered in [BG97] was one of the few models that are well-behaved under the transformation $h \mapsto \exp(h)$, which is why progress in this direction was also very slow.

It was shown in [Hai13, Hai14] that (2.4) can be renormalised in the following way. Consider a symmetric mollifier ϱ_ε, set $\xi_\varepsilon = \xi \star \varrho_\varepsilon$, and consider the solutions h_ε to

$$\partial_t h_\varepsilon = \partial_x^2 h_\varepsilon + (\partial_x h_\varepsilon)^2 + \xi_\varepsilon - C_\varepsilon \, . \tag{2.4}$$

Then, it was shown that there exists a choice of constants C_ε such that, as $\varepsilon \to 0$, h_ε does indeed converge to the Hopf-Cole solution of the KPZ equation. Note how this fits into the narrative of Section 1: the regularised equation has many parameters (the arbitrary shape of the mollifier) and the diverging constant C_ε does depend on these, while the limiting object does not. In the context of semilinear stochastic PDEs, the theory developed in [Hai14] allows to describe such phenomena in a systematic way. Rather fittingly, a preliminary version of these results, as well as the alternative viewpoint developed in [GIP15] were both first announced during the workshop "Rough paths and stochastic PDEs" that was held in Oberwolfach in August 2012.

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1.7. Nachruf

Gerhard Rupprecht (1948-2014)

Am 8. August 2014 verunglückte Gerhard Rupprecht, Vorsitzender des Stiftungsrates der Oberwolfach Stiftung, im Alter von 65 Jahren bei einem Bergunfall an der Roggalspitze in Österreich tödlich.

Gerhard Rupprecht wurde 1978 bei Klaus Kirchgässner am Mathematischen Institut der Universität Stuttgart promoviert. Seither war er der Mathematik und ihrer Anwendung in der Industrie eng verbunden. Langjährig war er in der Allianz Versicherungsgruppe tätig, zuletzt (von 1991 bis 2010) als Vorstandsvorsitzender der Allianz Deutschland und Vorstandsmitglied der Allianz SE. Zusammen mit K. Kirchgässner und R. Remmert initiierte Gerhard Rupprecht 1997 die Oberwolfach Stiftung, die die Förderung des Mathematischen Forschungsinstituts Oberwolfach zum Ziel hat. Seine Tatkraft und sein profunder Rat waren beim Aufbau der Stiftung unverzichtbar. Lange Zeit leitete Gerhard Rupprecht die Stiftung kollegial mit Reinhold Remmert; seit 11. Juni 2010 fungierte er als Vorsitzender des Stiftungsrates.

Neben seinem Interesse für die mathematischen Wissenschaften war es Gerhard Rupprecht stets ein Anliegen, die Distanz zwischen der Mathematik und deren Anwendung in den Unternehmen zu überbrücken. Hier sei insbesondere der Band „Motor der Wissenschaft - Initiative der Wissenschaft zum Jahr der Mathematik" genannt, den er mit Reinhold Remmert und Gert-Martin Greuel, dem damaligen Direktor des Mathematischen Forschungsinstituts Oberwolfach, 2008 herausgab.

Die Oberwolfach Stiftung, das Mathematische Forschungsinstitut Oberwolfach und die gesamte mathematische Gemeinschaft trauern um eine hervorragende Persönlichkeit, die sich um die Mathematik und insbesondere das Mathematische Forschungsinstitut Oberwolfach verdient gemacht hat.

2. Wissenschaftliches Programm

Das wissenschaftliche Programm wird 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 Vorjahren erhielt das MFO wesentlich mehr Anträge als genehmigt werden konnten.

2.1. Übersicht der Programme

Das Mathematische Forschungsinstitut Oberwolfach hat sechs 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 bietet das MFO zusätzliche Serviceleistungen an.

Das Workshop Programm

Das wissenschaftliche Hauptprogramm besteht aus etwa 40 einwöchigen Workshops pro Jahr mit jeweils etwa 50 Teilnehmern. Alternativ können zwei Workshops halber Größe (ca. 25 Teilnehmer) parallel stattfinden. Die Workshops werden von international führenden Experten der jeweiligen Fachgebiete organisiert. Die Teilnehmer werden auf Empfehlung der Organisatoren vom Direktor persönlich eingeladen. Eine Besonderheit der Oberwolfacher Workshops ist die Forschungsorientierung. Sehr häufig weisen Gastforscher darauf hin, wie stimulierend die Atmosphäre sei. Viele bedeutende Forschungsprojekte haben ihre Entstehung der Durchführung eines Workshops in Oberwolfach zu verdanken.

Simons Visiting Professors

Das Simons Visiting Professors (SVP) Programm startete im Januar 2014. Es wird durch die Simons Foundation finanziert. Das Programm unterstützt jährlich bis zu 40 Simons Visiting Professoren, führende Wissenschaftler von außerhalb Europas, die eine Einladung zu einem Oberwolfacher Workshop mit einem Forschungsaufenthalt an einer europäischen Universität von bis zu zwei Wochen kombinieren möchten. Das Programm bietet Unterstützung in Höhe von 135 Euro pro Tag des Gastaufenthalts an der Universtität. Die beteiligten Universitäten

2. Scientific program

The Director of the Institute decides on the scientific program in cooperation with the Scientific Committee of the Gesellschaft für Mathematische Forschung e.V. For the scientific program, 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 Committee examines all scientific events at the Institute prior to their approval. The program 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 program

The Mathematisches Forschungsinstitut Oberwolfach focuses on six central programs: the Workshop program, the Mini-Workshop program, the Oberwolfach Arbeitsgemeinschaft, the Oberwolfach Seminars, the Research in Pairs program, and the Oberwolfach Leibniz Fellows. In addition the MFO provides some further services.

The Workshop program

The main scientific program 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 organized by internationally leading experts in the relevant fields. The participants are personally invited by the Director after recommendation by the organizers. 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.

Simons Visiting Professors

The Simons Visiting Professors (SVP) program started in January 2014. It is funded by the Simons Foundation. The program annually supports up to 40 Simons Visiting Professors, distinguished scientists from outside Europe, who wish to combine an invitation to an Oberwolfach Workshop with a research visit to a European university of up to two weeks. The program provides support to each Simons Visiting Professor by Oberwolfach amounting to 135 Euro per day of the university visit. Additionally, the participating universities are required to provide

stellen im Gegenzug Unterkünfte für die Dauer des Besuches an der Universität zur Verfügung und tragen die Reisekosten innerhalb Europas zwischen Oberwolfach und der Universität.

Die SVP Auszeichnungen werden vom Direktor auf Vorschlag der Organisatoren eines Workshops entschieden.

accommodation for the duration of the visit at the university as well as travel expenses within Europe between Oberwolfach and the university as a matching of this support.

The SVP awards are decided by the director on suggestion of the organizers of a workshop.

Das Miniworkshop Programm

Im Rahmen dieses Programms können jährlich 12 einwöchige Miniworkshops mit je etwa 15 Teilnehmern veranstaltet werden. Die 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.

The Mini-Workshop program

This program 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 Nachwuchsforscher und 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.

The Oberwolfach Arbeitsgemeinschaft

The idea of the Arbeitsgemeinschaft (study group) for junior 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 organized by Prof. Christopher Deninger and Prof. Gerd Faltings.

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 es, 25 Teilnehmer in ein besonders aktuelles Arbeitsgebiet einzuführen.

The Oberwolfach Seminars

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

Wir freuen uns, dass die Carl Friedrich von Siemens Stiftung die Oberwolfach Seminare von Sommer 2008 bis Sommer 2016 substanziell unterstützt.

We are pleased that the Carl Friedrich von Siemens Foundation substiantially supports the Oberwolfach Seminars from summer 2008 to summer 2016.

Das Research in Pairs Programm

Ein weiterer Schwerpunkt ist das Programm „Research in Pairs" (RiP). Dieses Programm ermöglicht es jeweils 2 bis 4 Forschern aus verschiedenen Institutionen für 2 Wochen bis 3 Monate am Mathematischen Forschungsinstitut Oberwolfach an einem vorher festzulegenden gemeinsamen Projekt zu arbeiten.

The Research in Pairs program

A further main activity of the Institute is the "Research in Pairs" (RiP) program. This program 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

In diesem Postdoktoranden-Programm werden seit Januar 2007 besonders qualifizierte Nachwuchswissenschaftler in einer entscheidenden Phase ihrer wissenschaftlichen Laufbahn durch die Bereitstellung idealer Arbeitsbedingungen

Oberwolfach Leibniz Fellows

The focus of this postdoctoral program, which has started in January 2007, is to support excellent junior researchers in an important period of their scientific career by providing ideal working conditions in an international atmosphere.

in einem internationalen Umfeld gefördert. Die jungen Forschenden können sich allein oder in Kleingruppen für die Durchführung eines Forschungsprojekts in Oberwolfach von zwei bis zu sechs Monaten bewerben. Entscheidend 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. Gefördert werden exzellente Doktoranden oder frisch Promovierte bis zu zwei Jahre nach der Promotion, insbesondere durch Reisekostenunterstützung. Es handelt sich um fünf zusätzliche Plätze pro Workshop, die für die Oberwolfach Leibniz Graduate Students reserviert sind und nicht durch etablierte Forscher besetzt werden dürfen.

Die Oberwolfach Reports

Um die Ergebnisse der Workshops einem international weiten Kreis zugänglich zu machen wurde 2004 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 europäische Nachwuchsforscher verliehen. Der

Outstanding junior 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 five doctoral students per Oberwolfach Workshop. This program fosters excellent graduate students and recent post docs (the Ph.D./Dr. degree must be received not more than two years ago), in particular by the reimbursement of travel costs. For this program, each Oberwolfach Workshop is given an extra capacity of five places which may not be taken by senior researchers.

The Oberwolfach Reports

The Oberwolfach Reports (OWR) were initiated in 2004 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. They 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 Foundation to European junior researchers. The prize is awarded for excellent

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 Nachwuchsforscher 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 zweijährigem Wechsel finden Fortbildungsveranstaltungen für Lehrer bzw. Bibliothekare des Landes Baden-Württemberg 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 Fotosammlung, die Oberwolfach References for Mathematical Software (ORMS) und die Wanderausstellung IMAGINARY zu nennen.

2.2. Jahresprogramm 2014

Im Jahr 2014 wurden während 41 Wochen 43 Workshops durchgeführt, 12 Miniworkshops während vier Wochen, 6 Oberwolfach Seminare während drei Wochen und 2 Arbeitsgemeinschaften während 2 Wochen. Insgesamt nahmen mehr als 2600 Forscher aus aller Welt an allen Programmen teil, davon ca. 28% aus Deutschland, 38% aus Resteuropa und 34% 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.

achievements in changing fields of mathematics. The Oberwolfach Foundation awards in cooperation with the MFO approximately every three years the John Todd Award to junior 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. 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. Annual schedule 2014

In the year 2014 43 workshops have taken place during 41 weeks, as well as 12 Mini-Workshops during four weeks, 6 Oberwolfach Seminars during three weeks and 2 Arbeitsgemeinschaften during 2 weeks. In total, more than 2,500 researchers from all over the world attended the Oberwolfach research program, about 28% from Germany, 38% from the rest of Europe, and 34% from non-European countries. The Institute emphasizes that all fields of mathematics and related areas are represented, including applications. The following scientific program gives proof of this policy.

Workshops

05.01. – 11.01.2014 **Combinatorics**
Organizers: Jeff Kahn, Piscataway
Angelika Steger, Zürich
Benny Sudakov, Los Angeles

12.01. – 18.01.2014 **Set Theory**
Organizers: Ilijas Farah, Toronto
Sy-David Friedman, Vienna
Menachem Magidor, Jerusalem
W. Hugh Woodin, Berkeley

19.01. – 25.01.2014 **Representation Theory and Analysis of Reductive Groups: Spherical Spaces and Hecke Algebras**
Organizers: Bernhard Krötz, Paderborn
Eric M. Opdam, Amsterdam
Henrik Schlichtkrull, Copenhagen
Peter Trapa, Salt Lake City

26.01. – 01.02.2014 **Mixing, Transport and Coherent Structures**
Organizers: Sanjeeva Balasuriya, Adelaide
George Haller, Zürich
Nicholas Ouellette, New Haven
Vered Rom-Kedar, Rehovot

02.02. – 08.02.2014 **Langlands Correspondence and Constructive Galois Theory**
Organizers: Michael Dettweiler, Bayreuth
Jochen Heinloth, Essen
Zhiwei Yun, Stanford

02.02. – 08.02.2014 **Dirichlet Series and Function Theory in Polydiscs**
Organizers: Andreas Defant, Oldenburg
Manuel Maestre, Burjassot
Eero Saksman, Helsinki
Kristian Seip, Trondheim

09.02. – 15.02.2014 **New Trends in Teichmüller Theory and Mapping Class Groups**
Organizers: Shigeyuki Morita, Tokyo
Athanase Papadopoulos, Strasbourg
Robert C. Penner, Aarhus
Anna Wienhard, Heidelberg

16.02. – 22.02.2014 **Representation Theory of Quivers and Finite Dimensional Algebras**
Organizers: William Crawley-Boevey, Leeds
Osamu Iyama, Nagoya
Bernhard Keller, Paris
Henning Krause, Bielefeld

02.03. – 08.03.2014 **Enumerative Combinatorics**
Organizers: Mireille Bousquet-Mélou, Bordeaux
Michael Drmota, Wien
Christian Krattenthaler, Wien
Marc Noy, Barcelona

09.03. – 15.03.2014 **Adaptive Statistical Inference**
Organizers: Mark Low, Philadelphia
Axel Munk, Göttingen
Alexandre Tsybakov, Malakoff

16.03. – 22.03.2014 **Nonlinear Evolution Equations: Analysis and Numerics**
Organizers: Marlis Hochbruck, Karlsruhe
Serge Nicaise, Valenciennes
Alexander Ostermann, Innsbruck
Roland Schnaubelt, Karlsruhe

23.03. – 29.03.2014 **Flat Surfaces and Dynamics on Moduli Space**
Organizers: Howard Masur, Chicago
Martin Möller, Frankfurt
Anton Zorich, Paris

06.04. – 12.04.2014 **Real Algebraic Geometry With A View Toward Systems Control and Free Positivity**
Organizers: Didier Henrion, Toulouse
Salma Kuhlmann, Konstanz
Victor Vinnikov, Beer-Sheva

20.04. – 26.04.2014 **Hilbert Modules and Complex Geometry**
Organizers: Kenneth R. Davidson, Waterloo
Ronald G. Douglas, College Station
Jörg Eschmeier, Saarbrücken
Harald Upmeier, Marburg

27.04. – 03.05.2014 **Modular Forms**
Organizers: Jan Hendrik Bruinier, Darmstadt
Atsushi Ichino, Kyoto
Tamotsu Ikeda, Kyoto
Özlem Imamoglu, Zürich

04.05. – 10.05.2014 **Stochastic Analysis in Finance and Insurance**
Organizers: Rene Carmona, Princeton
Martin Schweizer, Zürich
Nizar Touzi, Paris

11.05. – 17.05.2014 **Schnelle Löser für Partielle Differentialgleichungen**
Organizers: Randolph E. Bank, La Jolla
Lars Grasedyck, Aachen
Wolfgang Hackbusch, Leipzig
Gabriel Wittum, Frankfurt

18.05. – 24.05.2014 **Interactions between Algebraic Geometry and Noncommutative Algebra**
Organizers: Markus Reineke, Wuppertal
J. Toby Stafford, Manchester
Catharina Stroppel, Bonn
Michel Van den Bergh, Diepenbeek

25.05. – 31.05.2014 **Algebraic Structures in Low-Dimensional Topology**
Organizers: Louis Hirsch Kauffman, Chicago
Vassily Olegovich Manturov, Moscow
Kent E. Orr, Bloomington
Robert Schneiderman, New York

25.05. – 31.05.2014 **Okounkov Bodies and Applications**
Organizers: Megumi Harada, Hamilton
Kiumars Kaveh, Pittsburgh
Askold Khovanskii, Toronto

01.06. – 07.06.2014 **Stochastic Analysis: Around the KPZ Universality Class**
Organizers: Alice Guionnet, Cambridge MA
Martin Hairer, Coventry
Wendelin Werner, Zürich

15.06. – 21.06.2014 **Geometrie**
Organizers: John Lott, Berkeley
Iskander Taimanov, Novosibirsk
Burkhard Wilking, Münster

22.06. – 28.06.2014 **Computational Multiscale Methods**
Organizers: Carsten Carstensen, Berlin/Seoul
Björn Engquist, Austin/Stockholm
Daniel Peterseim, Bonn

29.06. – 05.07.2014 **Classical Algebraic Geometry**
Organizers: Olivier Debarre, Paris
David Eisenbud, Berkeley
Gavril Farkas, Berlin
Ravi Vakil, Stanford

06.07. – 12.07.2014 **Algebraische Zahlentheorie**
Organizers: Benjamin Howard, Chestnut Hill
Guido Kings, Regensburg
Ramdorai Sujatha, Vancouver
Otmar Venjakob, Heidelberg

13.07. – 19.07.2014 **Calculus of Variations**
Organizers: Simon Brendle, Stanford
Camillo De Lellis, Zürich
Robert L. Jerrard, Toronto

20.07. – 26.07.2014 **Real Analysis, Harmonic Analysis and Applications**
Organizers: Michael Christ, Berkeley
Detlef Müller, Kiel
Christoph Thiele, Bonn

27.07. – 02.08.2014 **Cryptography**
Organizers: Johannes Buchmann, Darmstadt
Shafi Goldwasser, Cambridge MA/Rehovot

03.08. – 09.08.2014 **Analysis, Geometry and Topology of Positive Scalar Curvature Metrics**
Organizers: Bernd Ammann, Regensburg
Bernhard Hanke, Augsburg
Andre Neves, London

10.08. – 16.08.2014 **Mathematics and Algorithms in Tomography**
Organizers: Martin Burger, Münster
Alfred Louis, Saarbrücken
Todd Quinto, Medford

17.08. – 23.08.2014 **Low-dimensional Topology and Number Theory**
Organizers: Paul E. Gunnells, Amherst
Walter Neumann, New York
Adam S. Sikora, New York
Don Zagier, Bonn/Paris

24.08. – 30.08.2014 **Komplexe Analysis**
Organizers: Philippe Eyssidieux, St. Martin d'Hères
Jun-Muk Hwang, Seoul
Stefan Kebekus, Freiburg
Mihai Paun, Nancy

31.08. – 06.09.2014 **Discrete Geometry**
Organizers: Imre Barany, Budapest/London
Jiri Matousek, Praha/Zürich
Günter Rote, Berlin

07.09. – 13.09.2014 **New Horizons in Statistical Decision Theory**
Organizers: Richard Gill, Leiden
Madalin Guta, Nottingham
Michael Nussbaum, Ithaca

14.09. – 20.09.2014 **Topologie**
Organizers: Thomas Schick, Göttingen
Peter Teichner, Bonn
Nathalie Wahl, Copenhagen
Michael Weiss, Münster

21.09. – 27.09.2014 **Reactive Flows in Deformable, Complex Media**
Organizers: Margot Gerritsen, Stanford
Jan Martin Nordbotten, Bergen
Iuliu Sorin Pop, Eindhoven
Barbara Wohlmuth, Garching

19.10. – 25.10.2014 **Dirichlet Form Theory and its Applications**
Organizers: Sergio Albeverio, Bonn
Zhen-Qing Chen, Seattle
Masatoshi Fukushima, Osaka
Michael Röckner, Bielefeld

26.10. – 01.11.2014 **Valuation Theory and Its Applications**
Organizers: Zoe Chatzidakis, Paris
Franz-Viktor Kuhlmann, Saskatoon
Jochen Koenigsmann, Oxford
Florian Pop, Philadelphia

02.11. – 08.11.2014 **Probability, Trees and Algorithms**
Organizers: Luc Devroye, Montreal
Ralph Neininger, Frankfurt

09.11. – 15.11.2014 **Combinatorial Optimization**
Organizers: Gerard Cornuejols, Pittsburgh
Fritz Eisenbrand, Lausanne
Bruce Shepherd, Montreal

16.11. – 22.11.2014 **Mathematical Logic: Proof theory, Constructive Mathematics**
Organizers: Samuel R. Buss, La Jolla
Ulrich Kohlenbach, Darmstadt
Michael Rathjen, Leeds

07.12. – 13.12.2014 **Mathematics in Undergraduate Study Programs: Challenges for Research and for the Dialogue between Mathematics and Didactics of Mathematics**
Organizers: Rolf Biehler, Paderborn
Reinhard Hochmuth, Hannover
Celia Hoyles, London
Patrick W. Thompson, Tempe

14.12. – 20.12.2014 **Variational Methods for Evolution**
Organizers: Luigi Ambrosio, Pisa
Alexander Mielke, Berlin
Mark Peletier, Eindhoven
Giuseppe Savare, Pavia

Miniworkshops

23.02. – 01.03.2014 **Kähler Groups**
Organizers: Dieter Kotschick, München
Domingo Toledo, Salt Lake City

23.02. – 01.03.2014 **Negative Curves on Algebraic Surfaces**
Organizers: Sandra Di Rocco, Stockholm
Alex Küronya, Budapest
Stefan Müller-Stach, Mainz
Tomasz Szemberg, Krakow

23.02. – 01.03.2014 **Batalin-Vilkovisky Algebras, Operads, and Hopf Algebroids**
Organizers: Vladimir Dotsenko, Dublin
Ulrich Krähmer, Glasgow

13.04. – 19.04.2014 **Mathematical Physics meets Sparse Recovery**
Organizers: David Gross, Freiburg
Felix Krahmer, Göttingen
Rachel Ward, Austin
Andreas Winter, Bellaterra

13.04. – 19.04.2014 **Mathematical Models for Cancer Cell Migration**
Organizers: Andreas Deutsch, Dresden
Thomas Hillen, Edmonton
Christina Surulescu, Kaiserslautern
Michael Winkler, Paderborn

13.04. – 19.04.2014 **Infinite Dimensional Hopf Algebras**
Organizers: Ken Brown, Glasgow
Ken Goodearl, Santa Barbara
Tom Lenagan, Edinburgh
James Zhang, Washington

28.09. – 04.10.2014 **Asymptotic Statistics on Stratified Spaces**
Organizers: Aasa Feragen, Tübingen
Stephan Huckemann, Göttingen
Steve Marron, Chapel Hill
Ezra Miller, Durham

28.09. – 04.10.2014 **Einstein Metrics, Ricci Solitons and Ricci Flow under Symmetry Assumptions**
Organizers: Christoph Böhm, Münster
Jorge Lauret, Cordoba
McKenzie Wang, Hamilton

28.09. – 04.10.2014 **Differentiable Ergodic Theory, Dimension Theory and Stable Foliations**
Organizers: Eugen Mihailescu, Bucharest
Bernd Stratmann, Bremen

30.11. – 06.12.2014 **Dynamical versus Diffraction Spectra in the Theory of Quasicrystals**
Organizers: Michael Baake, Bielefeld
David Damanik, Houston
Uwe Grimm, Milton Keynes

30.11. – 06.12.2014 **Eigenvalue Problems in Surface Superconductivity**
Organizers: Virginie Bonnaillie-Noel, Paris
Hynek Kovarik, Brescia
Konstantin Pankrashkin, Orsay

30.11. – 06.12.2014 **Reflection Positivity in Representation Theory, Stochastics and Physics**
Organizers: Karl-Hermann Neeb, Erlangen
Gestur Olafsson, Baton Rouge
Palle Jorgensen, Iowa City

Oberwolfach Seminare

08.06. – 14.06.2014 **Moduli Spaces of Riemannian Metrics**
Organizers: Wilderich Tuschmann, Karlsruhe
David J. Wraith, Maynooth

08.06. – 14.06.2014 **Recent Methods in Sphere Packing and Optimization**
Organizers: Christine Bachoc, Bordeaux
Henry Cohn, Cambridge MA
Frank Vallentin, Köln

12.10. – 18.10.2014 **K-Theory for Group C*-Algebras and Semigroup C*-Algebras**
Organizers: Joachim Cuntz, Münster
Siegfried Echterhoff, Münster
Xin Li, London
Guoliang Yu, College Station

12.10. – 18.10.2014 **High Frequency Approximations**
Organizers: Caroline Lasser, München
Olof Runborg, Stockholm
Anders Szepessy, Stockholm

23.11. – 29.11.2014 **Analysis of Compressible Navier Stokes Equations and Related Topics**
Organizers: Eduard Feireisl, Prague
David Gérard-Varet, Paris
Rupert Klein, Berlin
Antonin Novotny, Toulon

23.11. – 29.11.2014 **Projection Based Model Reduction: Reduced Basis Methods, Proper Orthogonal Decomposition, and Low Rank Tensor Approximations**
Organizers: Bernard Haasdonk, Stuttgart
Anthony Nouy, Nantes
Mario Ohlberger, Münster
Stefan Volkwein, Konstanz

Arbeitsgemeinschaften

30.03. – 05.04.2014 **Superrigidity**
Organizers: Uri Bader, Haifa
Alex Furman, Chicago
Jesse Peterson, Nashville

05.10. – 10.10.2014 **Totally Disconnected Groups**
Organizers: Pierre-Emmanuel Caprace, Louvain-la-Neuve
Nicolas Monod, Lausanne

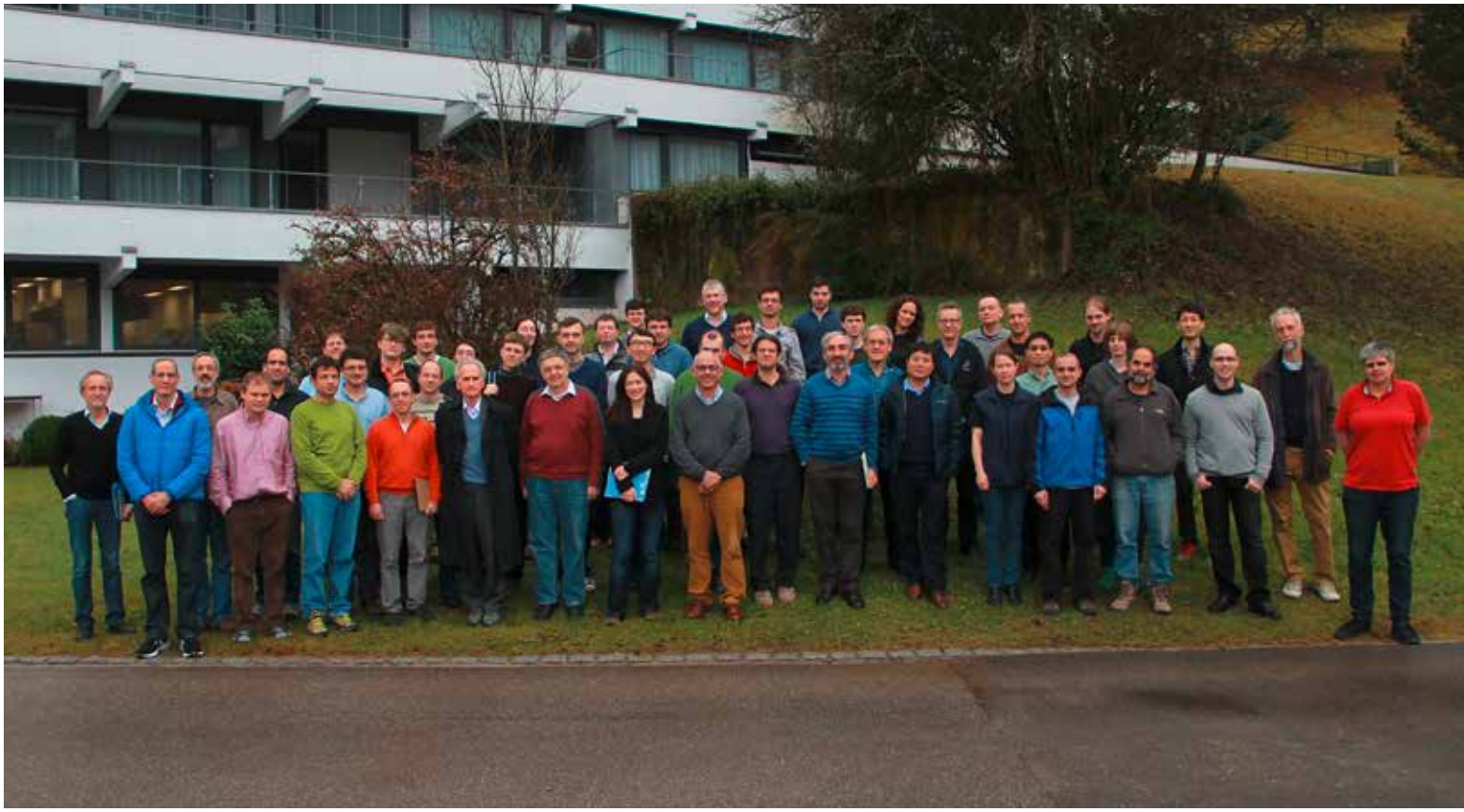
Fortbildungsveranstaltungen/ Training Activities

17.05. - 24.05.2014 **Trainings- und Abschluß-Seminar für die Internationale Mathematik-Olympiade**
Organizers: Hans-Dietrich Gronau, Rostock
Hanns-Heinrich Langmann
Jürgen Prestin

02.11. – 08.11.2014 **Differentialgleichungen**
Organizers: Ernst Kuwert, Freiburg
Tobias Malkmus, Freiburg
Martin Nolte, Freiburg

2.3. Workshops

Workshop 1402



05.01. – 11.01.2014 **Combinatorics**

Organizers: Jeff Kahn, Piscataway
Angelika Steger, Zürich
Benny Sudakov, Los Angeles

Abstract

Combinatorics is a fundamental mathematical discipline which focuses on the study of discrete objects and their properties. The current workshop brought together researchers from diverse fields such as Extremal and Probabilistic Combinatorics, Discrete Geometry, Graph theory, Combinatorial Optimization and Algebraic Combinatorics for a fruitful interaction. New results, methods and developments and future challenges were discussed.

Participants

Alon, Noga (Tel Aviv), Balogh, Jozsef (Urbana), Barvinok, Alexander (Ann Arbor), Björner, Anders (Stockholm), Bollobas, Bela (Cambridge), Böttcher, Julia (London), Bringmann, Karl (Saarbrücken), Chudnovsky, Maria (New York), Coja-Oghlan, Amin (Frankfurt), Conlon, David (Oxford), Diestel, Reinhard (Hamburg), Fox, Jacob (Cambridge), Friedgut, Ehud (Rehovot), Gamarnik, David (Cambridge), Glebov, Roman (Zürich), Haxell, Penny E. (Waterloo), Heinig, Peter (Hamburg), Huh, June E. (Ann Arbor), Kahn, Jeff (Piscataway), Keevash, Peter (Oxford), Krivelevich, Michael (Tel Aviv), Lee, Choongbum (Cambridge), Linial, Nathan (Jerusalem), Loh, Po-Shen (Pittsburgh), Lovász, László (Budapest), Lubetzky, Eyal (Redmond), Luczak, Tomasz (Poznan), Mieczkowska, Katarzyna (Zürich), Mubayi, Dhruv (Chicago), Noever, Andreas (Zürich), Norin, Sergey (Montreal), Noy, Marc (Barcelona), Peled, Ron (Ramat Aviv, Tel Aviv), Riordan, Oliver M. (Oxford), Rödl, Vojtech (Atlanta), Samotij, Wojciech (Cambridge), Schacht, Mathias (Hamburg), Schrijver, Alexander (Amsterdam), Scott, Alex (Oxford), Seymour, Paul (Princeton), Shapira, Asaf (Ramat Aviv, Tel Aviv), Solymosi, József (Vancouver), Steger, Angelika (Zürich), Sudakov, Benjamin (Zürich), Szabo, Tibor (Berlin), Thomason, Andrew (Cambridge), Vu, Van H. (New Haven), Welker, Volkmar (Marburg), Wormald, Nicholas (Clayton), Zhao, Yufei (Cambridge), Ziegler, Günter M. (Berlin)

Workshop 1403

12.01. – 18.01.2014 **Set Theory**

Organizers: Ilijas Farah, Toronto
Sy-David Friedman, Vienna
Menachem Magidor, Jerusalem
W. Hugh Woodin, Berkeley

Abstract

The workshop featured a broad selection of some of the most important recent developments in combinatorial set theory, the theory and applications of forcing, large cardinal theory and descriptive set theory. This gave us a good opportunity to learn about areas of the field other than our own, providing a good overview of the current state of the subject. The workshop demonstrated the increasing breadth of the field as well as its steady progress towards resolving problems that have been of constant interest and under investigation for decades.

Participants

Brendle, Jörg (Kobe), Conley, Clinton (Ithaca), Cramer, Scott (Piscataway), Cummings, James W. (Pittsburgh), Dobrinen, Natasha (Denver), Dzamonja, Mirna (Norwich), Eisworth, Todd (Athens), Farah, Ilijas (Toronto), Fischer, Vera (Wien), Fontanella, Laura (Wien), Friedman, Sy-David (Wien), Gao, Su (Denton), Geschke, Stefan (Hamburg), Gitik, Moti (Ramat Aviv, Tel Aviv), Golshani, Mohammad (Teheran), Honzik, Radek (Praha), Jensen, Ronald Björn (Berlin), Koepke, Peter (Bonn), Krueger, John (Denton), Larson, Jean (Gainesville), Larson, Paul B. (Oxford), Louveau, Alain (Paris), Lupini, Martino (Toronto), Magidor, Menachem (Jerusalem), Melleray, Julien (Villeurbanne), Merimovich, Carmi (Tel Aviv), Mildenberger, Heike (Freiburg), Miller, Benjamin (Münster), Mitchell, William J. (Gainesville), Moore, Justin Tatch (Ithaca), Motto Ros, Luca (Freiburg), Neeman, Itay (Los Angeles), Raghavan, Dilip (Singapore), Rinot, Assaf (Ramat-Gan), Sabok, Marcin (Warszawa), Sakai, Hiroshi (Kobe), Sargsyan, Grigor (Piscataway), Schindler, Ralf-Dieter (Münster), Sinapova, Dima (Chicago), Solecki, Slawomir (Urbana), Spinas, Otmar (Kiel), Steel, John R. (Berkeley), Thomas, Simon (Piscataway), Todorcevic, Stevo (Paris), Törnquist, Asger (Copenhagen), Tsankov, Todor (Paris), Tserunyan, Anush (Urbana), Tucker-Drob, Robin (Piscataway), Velickovic, Boban D. (Paris), Viale, Matteo (Torino), Woodin, W. Hugh (Berkeley), Zapletal, Jindrich (Gainesville), Zdomskyy, Lyubomyr (Wien), Zeman, Martin (Irvine)

Workshop 1404

19.01. – 25.01.2014 **Representation Theory and Analysis of Reductive Groups: Spherical Spaces and Hecke Algebras**

Organizers: Bernhard Krötz, Paderborn
Eric M. Opdam, Amsterdam
Henrik Schlichtkrull, Copenhagen
Peter Trapa, Salt Lake City

Abstract
The workshop gave an overview of current research in the representation theory and analysis of reductive Lie groups and its relation to spherical varieties and Hecke algebras. The participants and the speakers represented an international blend of senior researchers and young scientists at the start of their career. Some particular topics covered in the 30 talks related to structure theory of spherical varieties, p-adic symmetric spaces, symmetry breaking operators, automorphic forms, and local Langlands correspondence.

Participants
Adams, Jeffrey D. (College Park), Akhiezer, Dmitry N. (Moscow), Barbasch, Dan (Ithaca), Chan, Kei Yuen (Salt Lake City), Coolimuttam Gopalakrishnan, Venketasubramanian (Beer Sheva), Delorme, Patrick (Marseille), de Martino, Marcelo (Marseille), Duflo, Michel (Paris), Feng, Yongqi (Amsterdam), Finis, Tobias (Berlin), Gomez, Raul (Ithaca), Gourevitch, Dmitry (Rehovot), Harris, Ben (Baton Rouge), Heiermann, Volker (Marseille), Hilgert, Joachim (Paderborn), Ion, Bogdan (Pittsburgh), Knop, Friedrich (Erlangen), Kobayashi, Toshiyuki (Tokyo), Krötz, Bernhard J. (Paderborn), Kuit, Job Jacob (Copenhagen), Lapid, Erez M. (Rehovot), Liu, Gang (Paderborn), Liu, Shoumin (Amsterdam), Mitra, Arnab (Beer Sheva), Moellers, Jan (Aarhus), Moy, Allen (Kowloon), Müller, Werner (Bonn), Nishiyama, Kyo (Tokyo), Opdam, Eric M. (Amsterdam), Orsted, Bent (Aarhus), Oshima, Yoshiki (Tokyo), Parthasarathy, Aprameyan (Paderborn), Popov, Vladimir L. (Moscow), Prasad, Dipendra (Mumbai), Reznikov, Andre (Ramat Gan), Sahi, Siddhartha (New Brunswick), Savin, Gordan (Salt Lake City), Sayag, Eitan (Beer-Sheva), Schlichtkrull, Henrik (Kobenhavn), Schwarz, Benjamin (Paderborn), Solleveld, Maarten (Nijmegen), Speh, Birgit (Ithaca), Stanton, Robert J. (Columbus), Stevens, Shaun (Norwich), Timashev, Dmitry A. (Moscow), Trapa, Peter (Salt Lake City), van den Ban, Erik P. (Utrecht), Wong, Kayue Daniel (Kowloon), Wood, Aaron (Columbia), Zhu, Chen-bo (Singapore)

Workshop 1405

26.01. – 01.02.2014 **Mixing, Transport and Coherent Structures**

Organizers: Sanjeeva Balasuriya, Adelaide
George Haller, Zürich
Nicholas Ouellette, New Haven
Vered Rom-Kedar, Rehovot

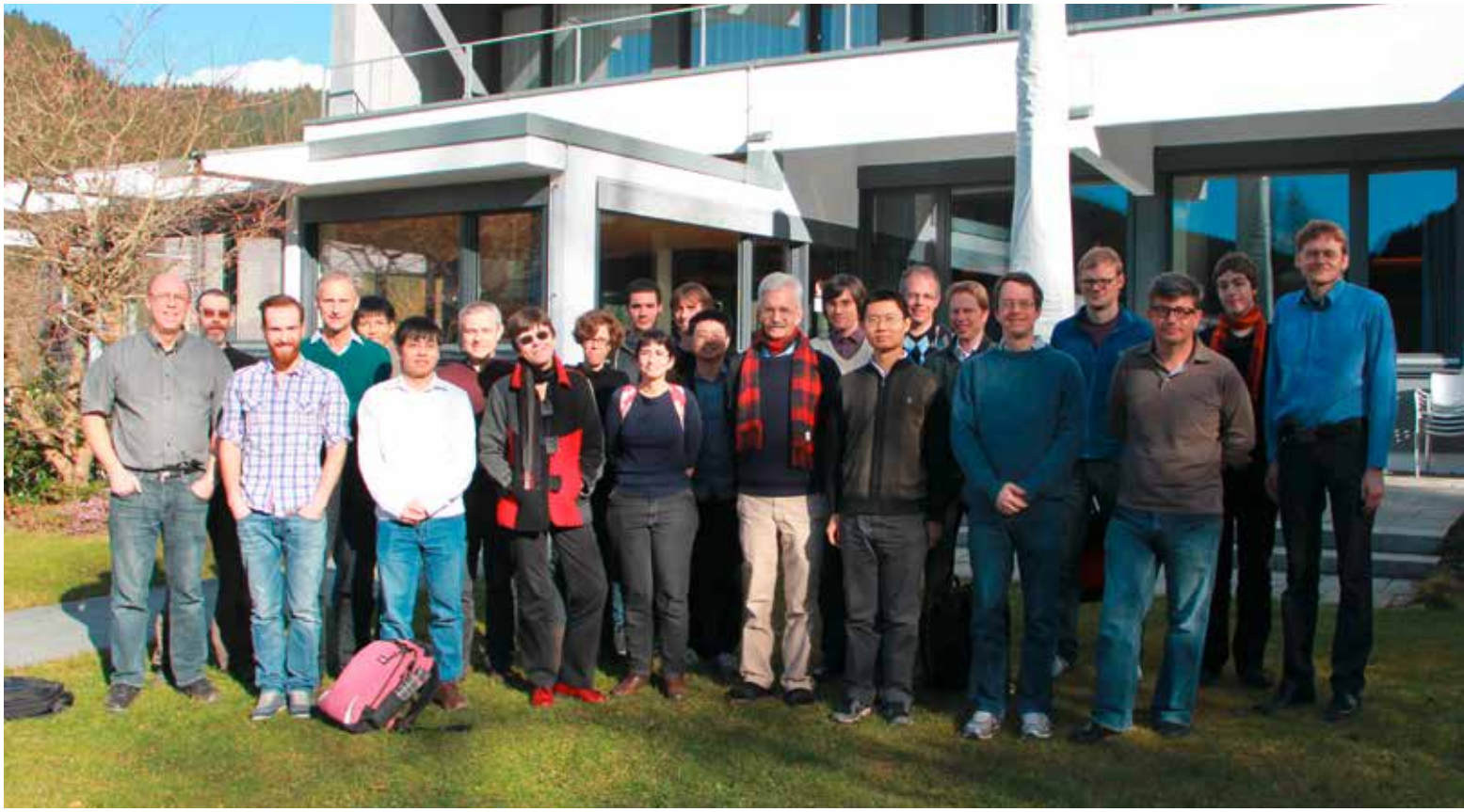
Abstract

The subject of this workshop was coherent structures, which play a significant role in the transport and mixing of passive and active scalars in fluids on a wide range of spatial scales. Participants coming from diverse scientific communities such as experimental fluid flows, dynamical systems theory, computational mathematics and visualisation, reported on recent developments and open problems.

Participants

Balasuriya, Sanjeeva (Adelaide), Bollt, Erik M. (Potsdam), Carlson, Daniel F. (Lerici), Dellnitz, Michael (Paderborn), Doering, Charles R. (Ann Arbor), Ecke, Robert (Los Alamos), Eckhardt, Bruno (Marburg), Farazmand, Mohammad (Zürich), Filippi, Margaux (Cambridge), Fredj, Erick (Jerusalem), Froyland, Gary (Sydney), Gildor, Hezi (Jerusalem), Giona, Massimiliano (Roma), Hadjighasem, Alireza (Zürich), Haller, George (Zürich), Hernandez-Garcia, Emilio (Palma de Mallorca), Junge, Oliver (Garching bei München), Karrasch, Daniel (Zürich), Kelley, Douglas H. (Rochester), Lamb, Jeroen (London), Mahoney, John R. (Merced), Mancho, Ana (Madrid), Mitchell, Kevin (Merced), Ouellette, Nicholas (New Haven), Padberg-Gehle, Kathrin (Dresden), Peacock, Tom (Cambridge), Peikert, Ronny (Zürich), Rom-Kedar, Vered (Rehovot), Ross, Shane D. (Blacksburg), Rowley, Clarence (Princeton), Rypina, Irina (Woods Hole), Siegmund, Stefan (Dresden), Solomon, Tom (Lewisburg), Speetjens, Michel (Eindhoven), Stremler, Mark (Blacksburg), Tang, Wenbo (Tempe), Thiffeault, Jean-Luc (Madison), Weinkauf, Tino (Saarbrücken), Zhang, Qinghai (Salt Lake City), Zsugyel, Marton (Budapest)

Workshop 1406a



02.02. – 08.02.2014 **Langlands Correspondence and Constructive Galois Theory**

Organizers: Michael Dettweiler, Bayreuth
Jochen Heinloth, Essen
Zhiwei Yun, Stanford

Abstract

Recent progress in the Langlands programm provides a significant step towards the understanding of the arithmetic of global fields. The geometric Langlands program provides a systematic way to construct l-adic sheaves (resp. D-modules) on algebraic curves which subsumes the construction of classical sheaves, like rigid local systems, used in inverse Galois theory (by Belyi, Malle, Matzat, Thompson, Dettweiler, Reiter) for the construction of field extension of the rational function fields $F_p(t)$ or $Q(t)$ (recent work of Heinloth, Ngo, Yun and Yun). On the other hand, using Langlands correspondence for the field Q, Khare, Larsen and Savin constructed many new automorphic representations which lead to new Galois realizations for classical and exceptional groups over Q. It was the aim of the workshop, to bring together the experts working in the fields of Langlands correspondence and constructive Galois theory.

Participants

Arias-de-Reyna, Sara (Luxembourg), Böckle, Gebhard (Heidelberg), Cadoret, Anna (Palaiseau), Dèbes, Pierre (Villeneuve d'Ascq), Dettweiler, Michael (Bayreuth), Do, Viet Cuong (Vandoeuvre-les-Nancy), Esnault, Hélène (Berlin), Fedorov, Roman (Manhattan), Freitas, Nuno (Bayreuth), Heinloth, Jochen (Essen), Katz, Nicholas M. (Princeton), Kindler, Lars (Berlin), Malle, Gunter (Kaiserslautern), Ngo, Dac Tuan (Villetaneuse), Reiter, Stefan (Bayreuth), Richarz, Timo (Bonn), Roberts, David (Morris), Savin, Gordan (Salt Lake City), Tenzler, Julian (Bayreuth), Varshavsky, Yakov (Jerusalem), Wiese, Gabor (Luxembourg), Yun, Zhiwei (Stanford), Zhu, Xinwen (Evanston)

Workshop 1406b

02.02. – 08.02.2014 **Dirichlet Series and Function Theory in Polydiscs**

Organizers: Andreas Defant, Oldenburg
Manuel Maestre, Burjassot
Eero Saksman, Helsinki
Kristian Seip, Trondheim

Abstract

The interaction between Dirichlet series and function theory in polydiscs dates back to a fundamental insight of Harald Bohr and the subsequent groundbreaking work on multilinear forms and polarization by Bohnenblust and Hille. Since around 1997, there has been a revival of interest in the research area opened up by these early contributions. The workshop reflected the status of the field and led to fruitful discussions on problems of current interest and future research directions.

Participants

Balazard, Michel (Marseille), Bayart, Frederic (Aubiere), Beneteau, Catherine (Tampa), Berkes, Istvan (Graz), Bonet, Jose (Valencia), Brevig, Ole Fredrik (Trondheim), Defant, Andreas (Oldenburg), Frerick, Leonhard (Trier), Garcia, Domingo (Burjassot), Hedenmalm, Hakan (Stockholm), Khavinson, Dmitry (Tampa), Lacey, Michael T. (Atlanta), Maestre, Manuel (Burjassot), Mastylo, Mieczyslaw (Poznan), McCarthy, John E. (St. Louis), Olsen, Jan-Fredrik (Lund), Ortega Cerda, Joaquim (Barcelona), Queffélec, Hervé (Villeneuve d'Ascq), Saksman, Eero (University of Helsinki), Schlüters, Sunke (Oldenburg), Seip, Kristian (Trondheim), Seoane-Sepúlveda, Juan Benigno (Madrid), Sevilla Peris, Pablo (Valencia), Thiele, Christoph (Bonn), Weber, Michel (Strasbourg)

Workshop 1407

09.02. – 15.02.2014 **New Trends in Teichmüller Theory and Mapping Class Groups**

Organizers: Shigeyuki Morita, Tokyo
Athanase Papadopoulos, Strasbourg
Robert C. Penner, Aarhus
Anna Wienhard, Heidelberg

Abstract
The workshop brought together people working in various aspects of the field and beyond. The focus was on the recent developments that include higher Teichmüller theory, the relation with three-manifolds, mapping class groups, dynamical aspects of the Weil-Petersson geodesic flow, and the relation with physics. The goal of bringing together researchers in these various areas, including young PhDs, and promoting interaction and collaboration between them was attained.

Participants
A'Campo, Norbert (Witterswil), Alberge, Vincent (Strasbourg), Alessandrini, Daniele (Heidelberg), Andersen, Jorgen E. (Aarhus), Aramayona, Javier (Galway), Bridgeman, Martin (Chestnut Hill), Burger, Marc (Zürich), Chekhov, Leonid O. (Moscow), Disarlo, Valentina (Bloomington), Dowdall, Spencer (Urbana), Fock, Vladimir V. (Strasbourg), Frenkel, Elena (Basel), Fujiwara, Koji (Kyoto), Funar, Louis (Saint-Martin-d'Heres), Goldman, William Mark (College Park), Guichard, Olivier (Strasbourg), Gupta, Subhojoy (Pasadena), Hamenstädt, Ursula (Bonn), Iozzi, Alessandra (Zürich), Ji, Lizhen (Ann Arbor), Kashaev, Rinat M. (Geneve), Kawazumi, Nariya (Tokyo), Kerckhoff, Steven P. (Stanford), Kitano, Teruaki (Tokyo), Kojima, Sadayoshi (Tokyo), Korkmaz, Mustafa (Ankara), Kuno, Yusuke (Tokyo), Lee, Gye-Seon (Heidelberg), Li, Qiongling (Houston), Luo, Feng (Piscataway), Maloni, Sara (Providence), Masbaum, Gregor (Paris), Massuyeau, Gwenael (Strasbourg), Ohshika, Ken'ichi (Osaka), Papadopoulos, Athanase (Strasbourg), Parlier, Hugo (Fribourg), Pozzetti, Maria Beatrice (Zürich), Sakasai, Takuya (Tokyo), Sambarino, Andrés (Orsay), Sato, Masatoshi (Gifu), Satoh, Takao (Tokyo), Schilling, Anna-Sofie (Heidelberg), Shiga, Hiroshige (Tokyo), Sulkowski, Piotr (Warszawa), Sun, Zhe (Orsay), Sun, Zongliang (Shenzhen), Suzuki, Masaaki (Tokyo), Treib, Nicolaus (Heidelberg), Uludag, A. Muhammed (Istanbul), Wienhard, Anna Katharina (Heidelberg), Wolf, Michael (Houston), Yamada, Sumio (Tokyo), Zmiaikou, David (Bonn)

Workshop 1408

16.02. – 22.02.2014 **Representation Theory of Quivers and Finite Dimensional Algebras**

Organizers: William Crawley-Boevey, Leeds
Osamu Iyama, Nagoya
Bernhard Keller, Paris
Henning Krause, Bielefeld

Abstract

Methods and results from the representation theory of quivers and finite dimensional algebras have led to many interactions with other areas of mathematics. Such areas include the theory of Lie algebras and quantum groups, commutative algebra, algebraic geometry and topology, and in particular the new theory of cluster algebras. The aim of this workshop was to further develop such interactions and to stimulate progress in the representation theory of algebras.

Participants

Amiot, Claire (Saint-Martin-d'Heres), Angeleri-Hügel, Lidia (Verona), Baur, Karin (Graz), Becker, Hanno (Bonn), Bergh, Petter A. (Trondheim), Bobinski, Grzegorz (Torun), Brion, Michel (Saint-Martin-d'Heres), Brüstle, Thomas (Sherbrooke), Buan, Aslak Bakke (Trondheim), Buchweitz, Ragnar-Olaf (Toronto), Burban, Igor (Köln), Chen, Xiao-Wu (Hefei), Crawley-Boevey, William (Leeds), Erdmann, Karin (Oxford), Geiss, Christof (México), Hermann, Reiner (Trondheim), Hille, Lutz (Münster), Holm, Thorsten (Hannover), Hubery, Andrew (Leeds), Iyama, Osamu (Nagoya), Iyengar, Srikanth B. (Lincoln), Kalck, Martin (Bielefeld), Kinser, Ryan (Boston), König, Steffen (Stuttgart), Krause, Henning (Bielefeld), Külshammer, Julian (Stuttgart), Lampe, Philipp (Bielefeld), Leclerc, Bernard (Caen), Lenzing, Helmut (Paderborn), Letellier, Emmanuel (Caen), Marsh, Robert J. (Leeds), Minamoto, Hiroyuki (Osaka), Mizuno, Yuya (Nagoya), Oppermann, Steffen (Trondheim), Plamondon, Pierre-Guy (Orsay), Qin, Fan (Strasbourg), Reineke, Markus (Wuppertal), Reiten, Idun (Trondheim), Ricke, Charlotte (Bonn), Ringel, Claus Michael (Bielefeld), Rodriguez-Villegas, Fernando (Trieste), Sauter, Julia (Bielefeld), Schröer, Jan (Bonn), Skowronski, Andrzej (Torun), Solberg, Oyvind (Trondheim), Stevenson, Greg (Bielefeld), Stovicek, Jan (Praha), Stroppel, Catharina (Bonn), Thomas, Hugh (Fredericton), van den Bergh, Michel (Diepenbeek), Weist, Thorsten (Wuppertal), Weyman, Jerzy (Storrs), Xiao, Jie (Beijing)

Workshop 1410

02.03. – 08.03.2014 **Enumerative Combinatorics**

Organizers: Mireille Bousquet-Mélou, Bordeaux
Michael Drmota, Wien
Christian Krattenthaler, Wien
Marc Noy, Barcelona

Abstract

Enumerative Combinatorics focusses on the exact and asymptotic counting of combinatorial objects. It is strongly connected to the probabilistic analysis of large combinatorial structures and has fruitful connections to several disciplines, including statistical physics, algebraic combinatorics, graph theory and computer science. This workshop brought together experts from all these various fields, including also computer algebra, with the goal of promoting cooperation and interaction among researchers with largely varying backgrounds.

Participants

Armstrong, Drew (Coral Gables), Bessenrodt, Christine (Hannover), Bóna, Miklós (Gainesville), Bousquet-Mélou, Mireille (Talence), Bouttier, Jeremie (Gif-sur-Yvette), Chapuy, Guillaume (Paris), Ciucu, Mihail (Bloomington), Corteel, Sylvie (Orsay), Courtiel, Julien (Talence), de Mier, Anna (Barcelona), Di Francesco, Philippe (Urbana), Drmota, Michael (Wien), Elizalde, Sergi (Hanover), Fang, Wenjie (Paris), Féray, Valentin (Talence), Fischer, Ilse (Wien), Fusy, Éric (Palaiseau), Gessel, Ira (Waltham), Gittenberger, Bernhard (Wien), Guttmann, Tony (Melbourne), Haglund, James (Philadelphia), Josuat-Vergès, Matthieu (Marne-la-Vallée), Kang, Mihyun (Graz), Kauers, Manuel (Linz), Kim, Jang Soo (Suwon), Konvalinka, Matjaz (Ljubljana), Koutschan, Christoph (Linz), Krattenthaler, Christian (Wien), Linusson, Svante (Stockholm), McDiarmid, Colin (Oxford), McKay, Brendan (Canberra), Miermont, Gregory (Lyon), Mishna, Marni (Burnaby), Morales, Alejandro (Montreal), Noy, Marc (Barcelona), Okada, Soichi (Nagoya), Pak, Igor (Los Angeles), Panagiotou, Konstantinos (München), Panholzer, Alois (Wien), Pemantle, Robin (Philadelphia), Pierrot, Adeline (Wien), Ramos, Lander (Barcelona), Raschel, Kilian (Tours), Rué, Juan (Berlin), Salvy, Bruno (Lyon), Schaeffer, Gilles (Palaiseau), Sportiello, Andrea (Villetaneuse), Stanley, Richard P. (Cambridge), Steingrimsson, Einar (Glasgow), Thiel, Marko (Wien), Viennot, Xavier Gérard (Talence), Weller, Kerstin (Oxford), Wormald, Nicholas (Clayton)

Workshop 1411

09.03. – 15.03.2014 **Adaptive Statistical Inference**

Organizers: Mark Low, Philadelphia
Axel Munk, Göttingen
Alexandre Tsybakov, Malakoff

Abstract

This workshop in mathematical statistics highlights recent advances in adaptive methods for statistical estimation, testing and confidence sets. Related open mathematical problems are discussed with potential impact on the development of computationally efficient algorithms of data processing under prior uncertainty. Parcticular emphasis is on high dimensional models, inverse problems and discrtete structures.

Participants

Andersen, Henning Haahr (Aarhus), Baumann, Pierre (Strasbourg), Brion, Michel (Saint-Martin-d'Heres), Chari, Vyjayanthi Birgé, Lucien (Paris), Brown, Lawrence D. (Philadelphia), Brunel, Victor-Emmanuel (Malakoff), Bühlmann, Peter (Zürich), Bunea, Florentina (Ithaca), Butucea, Cristina (Marne-la-Vallée), Cai, T. Tony (Philadelphia), Dahlhaus, Rainer (Heidelberg), Dalalyan, Arnak (Malakoff), Dette, Holger (Bochum), Diehn, Manuel (Göttingen), Dümbgen, Lutz (Bern), Gautier, Eric (Malakoff), Goldenshluger, Alexander (Haifa), Györfi, Laszlo (Budapest), Hoffmann, Marc (Malakoff), Hohage, Thorsten (Göttingen), Jongbloed, Geurt (Delft), Klopp, Olga (Nanterre), Lecué, Guillaume (Palaiseau), Lepski, Oleg (Marseille), Li, Housen (Göttingen), Liang, Tengyuan (Philadelphia), Low, Mark (Philadelphia), Mammen, Enno (Mannheim), Meziani, Katia (Paris), Munk, Axel (Göttingen), Nowak, Robert (Madison), Nussbaum, Michael (Ithaca), Olivier, Adélaide (Malakoff), Pein, Florian (Göttingen), Pensky, Marianna (Orlando), Polonik, Wolfgang (Davis), Rakhlin, Alexander (Philadelphia), Reiß, Markus (Berlin), Rohde, Angelika (Bochum), Rousseau, Judith (Paris), Sabel, Till (Göttingen), Samworth, Richard (Cambridge), Schmidt-Hieber, Johannes (Malakoff), Scricciolo, Catia (Milano), Sommerfeld, Max (Research Triangle Park, NC), Spokoiny, Vladimir G. (Berlin), Tsybakov, Alexandre B. (Malakoff), van de Geer, Sara (Zürich), van der Vaart, Aad W. (Leiden), Yang, Dan (Piscataway), Yu, Bin (Berkeley), Zhang, Anru (Philadelphia), Zhang, Cun-Hui (Piscataway), Zhao, Linda (Philadelphia), Zhou, Huibin (New Haven)

Workshop 1412

16.03. – 22.03.2014 **Nonlinear Evolution Equations: Analysis and Numerics**

Organizers: Marlis Hochbruck, Karlsruhe
Serge Nicaise, Valenciennes
Alexander Ostermann, Innsbruck
Roland Schnaubelt, Karlsruhe

Abstract

The workshop was devoted to the analytical and numerical investigation of nonlinear evolution equations. The main aim was to stimulate a closer interaction between experts in analytical and numerical methods for areas such as wave and Schrödinger equations or the Navier–Stokes equations and fluid dynamics.

Participants

Abels, Helmut (Regensburg), Akrivis, Georgios (Ioannina), Arendt, Wolfgang (Ulm), Beyn, Wolf-Jürgen (Bielefeld), Bonnetier, Eric (Grenoble), Buchholz, Simone (Karlsruhe), Calvo, Maria Paz (Valladolid), Crouzeix, Michel (Rennes), Csomos, Petra (Budapest), D'Ancona, Piero (Roma), Dier, Dominik (Ulm), Eilinghoff, Johannes (Karlsruhe), Einkemmer, Lukas (Innsbruck), Escher, Joachim (Hannover), Faou, Erwan (Bruz), Gauckler, Ludwig (Berlin), Hansen, Eskil (Lund), Hell, Tobias (Innsbruck), Herr, Sebastian (Bielefeld), Hieber, Matthias (Darmstadt), Hipp, David (Karlsruhe), Hiptmair, Ralf (Zürich), Hochbruck, Marlis (Karlsruhe), Hundertmark, Dirk (Karlsruhe), Jahnke, Tobias (Karlsruhe), Koch, Herbert (Bonn), Kovács, Mihály (Dunedin), Larsson, Stig (Göteborg), Lasiecka, Irena (Charlottesville), Liu, Yuning (Regensburg), Lohrengel, Stephanie (Reims), Lopez-Fernandez, Maria (Zürich), Lubich, Christian (Tübingen), Lunardi, Alessandra (Parma), Makridakis, Charalambos (Brighton), Mansour, Dhia Eddine (Tübingen), Mikl, Marcel (Karlsruhe), Monk, Peter (Newark), Müller, Dominik (Karlsruhe), Nguyen, Thieu-Huy (Darmstadt), Nicaise, Serge (Valenciennes), Ostermann, Alexander (Innsbruck), Palencia de Lara, César (Valladolid), Prüß, Jan (Halle), Savare, Giuseppe (Pavia), Schädle, Achim (Düsseldorf), Scheid, Claire (Nice), Schnaubelt, Roland (Karlsruhe), Schratz, Katharina (Karlsruhe), Schwab, Christoph (Zürich), Tittarelli, Roberta (Villeneuve d'Ascq), Tokman, Mayya (Merced), Tucsnak, Marius (Vandoeuvre-les-Nancy), Weis, Lutz (Karlsruhe)

Workshop 1413

23.03. – 29.03.2014 **Flat Surfaces and Dynamics on Moduli Space**

Organizers: Howard Masur, Chicago
Martin Möller, Frankfurt
Anton Zorich, Paris

Abstract

Dynamics of the Teichmüller geodesic flow on the moduli space of curves and asymptotic monodromy of the Hodge bundle along this flow have numerous applications to dynamics and geometry of measured foliations, to billiards in polygons, to interval exchange transformations, and to geometry of flat surfaces.

Participants

Athreya, Jayadev S. (Urbana), Aulicino, David (Chicago), Bainbridge, Matthew (Bloomington), Boissy, Corentin (Marseille), Bowman, Joshua P. (Northampton), Bufetov, Alexander I. (Marseille), Chaika, Jonathan M. (Salt Lake City), Chen, Dawei (Chestnut Hill), Cheung, Yitwah (San Francisco), Davis, Diana J. (Evanston), Delecroix, Vincent (Talence), Eskin, Alex (Chicago), Filip, Simion (Chicago), Fougeron, Charles (Paris), Gendron, Quentin (Frankfurt), Gouezel, Sebastien (Rennes), Goujard, Elise (Rennes), Grivaux, Julien (Marseille), Grushevsky, Samuel (Stony Brook), Hamenstädt, Ursula (Bonn), Herrlich, Frank (Karlsruhe), Hooper, W. Patrick (New York), Hubert, Pascal (Marseille), Judge, Christopher (Bloomington), Kappes, André (Frankfurt), Kucharczyk, Robert (Bonn), Lanneau, Erwan (Saint-Martin-d'Heres), Lehnert, Ralf (Frankfurt), Lelièvre, Samuel (Orsay), Lenzhen, Anna (Rennes), Málaga Sabogal, Alba Marina (Orsay), Marchese, Luca (Villetaneuse), Masur, Howard (Chicago), Matheus, Carlos (Paris), Mohammadi, Amir (Austin), Möller, Martin (Frankfurt), Mondello, Gabriele (Roma), Mukamel, Ronen E. (Chicago), Nguyen, Duc-Manh (Talence), Rafi, Kasra (Toronto), Randecker, Anja (Karlsruhe), Smillie, John (Ithaca), Treviño, Rodrigo (Ramat Aviv, Tel Aviv), Ulcigrai, Corinna (Bristol), Valdez Lorenzo, Jose Ferrán (Morelia), Weiss, Barak (Tel Aviv), Weitze-Schmithüsen, Gabriela (Karlsruhe), Wright, Alex M. (Chicago), Yoccoz, Jean-Christophe (Paris), Yu, Fei (Xiamen), Zachhuber, Jonathan (Frankfurt), Zograf, Peter (St. Petersburg), Zorich, Anton (Paris)

Workshop 1415

06.04. – 12.04.2014 **Real Algebraic Geometry With A View Toward Systems Control and Free Positivity**

Organizers: Didier Henrion, Toulouse
Salma Kuhlmann, Konstanz
Victor Vinnikov, Beer-Sheva

Abstract

New interactions between real algebraic geometry, convex optimization and free non-commutative geometry have recently emerged, and have been the subject of numerous international meetings. The aim of the workshop was to bring together experts, as well as young researchers, to investigate current key questions at the interface of these fields, and to explore emerging interdisciplinary applications.

Participants

Abril Bucero, Marta (Sophia-Antipolis), Ahmadi, Amir Ali (Cambridge), Ball, Joseph A. (Blacksburgh), Blekherman, Greg (Atlanta), Bränden, Petter (Stockholm), Burgdorf, Sabine (Amsterdam), Busé, Laurent (Sophia Antipolis), Cimpric, Jaka (Ljubljana), de Klerk, Etienne (Tilburg), Dritschel, Michael A. (Newcastle upon Tyne), Dykema, Ken (College Station), Goel, Charu (Konstanz), Gondard, Danielle (Paris), Gruler, Sebastian (Konstanz), Hanselka, Christoph (Konstanz), Helton, J. William (La Jolla), Henrion, Didier (Toulouse), Hildebrand, Roland (Grenoble), Infusino, Maria (Reading), Kellner, Kai (Frankfurt), Korda, Milan (Lausanne), Kuhlmann, Salma (Konstanz), Kummer, Mario (Konstanz), Lasserre, Jean Bernard (Toulouse), Laurent, Monique (Amsterdam), Lopez-Quijorna, Maria (Konstanz), Marshall, Murray (Saskatoon), Mourrain, Bernard (Sophia Antipolis), Naldi, Simone (Toulouse), Netzer, Tim (Leipzig), Pasechnik, Dmitrii V. (Oxford), Pons Llopis, Juan Francisco (Pau), Povh, Janez (Novo Mesto), Powers, Victoria (Atlanta), Prestel, Alexander (Konstanz), Reznick, Bruce (Urbana), Safey El Din, Mohab (Paris), Sanyal, Raman (Berlin), Scheiderer, Claus (Konstanz), Schmüdgen, Konrad (Leipzig), Schweighofer, Markus (Konstanz), Shamovich, Eli (Beer Sheva), Sinn, Rainer (Konstanz), Thom, Andreas B. (Leipzig), Trébuchet, Philippe (Paris), Tsigaridas, Elias (Paris), Vallentin, Frank (Köln), Vallès, Jean (Pau), Vinnikov, Victor (Beer-Sheva), Weisser, Tillmann (Konstanz), Woerdeman, Hugo J. (Philadelphia), Yomdin, Yosef N. (Rehovot)

Workshop 1417

20.04. – 26.04.2014 **Hilbert Modules and Complex Geometry**

Organizers: Kenneth R. Davidson, Waterloo
Ronald G. Douglas, College Station
Jörg Eschmeier, Saarbrücken
Harald Upmeier, Marburg

Abstract

The major topics discussed in the workshop were Hilbert modules of analytic functions on domains in Cn, Toeplitz and Hankel operators, reproducing kernel Hilbert spaces and multiplier algebras, the interplay of complex geometry and operator theory, non-commutative function theory and operator theory, Hilbert bundles on symmetric spaces.

Participants

Amar, Eric (Talence), Andersson, Mats (Göteborg), Arazy, Jonathan (Haifa), Bauer, Wolfram (Göttingen), Bercovici, Hari (Bloomington), Bhattacharyya, Tirthankar (Bangalore), Bickel, Kelly A. (Atlanta), Biswas, Shibananda (Calcutta), Clouatre, Raphael (Waterloo), Curto, Raul E. (Iowa City), Davidson, Kenneth R. (Waterloo), Douglas, Ronald G. (College Station), Dritschel, Michael A. (Newcastle upon Tyne), Englis, Miroslav (Praha), Eschmeier, Jörg (Saarbrücken), Gaebler, David (Hillsdale), Goffeng, Magnus (Hannover), Hartz, Michael P. (Waterloo), Jorgensen, Palle E. T. (Iowa City), Jury, Michael T. (Gainesville), Kennedy, Matthew (Ottawa), Knese, Gregory E. (St. Louis), Kwon, Hyun-Kyoung (Tuscaloosa), Liaw, Constanze (Waco), McCarthy, John E. (St. Louis), Misra, Gadadhar (Bangalore), Müller, Vladimir (Praha 1), Neeb, Karl-Hermann (Erlangen), Neretin, Yuri (Wien), Popescu, Gelu (San Antonio), Richter, Stefan (Knoxville), Rochberg, Richard (St. Louis), Roy, Subrata Shyam (Nadia), Sarkar, Jaydeb (Bangalore), Schwarz, Benjamin (Paderborn), Shalit, Orr (Beer Sheva), Solel, Baruch (Haifa), Upmeier, Harald (Marburg), Vasilescu, Florian-Horia (Villeneuve d'Ascq), Vinnikov, Victor (Beer-Sheva), Wang, Kai (Shanghai), Wernet, Michael (Saarbrücken), Wick, Brett D. (Atlanta), Xia, Jingbo (Buffalo), Yang, Rongwei (Albany), Zhang, Genkai (Göteborg), Zhu, Kehe (Albany)

Workshop 1418

27.04. – 03.05.2014 **Modular Forms**

Organizers: Jan Hendrik Bruinier, Darmstadt
Atsushi Ichino, Kyoto
Tamotsu Ikeda, Kyoto
Özlem Imamoglu, Zürich

Abstract

The theory of Modular Forms has been central in mathematics with a rich history and connections to many other areas of mathematics. The workshop explored recent developments and future directions with a particular focus on connections to the theory of periods. In this context, the topics that the workshop addressed include the global Gross-Prasad conjecture and its analogs, which predict a relationship between periods of automorphic forms and central values of L-functions, the theory of liftings and their applications to period relations, as well as explicit aspects of these formulas and relations with a view towards the arithmetic properties of periods.

Participants

Alfes, Claudia (Darmstadt), Atobe, Hiraku (Kyoto), Blomer, Valentin (Göttingen), Böcherer, Siegfried (Mannheim), Bringmann, Kathrin (Köln), Bruinier, Jan Hendrik (Darmstadt), Chinta, Gautam (New York), Cléry, Fabien (Siegen), Ehlen, Stephan (Darmstadt), Feigon, Brooke (New York), Funke, Jens (Durham), Furusawa, Masaaki (Osaka), Gan, Wee-Teck (Singapore), Gritsenko, A. Valery (Villeneuve d'Ascq), Hiraga, Kaoru (Kyoto), Hironaka, Yumiko (Tokyo), Ibukiyama, Tomoyoshi (Osaka), Ichino, Atsushi (Kyoto), Ikeda, Tamotsu (Kyoto), Imamoglu, Özlem (Zürich), Ishii, Taku (Tokyo), Katsurada, Hidenori (Muroran), Kohnen, Winfried (Heidelberg), Konno, Takuya (Fukuoka), Kramer, Jürg (Berlin), Kudla, Stephen S. (Toronto), Kühn, Ulf (Hamburg), Lapid, Erez M. (Rehovot), Li, Yingkun (Köln), Liu, Yifeng (Cambridge), Martin, Yves (Casilla), Morimoto, Kazuki (Osaka), Moriyama, Tomonori (Osaka), Narita, Hiro-aki (Kumamoto), Nelson, Paul David (Lausanne), Offen, Omer (Haifa), Raghuram, Anantharam (Pune), Richter, Olav (Denton), Rolen, Larry (Köln), Saha, Abhishek (Bristol), Sankaran, Siddarth (Bonn), Skoruppa, Nils-Peter (Siegen), Su, Ren He (Kyoto), Takeda, Shuichiro (Columbia), Toth, Arpad (Budapest), Tsuzuki, Masao (Tokyo), van der Geer, Gerard (Amsterdam), von Pippich, Anna (Darmstadt), Wakatsuki, Satoshi (Kanazawa), Westerholt-Raum, Martin (Zürich), Yamana, Shunsuke (Fukuoka), Yang, Tonghai (Madison), Zemel, Shaul (Darmstadt)

Workshop 1419

04.05. – 10.05.2014 **Stochastic Analysis in Finance and Insurance**

Organizers: Rene Carmona, Princeton
Martin Schweizer, Zürich
Nizar Touzi, Paris

Abstract

This workshop brought together leading experts and a large number of younger researchers in stochastic analysis and mathematical finance from all over the world. During a highly intense week, participants exchanged many ideas during talks and discussions, and laid foundations for new collaborations and further developments in the field. Some of the major developments included a focus on optimal transport problems in connection with robust pricing and hedging, microstructure and other modelling issues, aspects of numerical computations in high-dimensional systems, and as always a number of foundational questions.

Participants

Alfonsi, Aurélien (Marne-la-Vallée), Bayraktar, Erhan (Ann Arbor), Bouchard, Bruno (Paris), Carmona, Rene (Princeton), Cetin, Umut (London), Cvitanic, Jaksa (Pasadena), Czichowsky, Christoph (London), Delarue, Francois (Nice), Delbaen, Freddy (Zürich), Drapeau, Samuel (Berlin), El Karoui, Nicole (Paris), Filipovic, Damir (Lausanne), Föllmer, Hans (Berlin), Grasselli, Matheus (Hamilton), Guasoni, Paolo (Dublin), Guéant, Olivier (Paris), Herdegen, Martin (Zürich), Herrmann, Sebastian (Zürich), Hobson, David G. (Coventry), Hurd, Tom R. (Hamilton), Jacod, Jean (Paris), Jeanblanc, Monique (Evry), Kabanov, Yuri (Besancon), Karatzas, Ioannis (New York), Kardaras, Kostas (London), Kohatsu-Higa, Arturo (Shiga), Kusuoka, Shigeo (Tokyo), Lacker, Daniel (Princeton), Lyons, Terence J. (Oxford), Moreau, Ludovic (Zürich), Nadtochiy, Sergey (Ann Arbor), Nutz, Marcel (New York), Obloj, Jan (Oxford), Pham, Huyen (Paris), Possamai, Dylan (Paris), Rasonyi, Miklos (Edinburgh), Ren, Zhen-Jie (Palaiseau), Rogers, L. Chris G. (Cambridge), Rosenbaum, Mathieu (Paris), Schachermayer, Walter (Wien), Schweizer, Martin (Zürich), Seifried, Frank (Kaiserslautern), Soner, H. Mete (Zürich), Tan, Xiaolu (Paris), Tankov, Peter (Paris), Teichmann, Josef (Zürich), Touzi, Nizar (Palaiseau), Webster, Kevin (Princeton), Zitkovic, Gordan (Austin)

Workshop 1420

11.05. – 17.05.2014 **Schnelle Löser für Partielle Differentialgleichungen**

Organizers: Randolph E. Bank, La Jolla
Lars Grasedyck, Aachen
Wolfgang Hackbusch, Leipzig
Gabriel Wittum, Frankfurt

Abstract

The field of solvers for the algebraic systems arising from the discretization of partial differential equations has developed to a major area of numerical mathematics and scientific computing. Solvers are the essential part of simulation codes for problems from science and technology, in many cases determining the complexity of the whole simulation. The idea of this workshop was to bring together experts from the different thriving areas of solvers and offer a platform for scientific exchange and progress. The meeting was well attended by 52 participants with broad geographic representation from 11 countries and 3 continents. This workshop was a nice blend of researchers with various backgrounds.

Participants

Bachmayr, Markus (Aachen), Bank, Randolph E. (La Jolla), Börm, Steffen (Kiel), Braess, Dietrich (Bochum), Breit, Markus (Frankfurt am Main), Brenner, Susanne C. (Baton Rouge), Deuflhard, Peter (Berlin), Douglas, Craig C. (Laramie), Falgout, Robert D. (Livermore), Gmeiner, Björn (Garching), Grasedyck, Lars (Aachen), Grillo, Alfio (Torino), Haase, Gundolf (Graz), Hackbusch, Wolfgang (Leipzig), Hoffer, Michael (Frankfurt am Main), Höllbacher, Susanne (Frankfurt am Main), Hoppe, Ronald H. W. (Augsburg), Johannsen, Klaus (Bergen), Keyes, David Elliot (New York,), Khoromskij, Boris N. (Leipzig), Knodel, Markus (Frankfurt am Main), Kornhuber, Ralf (Berlin), Krause, Rolf (Lugano), Langer, Ulrich (Linz), Le Borne, Sabine (Hamburg), Lemke, Babett (Frankfurt am Main), Löbbert, Christian (Aachen), Mehrmann, Volker (Berlin), Meyer, Arnd (Chemnitz), Mittelmann, Hans D. (Tempe), Nägel, Arne (Frankfurt am Main), Ovall, Jeffrey S. (Portland), Queisser, Gillian (Frankfurt am Main), Reisinger, Christoph (Oxford), Reiter, Sebastian (Frankfurt am Main), Reusken, Arnold (Aachen), Sauter, Stefan A. (Zürich), Schulz, Volker (Trier), Scott, Ridgway (Chicago), Stevenson, Rob (Amsterdam), Vandewalle, Stefan (Leuven), Vanroose, Wim (Antwerpen), Vassilevski, Panayot S. (Livermore), Vogel, Andreas (Frankfurt am Main), Vohralik, Martin (Le Chesnay), Vuik, Kees (Delft), Widlund, Olof B. (New York), Wieners, Christian (Karlsruhe), Wittum, Gabriel (Frankfurt am Main), Wohlmuth, Barbara (Garching), Yserentant, Harry (Berlin), Zenger, Christoph (Garching)

Workshop 1421

18.05. – 24.05.2014 **Interactions between Algebraic Geometry and Noncommutative Algebra**

Organizers: Markus Reineke, Wuppertal
J. Toby Stafford, Manchester
Catharina Stroppel, Bonn
Michel Van den Bergh, Diepenbeek

Abstract
The workshop presented the current developments in the field of noncommutative algebra geometry and its interactions with algebraic geometry and representation theory. Areas covered include noncommutative projective algebraic geometry, (quantized) quiver varieties/quiver representations, deformation theory, representation theory of Cherednik and related Hecke algebras, and D-module theory. A number of advances in the above areas were presented and possible starting points for further research proposed.

Participants
Becker, Hanno (Bonn), Bell, Jason P. (Waterloo), Bellamy, Gwyn (Glasgow), Berest, Yuri (Ithaca), Bocklandt, Rafael (Newcastle upon Tyne), Brown, Ken A. (Glasgow), Buchweitz, Ragnar-Olaf (Toronto), Crawley-Boevey, William (Leeds), de Thanhoffer de Volcsey, Louis (Diepenbeek), Dodd, Chris (Toronto), Ehrig, Michael (Bonn), Franzen, Hans (Wuppertal), Fryer, Sian (Manchester), Ginzburg, Victor (Chicago), Goodearl, Kenneth R. (Santa Barbara), Gordon, Iain (Edinburgh), Huisgen-Zimmermann, Birge (Santa Barbara), Ingalls, Colin (Fredericton), Iyama, Osamu (Nagoya), Kalck, Martin (Edinburgh), Kaledin, Dmitry (Moscow), Krause, Henning (Bielefeld), Lenagan, Thomas H. (Edinburgh), Levasseur, Thierry (Brest), Loseu, Ivan (Boston), Lowen, Wendy Tor (Antwerpen), Lunts, Valery A. (Bloomington), McGerty, Kevin R. (Oxford), Morrison, Andrew (Zürich), Mozgovoy, Sergey (Dublin), Nevins, Thomas A. (Urbana), Petit, Francois (Edinburgh), Reineke, Markus (Wuppertal), Reiten, Idun (Trondheim), Ringel, Claus Michael (Bielefeld), Rogalski, Daniel (La Jolla), Sartori, Antonio (York), Schedler, Travis (Austin), Schnürer, Olaf (Bonn), Sierra, Susan J. (Edinburgh), Stafford, J. Toby (Manchester), Stroppel, Catharina (Bonn), Szendroi, Balazs (Oxford), van den Bergh, Michel (Diepenbeek), Van Roosmalen, Adam-Christiaan (Praha), Walton, Chelsea (Cambridge), Webster, Ben (Charlottesville), Weist, Thorsten (Wuppertal), Wemyss, Michael (Edinburgh), Wu, Quan-Shui (Shanghai), Yekutieli, Amnon (Beer Sheva), Zhang, James (Seattle)

Workshop 1422a

25.05. – 31.05.2014 **Algebraic Structures in Low-Dimensional Topology**

Organizers: Louis Hirsch Kauffman, Chicago
Vassily Olegovich Manturov, Moscow
Kent E. Orr, Bloomington
Robert Schneiderman, New York

Abstract

The workshop concentrated on important and interrelated invariants in low dimensional topology. The subject areas included specifically algebraic and combinatorial approaches to invariants sucn as parity in the theory of graph links, free knots and virtual knot theory, uses of surfaces and curves on surfaces to understand virtual knot cobordism and to understand relationships between classical and virtual knots, orderability in groups and fundamental groups, new approaches to the Alexander polynomial, braids and representations of braid groups, relationships of representation theory with the skein theory of knot polynomials, structure of quandles, structure of skein modules, and extensions of ideas in quandle cohomology to distributive cohomology.

Participants

Bar-Natan, Dror (Toronto), Bauer, Stefan A. (Bielefeld), Bryden, John M. (Al-Khobar), Cha, Jae Choon (Pohang Gyungbuk), Chrisman, Micah (West Long Branch), Eisermann, Michael (Stuttgart), Fedoseev, Denis A. (Moscow), Fenn, Roger A. (Brighton), Fiedler, Thomas (Toulouse), Gordon, Cameron M. (Austin), Harvey, Shelly (Houston), Ilyutko, Denis P. (Moscow), Kaestner, Aaron M. (Chicago), Kauffman, Louis H. (Chicago), Kim, Seongjeong (Daegu), Lambropoulou, Sofia (Athens), Manturov, Vassily O. (Moscow), Matveev, Sergey V. (Chelyabinsk), Morton, Hugh R. (Liverpool), Orr, Kent Edward (Bloomington), Powell, Mark (Bloomington), Przytycki, Jozef H. (Washington), Schneiderman, Robert (Bronx), Vesnin, Andrei Yu. (Chelyabinsk), Cochran, Tim D. (Houston)

Workshop 1422b

25.05. – 31.05.2014 **Okounkov Bodies and Applications**

Organizers: Megumi Harada, Hamilton
Kiumars Kaveh, Pittsburgh
Askold Khovanskii, Toronto

Abstract

The theory of Newton-Okounkov bodies, also called Okounkov bodies, is a relatively new connection between algebraic geometry and convex geometry. It generalizes the well-known and extremely rich correspondence between geometry of toric varieties and combinatorics of convex integral polytopes. Following a successful MFO Mini-workshop on this topic in August 2011, the MFO Half-Workshop 1422b, "Okounkov bodies and applications", held in May 2014, explored the development of this area in recent years, with particular attention to applications and relationships to other areas such as number theory and tropical geometry.

Participants

Anderson, Dave (Rio de Janeiro), Batyrev, Victor V. (Tübingen), Buchstaber, Victor M. (Moscow), Chen, Huayi (Saint-Martin-d'Heres), Harada, Megumi (Hamilton), Hilgert, Joachim (Paderborn), Huh, June E. (Ann Arbor), Karshon, Yael (Toronto), Kaveh, Kiumars (Pittsburgh), Kazarnovskii, Boris Y. (Moscow), Khovanskii, Askold (Toronto), Kiritchenko, Valentina (Moscow), Küronya, Alex (Budapest), Lozovanu, Victor (Milano), Maclagan, Diane (Coventry), Manon, Christopher (Fairfax), Martens, Johan (Edinburgh), Murata, Takuya (Pittsburgh), Nohara, Yuichi (Takamatsu City), Ono, Kaoru (Kyoto), Payne, Sam (New Haven), Smirnov, Evgeny (Moscow), Timorin, Vladlen (Moscow), Witt Nystrom, David (Cambridge), Yang, Jihyeon Jessie (Hamilton)

Workshop 1423

01.06. – 07.06.2014 **Stochastic Analysis: Around the KPZ Universality Class**

Organizers: Alice Guionnet, Cambridge MA
Martin Hairer, Coventry
Wendelin Werner, Zürich

Abstract

The Gaussian distribution is the "universal" distribution arising in a huge variety of contexts that describes the compound effect of the random fluctuations of many independent (or weakly dependent) sources of randomness that are combined in a (close to) additive way. While this has been very well understood for a long time, the last few years have seen an explosion of results around the "KPZ universality class", which contains many systems where strongly interacting individual components are combined in a highly non-linear way. In this class, which is still rather poorly understood from a mathematical perspective, fluctuations typically exhibit scaling exponent 1/3 instead of the exponent 1/2 familiar from the central limit theorem and limiting distributions are of Tracy-Widom type rather than Gaussian. This workshop brought together outstanding researchers from a variety of mathematical backgrounds whose areas of research are linked to the understanding of the KPZ equation and universality class.

Participants

Bakhtin, Yuri (Atlanta), Balázs, Márton (Bristol), Borodin, Alexei (Cambridge), Bourgade, Paul (Cambridge), Bovier, Anton (Bonn), Bruned, Yvain (Paris), Brunet, Éric (Paris), Cames van Batenburg, Wouter P. S. (Nijmegen), Cannizzaro, Giuseppe (Berlin), Carvalho Goncalves, Ana Patrícia (Rio de Janeiro), Cator, Eric A. (Nijmegen), Chhita, Sunil (Bonn), Chouk, Khalil (Berlin), Comets, Francis M. (Paris), Corwin, Ivan (Cambridge), Dey, Partha Sarathi (Coventry), Duminil-Copin, Hugo (Geneve), Ferrari, Patrik L. (Bonn), Friz, Peter K. (Berlin), Gorin, Vadim (Cambridge), Gubinelli, Massimiliano (Paris), Guionnet, Alice (Cambridge), Hairer, Martin (Coventry), Hammond, Alan M. (Oxford), Jara, Milton (Rio de Janeiro), Johansson, Kurt (Stockholm), Khanin, Konstantin M. (Toronto), Khoshnevisan, Davar (Salt Lake City), Knowles, Antti (Zürich), Le Doussal, Pierre (Paris), Ledoux, Michel (Toulouse), Matetski, Kanstantsin (Coventry), Nejjar, Peter (Bonn), Perkowski, Nicolas (Paris), Petrov, Leonid (Boston), Prähofer, Michael (Garching), Prolhac, Sylvain (Toulouse), Quastel, Jeremy (Toronto), Remenik, Daniel (Santiago), Rider, Brian (Philadelphia), Seppäläinen, Timo (Madison), Soshnikov, Alexander B. (Davis), Tracy, Craig A. (Davis), Tribe, Roger (Coventry), Tsai, Li-Cheng (Stanford), Valko, Benedek (Madison), Virag, Balint (Toronto), Weber, Hendrik (Coventry), Werner, Wendelin (Zürich), Widom, Harold (Santa Cruz), Zaboronski, Oleg (Coventry), Zygouras, Nikolaos (Coventry)

Workshop 1425

15.06. – 21.06.2014 **Geometrie**

Organizers: John Lott, Berkeley
Iskander Taimanov, Novosibirsk
Burkhard Wilking, Münster

Abstract

The topics discussed at the meeting ranged from geometric evolution equations to minimal surfaces, Riemannian foliations and hyperbolic geometry. The format of the meeting consisted of 18 one hour talks and four half hour after-dinner talks. The after-dinner talks were given by PhD students and recent PhDs. Because of a flexible schedule, the 53 participants had ample time for discussion.

Participants

Abresch, Uwe (Bochum), Bangert, Victor (Freiburg), Bär, Christian (Potsdam), Bohle, Christoph (Tübingen), Böhm, Christoph (Münster), Breiner, Christine (Bronx), Bucher-Karlsson, Michelle (Geneve), Cabezas-Rivas, Esther (Frankfurt), Gaifullin, Alexander A. (Moscow), Galaz-Garcia, Fernando (Karlsruhe), Grove, Karsten (Notre Dame), Hamenstädt, Ursula (Bonn), Hein, Hans-Joachim (Nantes), Hensel, Sebastian (Chicago), Hoelzel, Sebastian (Münster), Huisken, Gerhard (Tübingen), Ilmanen, Tom (Zürich), Ivanov, Sergei V. (St. Petersburg), Jansen, Dorothea (Münster), Kramer, Linus (Münster), Kuwert, Ernst (Freiburg), Lamm, Tobias (Karlsruhe), Lang, Urs (Zürich), Lange, Christian (Köln), LeBrun, Claude (Stony Brook), Leeb, Bernhard (München), Lott, John (Berkeley), Lytchak, Alexander (Köln), Marxen, Tobias (Hannover), Matthiesen, Henrik (Bonn), Mendes, Ricardo (Notre Dame), Nepechiy, Artem (Münster), Neves, André A. (London), Ni, Lei (La Jolla), Panov, Dmitri (London), Petrunin, Anton (University Park), Radeschi, Marco (Münster), Rausse, Christian (Münster), Schroeder, Viktor (Zürich), Schulze, Felix (London), Simon, Miles (Magdeburg), Sinestrari, Carlo (Roma), Spindeler, Wolfgang (Münster), Sturm, Karl-Theodor (Bonn), Taimanov, Iskander A. (Novosibirsk), Topping, Peter (Coventry), Tosatti, Valentino (Evanston), Tuschmann, Wilderich (Karlsruhe), Viaclovsky, Jeff A. (Madison), Wei, Guofang (Santa Barbara), Weinkove, Ben (Evanston), Wilking, Burkhard (Münster), Ziller, Wolfgang (Philadelphia)

Workshop 1426

22.06. – 28.06.2014 **Computational Multiscale Methods**

Organizers: Carsten Carstensen, Berlin/Seoul
Björn Engquist, Austin/Stockholm
Daniel Peterseim, Bonn

Abstract

Almost all processes in engineering and the sciences are characterized by the complicated relation of features on a large range of nonseparable spatial and time scales. The workshop concerned the computeraided simulation of such processes, the underlying numerical algorithms and the mathematics behind them to foresee their performance in practical applications.

Participants

Abdulle, Assyr (Lausanne), Arbogast, Todd (Austin), Bal, Guillaume (New York), Berlyand, Leonid (University Park), Bochev, Pavel B. (Albuquerque), Bringmann, Philipp (Berlin), Cances, Eric (Marne-la-Vallée), Carstensen, Carsten (Berlin), Diehl, Patrick (Bonn), Efendiev, Yalchin (College Station), Engquist, Björn (Austin), Frederick, Christina (Austin), Gallistl, Dietmar (Berlin), Gorb, Yulia (Houston), Greff, Isabelle (Pau), Gunzburger, Max D. (Tallahassee), Hackbusch, Wolfgang (Leipzig), Heitzinger, Clemens (Tempe), Hellwig, Friederike (Berlin), Henning, Patrick (Münster), Jäger, Willi (Heidelberg), Larson, Mats G. (Umea), Legoll, Frederic (Marne-la-Vallée), Lipton, Robert (Baton Rouge), Luskin, Mitchell B. (Minneapolis), Malqvist, Axel (Uppsala), Melenk, Jens Markus (Wien), Morgenstern, Philipp (Bonn), Nordbotten, Jan Martin (Bergen), Ortner, Christoph (Coventry), Owhadi, Houman (Pasadena), Park, Eun-Jae (Seoul), Persson, Anna (Göteborg), Peterseim, Daniel (Bonn), Puttkammer, Sophie (Berlin), Rumpf, Martin (Bonn), Samaey, Giovanni (Heverlee), Schedensack, Mira (Berlin), Schmuck, Markus (Edinburgh), Spillane, Nicole (Santiago), Szepessy, Anders (Stockholm), Tsai, Yen-Hsi Richard (Austin), van Brummelen, E. Harald (Eindhoven), Voigt, Axel (Dresden), Wheeler, Mary Fanett (Austin), Zhang, Lei (Shanghai)

Workshop 1427

29.06. – 05.07.2014 **Classical Algebraic Geometry**

Organizers: Olivier Debarre, Paris
David Eisenbud, Berkeley
Gavril Farkas, Berlin
Ravi Vakil, Stanford

Abstract

Progress in algebraic geometry usually comes through the introduction of new tools and ideas to tackle the classical problems of the field. Examples include new invariants that capture some aspect of geometry in a novel way, such as Voisin's "existence of decomposition of the diagonal", and the extension of the class of geometric objects considered to allow constructions not previously possible, such as stacks, tropical geometry, and log structures. Many famous old problems and outstanding conjectures have been resolved in this way over the last 50 years. While the new theories are sometimes studied for their own sake, they are in the end best understood in the context of the classical questions they illuminate. The goal of the workshop was to study new developments in algebraic geometry, in the context of their application to the classical problems.

Participants

Abuaf, Roland (Saint-Martin-d'Heres), Alper, Jarod (Canberra), Aprodu, Marian (Bucharest), Beauville, Arnaud (Nice), Benoist, Olivier (Paris), Boissiere, Samuel (Chasseneuil), Bolognesi, Michele (Rennes), Cantat, Serge (Rennes), Casalaina-Martin, Sebastian (Boulder), Catanese, Fabrizio (Bayreuth), Charles, Francois (Orsay), Codogni, Giulio (Roma), Coskun, Izzet (Chicago), Debarre, Olivier (Paris), Deopurkar, Anand (New York), Dolgachev, Igor (Ann Arbor), Ein, Lawrence (Chicago), Eisenbud, David (Berkeley), Erman, Daniel (Madison), Farkas, Gavril (Berlin), Fu, Lie (Paris), Harris, Joseph (Cambridge), Hassett, Brendan (Houston), Hulek, Klaus (Hannover), Huybrechts, Daniel (Bonn), Janda, Felix (Zürich), Jiang, Zhi (Orsay), Keel, Sean (Austin), Kemeny, Michael (Berlin), Kloosterman, Remke (Berlin), Krämer, Thomas (Heidelberg), Kummer, Mario (Konstanz), Laza, Radu (Stony Brook), Lazarsfeld, Robert (Stony Brook), Lelli-Chiesa, Margherita (Pisa), Li, Jun (Stanford), Litt, Daniel (Stanford), Macri, Emanuele (Columbus), Mustata, Mircea (Ann Arbor), Netzer, Tim (Leipzig), Ortega, Angela (Berlin), Pandharipande, Rahul (Zürich), Payne, Sam (New Haven), Purnaprajna, Bangere P. (Lawrence), Raicu, Claudiu (Princeton), Schreyer, Frank-Olaf (Saarbrücken), Shende, Vivek V. (Cambridge), Smyth, David (Canberra), Vakil, Ravi (Stanford), van der Geer, Gerard (Amsterdam), Verra, Alessandro (Roma), Voisin, Claire (Palaiseau), Yin, Qizheng (Zürich)

Workshop 1428

06.07. – 12.07.2014 **Algebraische Zahlentheorie**

Organizers: Benjamin Howard, Chestnut Hill
Guido Kings, Regensburg
Ramdorai Sujatha, Vancouver
Otmar Venjakob, Heidelberg

Abstract

The workshop brought together leading experts in Algebraic Number Theory. The talks presented new methods and results that intertwine a multitude of topics ranging from classical diophantine themes to modern arithmetic geometry, modular forms and p-adic aspects in number theory. These were supplemented by stimulating discussions among the participants. In conclusion, this workshop reflected the breadth and depth of on-going research in this old and beautiful area of mathematics.

Participants

Andreatta, Fabrizio (Milano), Bannai, Kenichi (Yokohama), Bellovin, Rebecca (London), Berger, Laurent (Lyon), Bertolini, Massimo (Essen), Bruinier, Jan Hendrik (Darmstadt), Bültel, Oliver (Essen), Burungale, Ashay A. (Los Angeles), Caraiani, Ana (Chicago), Colmez, Pierre (Paris), Darmon, Henri René (Montreal), Di Proietto, Valentina (Tokyo), Disegni, Daniel (Montreal), Eischen, Ellen E. (Chapel Hill), Ertl, Veronika (Regensburg), Esnault, Hélène (Berlin), Fouquet, Olivier (Orsay), Fukaya, Takako (Chicago), Graf, Philipp (Regensburg), Hellmann, Eugen (Bonn), Howard, Benjamin V. (Chestnut Hill), Hsieh, Ming-Lun (Taipei), Huber-Klawitter, Annette (Freiburg), Jannsen, Uwe (Regensburg), Johnston, Henri (Exeter), Kato, Kazuya (Chicago), Kedlaya, Kiran S. (La Jolla), Kings, Guido (Regensburg), Kobayashi, Shinichi (Sendai), Kudla, Stephen S. (Toronto), Loeffler, David (Coventry), Madapusi Pera, Keerthi (Cambridge), Mihatsch, Andreas (Bonn), Morel, Sophie (Princeton), Nekovar, Jan (Paris), Pappas, Georgios (East Lansing), Prasanna, Kartik (Ann Arbor), Rapoport, Michael (Bonn), Riedel, Andreas (Heidelberg), Rotger, Victor (Barcelona), Schmidt, Alexander (Heidelberg), Schneider, Peter (Münster), Shekar, Sudhanshu (Heidelberg), Sprung, Florian (Princeton), Stroh, Benoit (Villetaneuse), Sujatha, Ramdorai (Vancouver), Urban, Eric (New York), Venjakob, Otmar (Heidelberg), Wake, Preston (Chicago), Witte, Malte (Heidelberg), Wittenberg, Olivier (Paris), Zerbes, Sarah (London)

Workshop 1429

13.07. – 19.07.2014 **Calculus of Variations**

Organizers: Simon Brendle, Stanford
Camillo De Lellis, Zürich
Robert L. Jerrard, Toronto

Abstract

The Calculus of Variations is at the same time a classical subject, with long-standing open questions which have generated deep discoveries in recent decades, and a modern subject in which new types of questions arise, driven by mathematical developments and by emergent applications. This workshop balanced the traditional variational problems with novel questions with origins in diverse areas, such as economic models of the academic labor market, or differential geometry in metric emasure spaces. In particular, the meeting featured presentations on regularity theory, existence, and classification questions related to minimal surfaces, surfaces of prescribed Gaussian curvature, and mean curvature flow; domain optimization problems; nonlinear elasticity; calibrated geometries; variational formulations of certain dynamical problems; and stochastic variational problems.

Participants

Armstrong, Scott (Paris), Beck, Lisa (Augsburg), Bella, Peter (Leipzig), Bellettini, Costante (Princeton), Braides, Andrea (Roma), Brendle, Simon (Stanford), Brenier, Yann (Palaiseau), Cabezas-Rivas, Esther (Frankfurt), Carlotto, Alessandro (Stanford), Chodosh, Otis (Stanford), Cicalese, Marco (München), Da Lio, Francesca (Zürich), Dal Maso, Gianni (Trieste), del Pino, Manuel (Santiago), de Philippis, Guido (Zürich), Edelen, Nick (Stanford), Garroni, Adriana (Roma), Gigli, Nicola (Paris), Haslhofer, Robert (New York), Hornung, Peter (Dresden), Huisken, Gerhard (Tübingen), Ignat, Radu (Toulouse), Jerrard, Robert L. (Toronto), Kim, Young-Heon (Vancouver), Kirchheim, Bernd (Leipzig), Kristensen, Jan (Oxford), Kuwert, Ernst (Freiburg), Lamm, Tobias (Karlsruhe), Luckhaus, Stephan (Leipzig), Mäder-Baumdicker, Elena (Freiburg), Maggi, Francesco (Austin), Massaccesi, Annalisa (Zürich), McCann, Robert J. (Toronto), Menne, Ulrich (Golm), Menz, Georg (Stanford), Mora, Maria Giovanna (Pavia), Moser, Roger (Bath), Müller, Stefan (Bonn), Niethammer, Barbara (Bonn), Novaga, Matteo (Pisa), Petrache, Mircea (Paris), Rivière, Tristan (Zürich), Schmidt, Thomas (Erlangen), Schulze, Felix (Berlin), Smets, Didier (Paris), Struwe, Michael (Zürich), Tonegawa, Yoshihiro (Sapporo), Vittone, Davide (Padova), White, Brian (Stanford), Wickramasekera, Neshan (Cambridge), Young, Robert (Toronto), Zhou, Xin (Cambridge)

Workshop 1430

20.07. – 26.07.2014 **Real Analysis, Harmonic Analysis and Applications**

Organizers: Michael Christ, Berkeley
Detlef Müller, Kiel
Christoph Thiele, Bonn

Abstract

The workshop has focused on important developments within the last few years in the point of view and methods of real and harmonic Analysis as well as significant concurrent progress in the application of these to various other fields. The meeting brought together experts and young scientists working in harmonic analysis and its applications (such as nonlinear dispersive and elliptic PDE, number theory, geometric measure theory) with the objective of furthering the important interactions between these fields.

Participants

Auscher, Pascal (Orsay), Bateman, Michael (Cambridge), Buschenhenke, Stefan (Madrid), Carbery, Anthony (Edinburgh), Carneiro, Emanuel (Rio de Janeiro), Charalambides, Marcos (Lemesos), Christ, Michael (Berkeley), Cowling, Michael G. (Sydney), David, Guy (Orsay), Dendrinos, Spyridon (Cork), Di Plinio, Francesco (Roma), Dziubanski, Jacek (Wroclaw), Erdogan, M. Burak (Urbana), Foschi, Damiano (Ferrara), Gressman, Philip (Philadelphia), Guo, Shaoming (Bonn), Hedenmalm, Hakan (Stockholm), Hundertmark, Dirk (Karlsruhe), Hytönen, Tuomas (University of Helsinki), Iosevich, Alexander (Rochester), Koch, Herbert (Bonn), Kovac, Vjekoslav (Zagreb), Li, Hong-Quan (Shanghai), Martini, Alessio (Kiel), Mirek, Mariusz (Bonn), Müller, Detlef (Kiel), Munarriz Aldaz, Jesus (Madrid), Muscalu, Camil (Ithaca), Naor, Assaf (New York), Oberlin, Richard (Tallahassee), Oliveira e Silva, Diogo (Bonn), Petermichl, Stefanie (Toulouse), Phong, Duong H. (New York), Pierce, Lillian Beatrix (Bonn), Pramanik, Malabika (Vancouver), Reguera, Maria (Birmingham), Rogers, Keith M. (Madrid), Seeger, Andreas (Madison), Sikora, Adam S. (NSW), Stein, Elias M. (Princeton), Steinerberger, Stefan (New Haven), Stovall, Betsy (Madison), Street, Brian T. (Madison), Thiele, Christoph (Bonn), Tolsa, Xavier (Bellaterra), Vallarino, Maria (Torino), Vega, Luis (Bilbao), Volberg, Alex (East Lansing), Wright, Jim (Edinburgh), Yung, Po-Lam (Oxford), Zienkiewicz, Jacek (Wroclaw), Zimmermann, Eugen (Kiel), Zorin-Kranich, Pavel (Bonn)

Workshop 1431

27.07. – 02.08.2014 **Cryptography**
Organizers: Johannes Buchmann, Darmstadt
Shafi Goldwasser, Cambridge MA/Rehovot

Abstract
The Oberwolfach workshop Cryptography brought together scientists from cryptography with mathematicians specializing in the algorithmic problems underlying cryptographic security. The goal of the workshop was to stimulate interaction and collaboration that enables a holistic approach to designing cryptography from the mathematical foundations to practical applications. The workshop covered basic computational problems such as factoring and computing discrete logarithms and short vectors. It addressed fundamental research results leading to innovative cryptography for protecting security and privacy in cloud applications. It also covered some practical applications.

Participants
Applebaum, Benny (Ramat Aviv), Bernstein, Daniel J. (Chicago), Bindel, Nina (Darmstadt), Boyle, Elette (Haifa), Buchmann, Johannes (Darmstadt), Canetti, Ran (Tel Aviv), Cohen, Aloni (Cambridge), Dagdelen, Özgür (Darmstadt), Ding, Jintai (Cincinnati), Dwork, Cynthia (Mountain View), El Bansarkhani, Rachid (Darmstadt), Fischlin, Marc (Darmstadt), Galbraith, Steven (Auckland), Goldwasser, Shafi (Cambridge), Göpfert, Florian (Darmstadt), Gorbunov, Sergey (Cambridge), Goyal, Vipul (Bangalore), Haitner, Iftach Ilan (Tel Aviv), Hofheinz, Dennis (Karlsruhe), Holmgren, Justin (Cambridge), Ishai, Yuval (Haifa), Jain, Abhishek (Cambridge), Joux, Antoine (Paris), Kalai, Yael (Cambridge), Lange, Tanja (Eindhoven), Lenstra, Hendrik W. (Leiden), Lin, Rachel (Santa Barbara), Lyubashevsky, Vadim (Paris), Micciancio, Daniele (La Jolla), Müller-Quade, Jörn (Karlsruhe), Naor, Moni (Rehovot), Ostrovsky, Rafail (Los Angeles), Paneth, Omer (Boston), Pass, Rafael (Ithaca), Peikert, Chris (Atlanta), Pietrzak, Krzysztof (Klosterneuburg), Rosen, Alon (Herzliya), Rothblum, Guy (Redmond), Rothblum, Ron (Rehovot), Schnorr, Claus-Peter (Frankfurt am Main), Silverberg, Alice (Irvine), Smart, Nigel (Bristol), Tessaro, Stefano (Santa Barbara), Wichs, Daniel (Boston), Zhandry, Mark (Stanford)

Workshop 1432

03.08. – 09.08.2014 **Analysis, Geometry and Topology of Positive Scalar Curvature Metrics**

Organizers: Bernd Ammann, Regensburg
Bernhard Hanke, Augsburg
Andre Neves, London

Abstract

One of the fundamental problems in Riemannian geometry is to understand the relation of locally defined curvature invariants and global properties of smooth manifolds. This workshop was centered around the investigation of scalar curvature, addressing questions in global analysis, geometric topology, relativity and minimal surface theory.

Participants

Alagalingam, Meru (Augsburg), Ammann, Bernd (Regensburg), Bär, Christian (Potsdam), Botvinnik, Boris (Eugene), Bowden, Jonathan (Augsburg), Bunke, Ulrich (Regensburg), Carlotto, Alessandro (Stanford), Chrusciel, Piotr T. (Wien), Crowley, Diarmuid (Bonn), Dahl, Mattias (Stockholm), Dessai, Anand N. (Fribourg), Engel, Alexander (Augsburg), Gicquaud, Romain (Tours), Goffeng, Magnus (Hannover), Gozzi, Francisco José (Rio de Janeiro), Große, Nadine (Leipzig), Gursky, Matthew John (Notre Dame), Hanke, Bernhard (Augsburg), Hebestreit, Fabian (Münster), Henry, Guillermo (Buenos Aires), Hermann, Andreas (Potsdam), Kahle, Alexander (Bochum), Kröncke, Klaus (Potsdam), Lee, Dan (New York), Madani, Farid (Regensburg), Marcinkowski, Michal (Wroclaw), Maximo, Davi (Stanford), Metzger, Jan (Potsdam), Mirandola, Heudson (London), Müller, Olaf (Regensburg), Nardmann, Marc (Hamburg), Neves, André A. (London), Nowaczyk, Nikolai (Regensburg), Petean, Jimmy (Guanajuato), Piazza, Paolo (Roma), Rodrigues Barbosa, Ezequiel (London), Schick, Thomas (Göttingen), Schulze, Felix (London), Semmelmann, Uwe (Stuttgart), Sharp, Ben (London), Steimle, Wolfgang (Bonn), Stephan, Christoph (Potsdam), Streil, Manuel (Regensburg), Tuschmann, Wilderich (Karlsruhe), Upmeier, Markus (Bruxelles), Volkmann, Alexander (Golm), Weiss, Hartmut (Kiel), Wiemeler, Michael (Karlsruhe), Wilking, Burkhard (Münster), Wulff, Christopher (Augsburg), Yamada, Sumio (Tokyo)

Workshop 1433

10.08. – 16.08.2014 **Mathematics and Algorithms in Tomography**

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

Abstract

This was the ninth Oberwolfach conference on the mathematics of tomography. Modalities represented at the workshop included Xray tomography, radar, seismic imaging, ultrasound, electron microscopy, impedance imaging, photoacoustic tomography, elastography, emission tomography, X-ray CT, and vector tomography along with a wide range of mathematical analysis.

Participants

Ambartsoumian, Gaik (Arlington), Arridge, Simon R. (London), Batenburg, K. Joost (Amsterdam), Boman, Jan (Stockholm), Burger, Martin (Münster), Clackdoyle, Rolf (St. Etienne), Defrise, Michel (Brussels), Desbat, Laurent (La Tronche), Dorn, Oliver (Manchester), Faridani, Adel (Corvallis), Finch, David V. (Corvallis), Frikel, Jürgen (Neuherberg), Grünbaum, F. Alberto (Berkeley), Hahn, Bernadette (Saarbrücken), Hansen, Per Christian (Lyngby), Jiang, Ming (Beijing), Katsevich, Alexander (Orlando), Kohr, Holger (Stockholm), Kolehmainen, Ville (Kuopio), Kunyansky, Leonid (Tucson), Lakhal, Aref (Saarbrücken), Lechleiter, Armin (Bremen), Louis, Alfred K. (Saarbrücken), Nguyen, Linh (Moscow), Nolan, Clifford (Limerick), Oeckl, Steven (Fürth), Öktem, Ozan (Stockholm), Palamodov, Victor P. (Tel Aviv), Patch, Sarah (Milwaukee), Quinto, Eric Todd (Medford), Ramlau, Ronny (Linz), Rieder, Andreas (Karlsruhe), Rigaud, Gael (Saarbrücken), Sawatzky, Alex (Münster), Scherzer, Otmar (Wien), Schoenlieb, Carola-Bibiane (Cambridge), Schön, Tobias (Fürth), Schotland, John C. (Ann Arbor), Schuster, Thomas (Saarbrücken), Sharafutdinov, Vladimir A. (Novosibirsk), Siltanen, Samuli (University of Helsinki), Suhr, Sebastian (Münster), Uhlmann, Gunther A. (Seattle), Wübbeling, Frank (Münster)

Workshop 1434

17.08. – 23.08.2014 **Low-dimensional Topology and Number Theory**

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

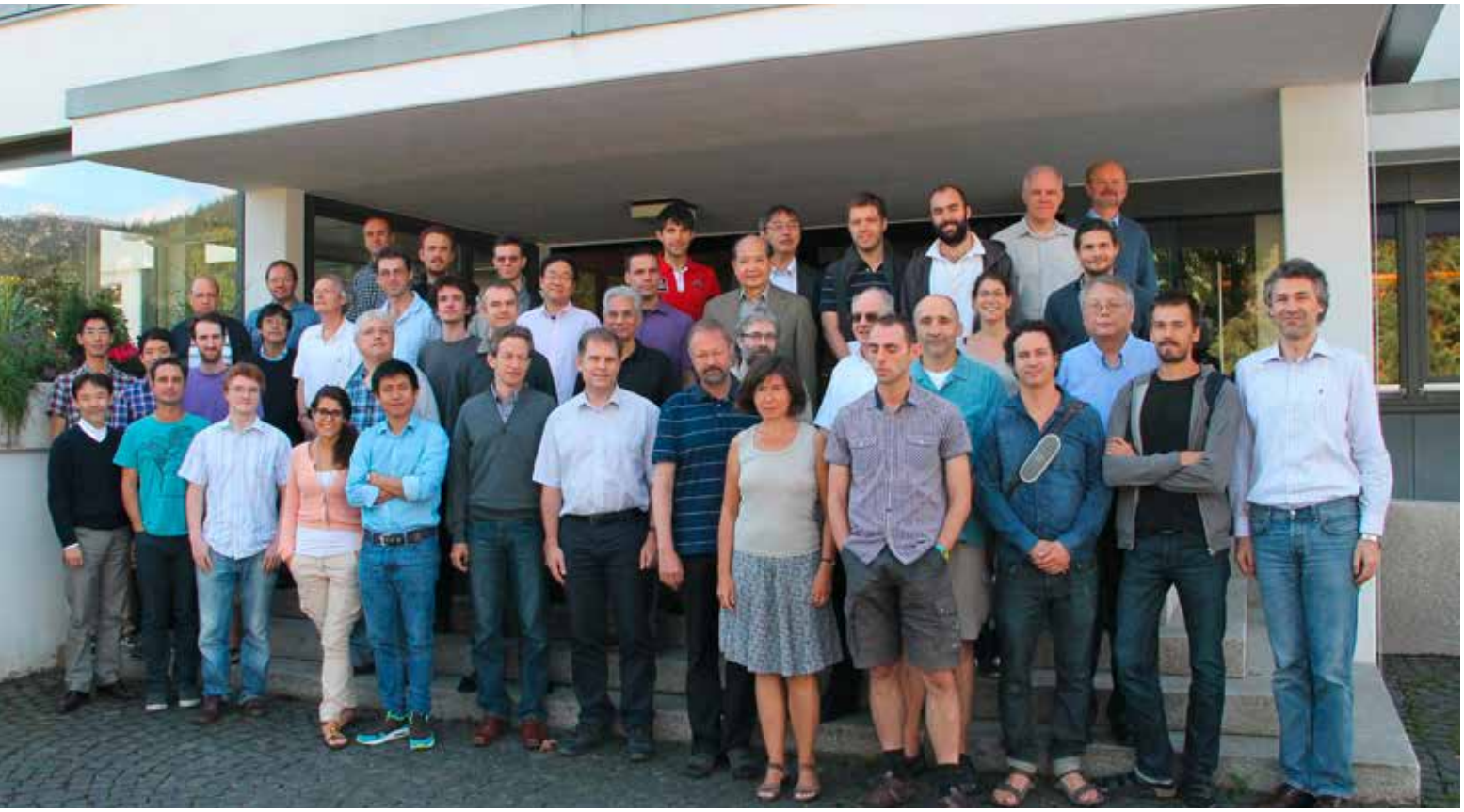
Abstract

The workshop brought together topologists and number theorists with the intent of exploring the many tantalizing connections between these areas. At the moment the topic of most active interaction between topologists and number theorists are quantum invariants of 3-manifolds and their asymptotics. The meeting showed significant progress in the field.

Participants

Andersen, Jorgen E. (Aarhus), Borot, Gaetan (Bonn), Boston, Nigel (Madison), Boyer, Steven (Montreal), Champanerkar, Abhijit (Staten Island), Chinburg, Ted C. (Philadelphia), Culler, Marc (Chicago), Dasbach, Oliver T. (Baton Rouge), Dimofte, Tudor D. (Princeton), Dunfield, Nathan M. (Urbana), Furusho, Hidekazu (Nagoya), Garoufalidis, Stavros (Atlanta), Gunnells, Paul E. (Amherst), Hajir, Farshid (Amherst), Hikami, Kazuhiro (Fukuoka), Jeon, BoGwang (New York), Kashaev, Rinat M. (Geneve), Kellerhals, Ruth (Fribourg), Kofman, Ilya (Staten Island), Kreck, Matthias (Bonn), Lawrence, Ruth (Jerusalem), Le, Thang (Atlanta), Lück, Wolfgang (Bonn), Masbaum, Gregor (Paris), Mkrtchyan, Ruben L. (Yerevan), Murakami, Hitoshi (Sendai), Nahm, Werner (Dublin), Neumann, Walter David (New York), Niibo, Hirofumi (Fukuoka), Osburn, Robert (Dublin), Petersen, Kathleen (Tallahassee), Savas, Murat (New York), Schwermer, Joachim (Wien), Shalen, Peter (Chicago), Sikora, Adam (Buffalo), Ueki, Jun (Fukuoka), van der Veen, Roland (Amsterdam), Yokota, Yoshiyuki (Tokyo), Zagier, Don B. (Bonn), Zickert, Christian (College Park), Zwegers, Sander (Köln)

Workshop 1435



24.08. – 30.08.2014 **Komplexe Analysis**

Organizers: Philippe Eyssidieux, St. Martin d'Hères
Jun-Muk Hwang, Seoul
Stefan Kebekus, Freiburg
Mihai Paun, Nancy

Abstract

Complex Analysis is a very active branch of mathematics with applications in many other fields. The central aim of our workshop was to present recent results in several complex variables and complex geometry, and to survey topics that link it to other branches of mathematics. The workshop was well attended in number and quality, with close to 50 participants. We were particularly glad to notice the presence of well-known experts from different backgrounds, who shared generously their ideas, points of view and recent results with young researchers.

Participants

Amerik, Ekaterina (Moscow), Auvray, Hugues (Cachan), Berman, Robert (Gothenburg), Blanc, Jeremy (Basel), Boucksom, Sebastien (Paris), Campana, Frédéric (Vandoeuvre-les-Nancy), Choi, Young-Jun (Seoul), Demailly, Jean-Pierre (Saint-Martin-d'Heres), Di Nezza, Eleonora (Toulouse), Eckl, Thomas (Liverpool), Ein, Lawrence (Chicago), Eyssidieux, Philippe (Saint-Martin-d'Heres), Gendron, Quentin (Frankfurt), Graf, Patrick (Bayreuth), Greb, Daniel (Bochum), Grushevsky, Samuel (Stony Brook), Guedj, Vincent (Toulouse), Höring, Andreas (Nice), Huckleberry, Alan T. (Bochum), Hulek, Klaus (Hannover), Hwang, Jun-Muk (Seoul), Jiang, Zhi (Orsay), Kawamata, Yujiro (Tokyo), Kebekus, Stefan (Freiburg), Kim, Dano (Seoul), Kovács, Sándor J. (Seattle), Kovalenko, Sergei (Freiburg), Lempert, Laszlo (West Lafayette), Lu, Hoang Chinh (Göteborg), McKernan, James (Cambridge), Mégy, Damien (Vandoeuvre-les-Nancy), Möller, Martin (Frankfurt), Oguiso, Keiji (Osaka), Pacienza, Gianluca (Strasbourg), Patakfalvi, Zsolt (Princeton), Paun, Mihai (Vandoeuvre-les-Nancy), Peternell, Thomas (Bayreuth), Ruppenthal, Jean (Wuppertal), Schumacher, Georg (Marburg), Sibony, Nessim (Orsay), Siu, Yum-Tong (Cambridge), Spinaci, Marco (Saint-Martin-d'Heres), Svaldi, Roberto (Cambridge), Taji, Behrouz (Freiburg), Takayama, Shigeharu (Tokyo), Tsuji, Hajime (Tokyo), Varolin, Dror (Stony Brook), Winkelmann, Jörg (Bochum), Zimmermann, Susanna (Basel)

Workshop 1436

31.08. – 06.09.2014 **Discrete Geometry**

Organizers: Imre Barany, Budapest/London
Jiri Matousek, Praha/Zürich
Günter Rote, Berlin

Abstract

Several significant new developments have been reported in many branches of discrete geometry at the workshop. The area has strong connections to other fields of mathematics for instance topology, algebraic geometry, combinatorics, and harmonic analysis. Discrete geometry is very active with hundreds of open questions and many solutions. There was a large number of young participants eager to work on these questions, and the future of discrete geometry is very safe.

Participants

Adiprasito, Karim (Bures-sur-Yvette), Akopyan, Arseniy (Moscow), Ambrus, Gergely (Budapest), Aronov, Boris (Brooklyn), Balko, Martin (Praha), Barany, Imre (Budapest), Blagojevic, Pavle (Berlin), Bukh, Boris (Pittsburgh), Cheong, Otfried (Daejeon), De Zeeuw, Frank (Lausanne), Dobbins, Michael G. (Korea), Dolnikov, Vladimir (Yaroslavl), Fulek, Radoslav (New York), Goaoc, Xavier (Marne-la-Vallée), Gundert, Anna (Köln), Karasev, Roman N. (Moscow), Karolyi, Gyula (Budapest), Keszegh, Balazs (Budapest), Kim, Heuna (Berlin), Kyncl, Jan (Praha), Maehara, Hiroshi (Okinawa), Miltzow, Tillman (Berlin), Montejano, Luis (México), Mustafa, Nabil (Marne-la-Vallée), Pach, Janos (Lausanne), Pak, Igor (Los Angeles), Palvölgyi, Dömötör (Budapest), Pollack, Richard M. (New York), Por, Attila (Bowling Green), Raz, Orit (Tel Aviv), Roldán-Pensado, Edgardo (Juriquilla Queretaro), Rote, Günter (Berlin), Rubin, Natan (Paris), Safernová, Zuzana (Praha), Santos, Francisco (Santander), Schaefer, Marcus (Chicago), Sedgwick, Eric (Chicago), Soberón, Pablo (Ann Arbor), Solomon, Noam (Tel Aviv), Solymosi, József (Vancouver), Swanepoel, Konrad (London), Tancer, Martin (Praha), Tardos, Gábor (Budapest), Tóth, Csaba Dávid (Los Angeles), Tóth, Géza (Budapest), Vallentin, Frank (Köln), Valtr, Pavel (Praha), Wagner, Uli (Klosterneuburg), Welzl, Emo (Zürich), Zahl, Joshua (Cambridge), Ziegler, Günter M. (Berlin)

Workshop 1437

07.09. – 13.09.2014 **New Horizons in Statistical Decision Theory**

Organizers: Richard Gill, Leiden
Madalin Guta, Nottingham
Michael Nussbaum, Ithaca

Abstract

The classical metric theory of statistical models (experiments) has recently been extended towards an asymptotic equivalence paradigm, allowing to classify and relate problems which are essentially infinite dimensional and ill-posed. Modern statistical concepts like these are also being integrated into the emerging field of quantum statistics, which is developing on the background of technological breakthroughs in quantum engineering. The workshop brought together leading experts in these areas, with the goal of establishing a common language, and fostering collaborations between mathematical statisticians, theoretical physicists and experimentalists.

Participants

Andresen, Andreas (Berlin), Audenaert, Koenraad (Egham, Surrey), Blanchard, Gilles (Potsdam), Blume-Kohout, Robin (Albuquerque), Burgarth, Daniel (Aberystwyth, Wales), Butucea, Cristina (Marne-la-Vallée), Campbell, Yuri (Leipzig), Castillo, Ismael (Paris), Eisert, Jens (Berlin), Ferrie, Chris (Albuquerque), Fujiwara, Akio (Osaka), Gill, Richard D. (Leiden), Golubev, Georgü K. (Marseille), Grama, Ion (Vannes), Groß, David (Freiburg), Guta, Madalin (Nottingham), Hoffmann, Marc (Paris), Holtz, Sebastian (Berlin), Jankova, Jana (Zürich), Janssen, Arnold (Düsseldorf), Jencova, Anna (Bratislava), Kholevo, Alexander S. (Moscow), Kiukas, Jukka (Nottingham), Knapik, Bartek (Amsterdam), Küng, Richard (Freiburg), Leucht, Anne (Braunschweig), Levitt, Matthew (Nottingham), Li, Housen (Göttingen), Macieszczak, Katarzyna (Nottingham), Mammen, Enno (Heidelberg), Matsumoto, Keiji (Tokyo), Meister, Alexander (Rostock), Monz, Thomas (Innsbruck), Naulet, Zacharie (Paris), Neumeyer, Natalie (Hamburg), Nickl, Richard (Cambridge), Nussbaum, Michael (Ithaca), Olivier, Adélaide (Malakoff), Reiß, Markus (Berlin), Rohde, Angelika (Bochum), Schmidt-Hieber, Johannes (Leiden), Shang, Jiangwei (Singapore), Spokoiny, Vladimir G. (Berlin), Steffens, Adrian (Berlin), Szkola, Arleta (Leipzig), Temme, Kristan (Pasadena), van de Geer, Sara (Zürich), Wahl, Martin (Mannheim), Winter, Andreas (Bellaterra), Zhilova, Mayya (Berlin), Zhou, Huibin (New Haven)

Workshop 1438

14.09. – 20.09.2014 **Topologie**

Organizers: Thomas Schick, Göttingen
Peter Teichner, Bonn
Nathalie Wahl, Copenhagen
Michael Weiss, Münster

Abstract

The Oberwolfach conference "Topologie" is one of only a few opportunities for researchers from many different areas in algebraic and geometric topology to meet and exchange ideas. The program covered new developments in fields such as automorphisms of manifolds, applications of algebraic topology to differential geometry, quantum field theories, combinatorial methods in low-dimensional topology, abstract and applied homotopy theory and applications of L2-cohomology. We heard about new results describing the cohomology of the automorphism spaces of some smooth manifolds, progress on spaces of positive scalar curvature metrics, a variant of the Segal conjecture without completion, advances in classifying topological quantum field theories, and a new undecidability result in combinatorial group theory, to mention some examples. As a special attraction, the conference featured a series of three talks by Dani Wise on the combinatorics of CAT(0)-cube complexes and applications to 3-manifold topology.

Participants

Banks, Jessica (Hull), Bartels, Arthur (Münster), Berglund, Alexander (Stockholm), Bergner, Julie (Riverside), Boavida de Brito, Pedro (Münster), Bridson, Martin R. (Oxford), Dancso, Zsuzsanna (Berkeley), Degrijse, Dieter (Copenhagen), Ebert, Johannes (Münster), Egas Santander, Daniela (Bonn), Gepner, David J. (West Lafayette), Gordon, Cameron M. (Austin), Grabowski, Lukasz (Coventry), Grodal, Jesper (Copenhagen), Gwilliam, Owen (Bonn), Habiro, Kazuo (Kyoto), Hanke, Bernhard (Augsburg), Hepworth, Richard (Aberdeen), Hill, Mike (Charlottesville), Kammeyer, Holger (Bonn), Kasprowski, Daniel (Bonn), Kreck, Matthias (Bonn), Laures, Gerd (Bochum), Leary, Ian J. (Southampton), Lewark, Lukas (Bern), Lück, Wolfgang (Bonn), Moerdijk, Ieke (Nijmegen), Nikolaus, Thomas (Regensburg), Pagliantini, Cristina (Zürich), Patchkoria, Irakli (Copenhagen), Pavlov, Dmitri (Göttingen), Putman, Andrew (Houston), Randal-Williams, Oscar (Cambridge), Richter, Birgit (Hamburg), Riehl, Emily (Cambridge), Schick, Thomas (Göttingen), Schleimer, Saul (Coventry), Schommer-Pries, Chris (Bonn), Schwede, Stefan (Bonn), Stapleton, Nat (Bonn), Teichner, Peter (Bonn), Thom, Andreas B. (Leipzig), Tillmann, Ulrike (Oxford), Tubbenhauer, Daniel (Aarhus), Upmeier, Markus (Bruxelles), Wahl, Nathalie (Copenhagen), Weiss, Michael (Münster), Westerland, Craig (Minneapolis), Wickelgren, Kirsten (Atlanta), Wise, Daniel T. (Montreal), Wockel, Christoph (Hamburg)

Workshop 1439

21.09. – 27.09.2014 **Reactive Flows in Deformable, Complex Media**

Organizers: Margot Gerritsen, Stanford
Jan Martin Nordbotten, Bergen
Iuliu Sorin Pop, Eindhoven
Barbara Wohlmuth, Garching

Abstract

Many processes of highest actuality in the real life are described through systems of equations posed in complex domains. Of particular interest is the situation when the domain is variable, undergoing deformations that depend on the unknown quantities of the model. Such kind of problems are encountered as mathematical models in the subsurface, or biological systems. Such models include various processes at different scales, and the key issue is to integrate the domain deformation in the multi-scale context. Having this as the background theme, this workshop focused on novel techniques and ideas in the analysis, the numerical discretization and the upscaling of such problems, as well as on applications of major societal relevance today.

Participants

Aavatsmark, Ivar (Bergen), Abdulle, Assyr (Lausanne), Arbogast, Todd (Austin), Bastian, Peter (Heidelberg), Bause, Markus (Hamburg), Berre, Inga (Bergen), Bringedal, Carina (Bergen), Brunner, Fabian (Erlangen), Carrera, Jesus (Barcelona), Celia, Michael A. (Princeton), Choquet, Catherine (La Rochelle), Gaspar, Francisco (Zaragoza), Gupta, Shubhangi (Garching), Hassanizadeh, S. Majid (Utrecht), Hesse, Marc (Austin), Hilhorst, Danielle (Orsay), Huyghe, Jacques (Eindhoven), Iliev, Oleg (Kaiserslautern), Jäger, Willi (Heidelberg), John, Lorenz (Garching), Knabner, Peter (Erlangen), Köppl, Tobias (Garching), Kumar, Kundan (Austin), Lakkis, Omar (Brighton), Mikelic, Andro (Villeurbanne), Muntean, Adrian (Eindhoven), Neuss-Radu, Maria (Erlangen), Neuweiler, Insa (Hannover), Nissen, Anna (Bergen), Nordbotten, Jan Martin (Bergen), Peszynska, Malgorzata (Corvallis), Pop, Iuliu Sorin (Eindhoven), Pustejovska, Petra (Graz), Ray, Nadja (Erlangen), Riviere, Beatrice (Houston), Rohde, Christian (Stuttgart), Rüde, Ulrich (Erlangen), Scheichl, Robert (Bath), Schweizer, Ben (Dortmund), Scotti, Anna (Milano), van der Zee, Kris G. (Nottingham), Vohralik, Martin (Le Chesnay), Waluga, Christian (Garching), Wheeler, Mary Fanett (Austin), Wieners, Christian (Karlsruhe), Wohlmuth, Barbara (Garching), Yotov, Ivan (Pittsburgh)

Workshop 1443

19.10. – 25.10.2014 **Dirichlet Form Theory and its Applications**

Organizers: Sergio Albeverio, Bonn
Zhen-Qing Chen, Seattle
Masatoshi Fukushima, Osaka
Michael Röckner, Bielefeld

Abstract

Theory of Dirichlet forms is one of the main achievements in modern probability theory. It provides a powerful connection between probabilistic and analytic potential theory. It is also an effective machinery for studying various stochastic models, especially those with non-smooth data, on fractal-like spaces or spaces of infinite dimensions. The Dirichlet form theory has numerous interactions with other areas of mathematics and sciences. This workshop brought together top experts in Dirichlet form theory and related fields as well as promising young researchers, with the common theme of developing new foundational methods and their applications to specific areas of probability. It provided a unique opportunity for the interaction between the established scholars and young researchers.

Participants

Albeverio, Sergio (Bonn), Alonso Ruiz, Patricia (Ulm), Beznea, Lucian (Bucharest), Bouleau, Nicolas (Paris), Chen, Zhen-Qing (Seattle), Cimpean, Iulian (Bucharest), Cipriani, Fabio (Milano), Denis, Laurent (Le Mans), Deuschel, Jean Dominique (Berlin), Eberle, Andreas (Bonn), Elworthy, David (Coventry), Fattler, Torben (Kaiserslautern), Freiberg, Uta (Stuttgart), Fukushima, Masatoshi (Osaka), Gong, Fuzhou (Beijing), Gordina, Masha (Storrs), Grigoryan, Alexander (Bielefeld), Grothaus, Martin (Kaiserslautern), Hino, Masanori (Osaka), Hinz, Michael (Bielefeld), Jacob, Niels (Swansea), Kajino, Naotaka (Kobe), Kassmann, Moritz (Bielefeld), Kawabi, Hiroshi (Okayama), Kigami, Jun (Kyoto), Kim, Panki (Seoul), Kondratiev, Yuri (Bielefeld), Kumagai, Takashi (Kyoto), Kuwae, Kazuhiro (Kumamoto), Ledoux, Michel (Toulouse), Lou, Shuwen (Chicago), Ma, Zhi-Ming (Beijing), Ouyang, Cheng (Chicago), Putan, Diana (Bielefeld), Röckner, Michael (Bielefeld), Schilling, René (Dresden), Shiozawa, Yuichi (Okayama), Song, Renming (Urbana), Stannat, Wilhelm (Berlin), Sturm, Karl-Theodor (Bonn), Sun, Wei (Montreal), Takeda, Masayoshi (Sendai), Tomisaki, Matsuyo (Nara), Trutnau, Gerald (Seoul), Uemura, Toshihiro (Osaka), von Renesse, Max (Leipzig), Vosshall, Robert (Kaiserslautern), Wang, Jian (Fuzhou), Winter, Anita (Essen), Zhang, Tusheng S. (Manchester), Zhu, Rongchan (Beijing), Zhu, Xiangchan (Beijing)

Workshop 1444

26.10. – 01.11.2014 **Valuation Theory and Its Applications**

Organizers: Zoe Chatzidakis, Paris
Franz-Viktor Kuhlmann, Saskatoon
Jochen Koenigsmann, Oxford
Florian Pop, Philadelphia

Abstract

In recent years, the applications of valuation theory in several areas of mathematics have expanded dramatically. In this workshop, we presented applications related to algebraic geometry, number theory and model theory, as well as advances in the core of valuation theory itself. Areas of particular interest were resolution of singularities and Galois theory.

Participants

Anscombe, William (Leeds), Astrand, Matti (Philadelphia), Bary-Soroker, Lior (Tel Aviv), Beyarslan, Özlem (Istanbul), Blaszczok, Anna (Katowice), Bogomolov, Fedor A. (New York), Chatzidakis, Zoe (Paris), Cluckers, Raf (Villeneuve d'Ascq), Cossart, Vincent (Versailles), Cutkosky, Steven Dale (Columbia), Delon, Francoise (Paris), Ducros, Antoine (Paris), Dupont, Katharina (Konstanz), Durhan, Salih (Mersin), Efrat, Ido (Beer Sheva), Fehm, Arno (Konstanz), Forey, Arthur (Paris), Geyer, Wulf-Dieter (Erlangen), Green, Barry William (Muizenberg), Halupczok, Immanuel (Leeds), Harbater, David (Philadelphia), Jahnke, Franziska (Münster), Jarden, Moshe (Tel Aviv), Kedlaya, Kiran S. (La Jolla), Koenigsmann, Jochen (Oxford), Kuhlmann, Franz-Viktor (Saskatoon), Kuhlmann, Katarzyna (Katowice), Loeser, Francois (Paris), Lütkebohmert, Werner (Ulm), MacIntyre, Angus John (London), Matusinski, Mickael (Talence), Moret-Bailly, Laurent (Rennes), Novacoski, Josnei (Toulouse), Obus, Andrew S. (Charlottesville), Point, Francoise (Paris), Pop, Florian (Philadelphia), Prestel, Alexander (Konstanz), Reguera, Ana J. (Valladolid), Scanlon, Thomas W. (Berkeley), Schoutens, Hans (Brooklyn), Silberstein, Aaron (Chicago), Spivakovsky, Mark (Toulouse), Stix, Jakob (Frankfurt), Strommen, Kristian (Oxford), Teissier, Bernard (Paris), Temkin, Michael (Jerusalem), Topaz, Adam (Berkeley), van den Dries, Lou (Urbana), van der Put, Marius (Groningen), Wewers, Stefan (Ulm), Wickelgren, Kirsten (Atlanta)

Workshop 1445a

02.11. – 08.11.2014 **Probability, Trees and Algorithms**

Organizers: Luc Devroye, Montreal
Ralph Neininger, Frankfurt

Abstract

The subject of this workshop were probabilistic aspects of algorithms for fundamental problems such as sorting, searching, selecting of and within data, random permutations, algorithms based on combinatorial trees or search trees, continuous limits of random trees and random graphs as well as random geometric graphs. The deeper understanding of the complexity of such algorithms and of shape characteristics of large discrete structures require probabilistic models and an asymptotic analysis of random discrete structures. The talks of this workshop focused on probabilistic, combinatorial and analytic techniques to study asymptotic properties of large random combinatorial structures.

Participants

Addario-Berry, Louigi (Montreal), Alsmeyer, Gerold (Münster), Ben-Hamou, Anna (Paris), Bertoin, Jean (Zürich), Bhamidi, Shankar (Chapel Hill), Bubeck, Sebastien (Princeton), Devroye, Luc (Montreal), Duquesne, Thomas (Paris), Fill, James Allen (Baltimore), Gittenberger, Bernhard (Wien), Gnedin, Alexander (London), Grübel, Rudolf (Hannover), Hwang, Hsien-Kuei (Taipei), Janson, Svante (Uppsala), Kabluchko, Zakhar (Ulm), Kortchemski, Igor (Zürich), Leckey, Kevin (Frankfurt am Main), Lugosi, Gabor (Barcelona), Mailler, Cecile (Bath), Marckert, Jean-Francois (Talence), Mitsche, Dieter (Nice), Müller, Noela (Frankfurt am Main), Müller, Tobias (Utrecht), Neininger, Ralph (Frankfurt am Main), Rösler, Uwe (Kiel), Rüschendorf, Ludger (Freiburg), Sulzbach, Henning (Le Chesnay)

Workshop 1446

09.11. – 15.11.2014 **Combinatorial Optimization**
Organizers: Gerard Cornuejols, Pittsburgh
Fritz Eisenbrand, Lausanne
Bruce Shepherd, Montreal

Abstract
Combinatorial Optimization is an area of mathematics that thrives from a continual influx of new questions and problems from practice. Attacking these problems has required the development and combination of ideas and techniques from different mathematical areas including graph theory, matroids and combinatorics, convex and nonlinear optimization, discrete and convex geometry, algebraic and topological methods. We continued a tradition of triannual Oberwolfach workshops, bringing together the best international researchers with younger talent to discover new connections with a particular emphasis on emerging breakthrough areas.

Participants
Balas, Egon (Pittsburgh), Bansal, Nikhil (Eindhoven), Basu, Amitabh (Baltimore), Chekuri, Chandra (Urbana), Conforti, Michele (Padova), Cook, William J. (Waterloo), Cornuejols, Gerard (Pittsburgh), Dey, Santanu S. (Atlanta), Eisenbrand, Friedrich (Lausanne), Fiorini, Samuel (Bruxelles), Frank, András (Budapest), Fujishige, Satoru (Kyoto), Goemans, Michel X. (Cambridge), Gritzmann, Peter (Garching bei München), Grötschel, Martin (Berlin), Guenin, Bertrand (Waterloo), Gupta, Anupam (Pittsburgh), Iwata, Satoru (Tokyo), Kaibel, Volker (Magdeburg), Kiraly, Tamas (Budapest), Koeppe, Matthias (Davis), Korte, Bernhard (Bonn), Lasserre, Jean Bernard (Toulouse), Laurent, Monique (Amsterdam), Lee, James R. (Seattle), Martin, Alexander (Erlangen), Möhring, Rolf H. (Berlin), Murota, Kazuo (Tokyo), Nemhauser, George L. (Atlanta), Olver, Neil (Amsterdam), Pap, Gyula (Budapest), Peis, Britta (Aachen), Pokutta, Sebastian (Atlanta), Rendl, Franz (Klagenfurt), Rothvoss, Thomas (Seattle), Sanità, Laura (Waterloo), Schrijver, Alexander (Amsterdam), Sebö, Andras (Grenoble), Shepherd, Bruce (Montreal), Singh, Mohit (Redmond), Skutella, Martin (Berlin), Stehlé, Damien (Lyon), Svensson, Ola Nils A. (Lausanne), Thomas, Rekha R. (Seattle), Vielma, Juan Pablo (Cambridge), Vygen, Jens (Bonn), Weismantel, Robert (Zürich), Wolsey, Laurence A. (Louvain-la-Neuve), Zenklusen, Rico (Zürich)

Workshop 1447

16.11. – 22.11.2014 **Mathematical Logic: Proof theory, Constructive Mathematics**

Organizers: Samuel R. Buss, La Jolla
Ulrich Kohlenbach, Darmstadt
Michael Rathjen, Leeds

Abstract

The workshop "Mathematical Logic: Proof Theory, Constructive Mathematics" was centered around proof-theoretic aspects of current mathematics, constructive mathematics and logical aspects of computational complexity. The workshop included two tutorials on univalent foundation and constructive mathematics, and on proof-theoretic methods in nonlinear analysis. In addition to these tutorials talks were given aiming to promote the interaction of proof theory and computability theory with core areas of mathematics as well as computer science via the use of proof interpretations, to further develop foundational aspects of proof theory and constructive mathematics, and to explore further the connections between logic and computational complexity.

Participants

Aczel, Peter (Manchester), Afshari, Bahareh (Wien), Arai, Toshiyasu (Chiba), Artemov, Sergei N. (New York), Aschieri, Federico (Lyon), Avigad, Jeremy (Pittsburgh), Baaz, Matthias (Wien), Bauer, Andrej (Ljubljana), Beckmann, Arnold (Swansea), Beklemishev, Lev D. (Moscow), Berardi, Stefano (Torino), Berger, Ulrich (Swansea), Brattka, Vasco (Neubiberg), Buchholtz, Ulrik Torben (Copenhagen), Buss, Samuel R. (La Jolla), Coquand, Thierry (Göteborg), Ferreira, Fernando (Lisboa), Garlik, Michal (Praha), Hyland, J. Martin E. (Cambridge), Iemhoff, Rosalie (Utrecht), Ishihara, Hajime (Ishikawa), Joosten, Joost (Barcelona), Kohlenbach, Ulrich (Darmstadt), Kolodziejczyk, Leszek (Warsaw), Kolokolova, Antonina (St. John's), Körnlein, Daniel (Darmstadt), Koutsoukou-Argyraki, Angeliki (Tokyo), Krajicek, Jan (Praha), Kreuzer, Alexander P. (Singapore), Leigh, Graham E. (Wien), Leustean, Laurentiu (Bucharest), Lombardi, Henri (Besancon), Martin-Löf, Per (Stockholm), Müller, Sebastian (Tokyo), Oliva, Paulo (London), Petrakis, Iosif (München), Powell, Thomas (Innsbruck), Pudlak, Pavel (Praha), Rathjen, Michael (Leeds), Schuster, Peter (Leeds), Schwichtenberg, Helmut (München), Seisenberger, Monika (Swansea), Strahm, Thomas (Bern), Streicher, Thomas (Darmstadt), Swan, Andrew (Leeds), Thapen, Neil (Praha), Towsner, Henry (Philadelphia), van den Berg, Benno (Amsterdam), Visser, Albert (Utrecht), Weiermann, Andreas (Gent)

Workshop 1450

07.12. – 13.12.2014 **Mathematics in Undergraduate Study Programs: Challenges for Research and for the Dialogue between Mathematics and Didactics of Mathematics**

Organizers: Rolf Biehler, Paderborn
Reinhard Hochmuth, Hannover
Celia Hoyles, London
Patrick W. Thompson, Tempe

Abstract
The topic of undergraduate mathematics is of considerable concern for mathematicians in universities, for those teaching mathematics as part of undergraduate studies other than mathematics, for employers seeking to employ a mathematically skilled workforce, and for teacher education. Different countries make massive efforts to improve the quality of mathematics education across all age ranges, with most of the research undertaken at the school level. A growing number of mathematicians and mathematics educators now see the need for interdisciplinary research and reflections around issues at the tertiary level. The conference aimed to share research results and experiences as a background to establishing a scientific community of mathematicians and mathematics educators.

Participants
Abramovich, Sergei (Potsdam), Arrowsmith, David (London), Bergsten, Christer (Linköping), Biehler, Rolf (Paderborn), Blum, Werner (Kassel), Borromeo Ferri, Rita (Kassel), Carlson, Marilyn (Tempe), Danckwerts, Rainer (Siegen), Deiser, Oliver (München), Dietz, Hans-Michael (Paderborn), Dreyfus, Tommy (Tel Aviv), Durand-Guerrier, Viviane (Montpellier), Feudel, Frank (Paderborn), Göller, Robin (Kassel), Goodchild, Simon (Kristiansand), Gueudet, Ghislaine (Rennes), Harel, Guershon (La Jolla), Harel, Sara-Jane (Evgenia) (San Diego), Hefendehl-Hebeker, Lisa (Essen), Herrmann, Angela (Essen), Hilgert, Joachim (Paderborn), Hochmuth, Reinhard (Hannover), Hoppenbrock, Axel (Paderborn), Hoyles, Celia (London), Hughes Hallett, Deborah (Tucson), Jablonka, Eva (London), Jaworski, Barbara (Loughborough), Kempen, Leander (Paderborn), Koepf, Wolfram (Kassel), Kramer, Jürg (Berlin), Lawson, Duncan (Birmingham), Liebendörfer, Michael (Lüneburg), McCallum, William G. (Tucson), Nardi, Elena (Norwich), Noss, Richard (London), Oehrtman, Michael (Stillwater), Prediger, Susanne (Dortmund), Rasmussen, Chris (San Diego), Richter-Gebert, Jürgen (Garching), Roegner, Katherine (Berlin), Roh, Kyeong Hah (Tempe), Rösken-Winter, Bettina (Bochum), Rück, Hans-Georg (Kassel), Sangwin, Christopher J. (Leicestershire), Schreiber, Stephan (Lüneburg), Specovius-Neugebauer, Maria (Kassel), Thompson, Patrick W. (Tempe), Törner, Günter (Duisburg), Voßkamp, Rainer (Kassel), Wagner, Joseph F. (Cincinnati), Weber, Eric (Corvallis), Winslow, Carl (Copenhagen), Zazkis, Rina (Burnaby)

Workshop 1451

14.12. – 20.12.2014 **Variational Methods for Evolution**

Organizers: Luigi Ambrosio, Pisa
Alexander Mielke, Berlin
Mark Peletier, Eindhoven
Giuseppe Savare, Pavia

Abstract

The workshop brought together researchers from geometry, nonlinear functional analysis, calculus of variations, partial differential equations, and stochastics around a common topic: systems whose evolution is driven by variational principles such as gradient or Hamiltonian systems. The talks covered a wide range of topics, including variational tools such as incremental minimization approximations, Gamma convergence, and optimal transport, reaction-diffusion systems, singular perturbation and homogenization, rate-independent models for visco-plasticity and fracture, Hamiltonian and hyperbolic systems, stochastic models and new gradient structures for Markov processes or variational large-deviation principles.

Participants

Ambrosio, Luigi (Pisa), Bellettini, Giovanni (Roma), Bonaschi, Giovanni (Eindhoven), Braides, Andrea (Roma), Brenier, Yann (Palaiseau), Carrillo de la Plata, Jose Antonio (London), Dal Maso, Gianni (Trieste), Disser, Karoline (Berlin), Erbar, Matthias (Bonn), Fathi, Max (Paris), Feng, Jin (Lawrence), Fischer, Julian (Leipzig), Francfort, Gilles (Brooklyn), Giacomin, Giambattista (Paris), Herrmann, Michael (Münster), Jüngel, Ansgar (Wien), Léonard, Christian (Nanterre), Luckhaus, Stephan (Leipzig), Maas, Jan (Bonn), Magni, Annibale (Münster), Matthes, Daniel (Garching bei München), Mielke, Alexander (Berlin), Minotti, Luca (Pavia), Mora, Maria Giovanna (Pavia), Niethammer, Barbara (Bonn), Novaga, Matteo (Pisa), Orrieri, Carlo (Pavia), Peletier, Mark A. (Eindhoven), Renger, Michiel (Berlin), Rossi, Riccarda (Brescia), Rotundo, Nella (Berlin), Roubicek, Tomas (Praha), Savare, Giuseppe (Pavia), Scardia, Lucia (Bath), Schlichting, André (Bonn), Schweizer, Ben (Dortmund), Segatti, Antonio (Pavia), Sharma, Upanshu (Eindhoven), Slepcev, Dejan (Pittsburgh), Stefanelli, Ulisse (Wien), Thomas, Marita (Berlin), Trevisan, Dario (Pisa), van Meurs, Patrick J.P. (Eindhoven), von Renesse, Max (Leipzig), Weber, Hendrik (Coventry), Westdickenberg, Michael (Aachen), Zaal, Martijn (Bonn), Zimmer, Johannes (Bath)

2.4. Simons Visiting Professors

Sumio Yamada, Tokyo
Workshop 1407: New Trends in Teichmüller Theory and Mapping Class Groups
Host: Athanase Papadopoulos, Strasbourg

Hugh Thomas, Fredericton
Workshop 1408: Representation Theory of Quivers and Finite Dimensional Algebras
Host: Henning Krause, Bielefeld

William Helton, La Jolla
Workshop 1415: Real Algebraic Geometry With A View Toward Systems Control and Free Positivity
Host: Markus Schweighofer, Konstanz

Bruce Reznick, Urbana
Workshop 1415: Real Algebraic Geometry With A View Toward Systems Control and Free Positivity
Host: Salma Kuhlmann, Konstanz

Brett D. Wick, Atlanta
Workshop 1417: Hilbert Modules and Complex Geometry
Host: Jörg Eschmeier, Saarbrücken

Stephen S. Kudla, Toronto
Workshop 1418: Modular Forms
Host: Jan Hendrik Bruinier, Darmstadt

Ragnar-Olaf Buchweitz, Toronto
Workshop 1421: Interactions between Algebraic Geometry and Noncommutative Algebra
Host: Henning Krause, Bielefeld

Thomas A. Nevins, Urbana
Workshop 1421: Interactions between Algebraic Geometry and Noncommutative Algebra
Host: Kevin R. McGerty, Oxford

Ana Patrícia Carvalho Goncalves, Rio de Janeiro
Workshop 1423: Stochastic Analysis: Around the KPZ Universality Class
Host: Cédric Bernardin, Nice

Konstantin M. Khanin, Toronto
Workshop 1423: Stochastic Analysis: Around the KPZ Universality Class
Host: Herbert Spohn, München

Davar Khoshnevisan, Salt Lake City
Workshop 1423: Stochastic Analysis: Around the KPZ Universality Class
Host: René Schilling, Dresden

Anton Petrunin, University Park
Workshop 1425: Geometrie
Host: Alexander Lytchak, Köln

Igor Dolgachev, Ann Arbor
Workshop 1427: Classical Algebraic Geometry
Host: Christian Liedtke, München

Henri René Darmon, Montreal
Workshop 1428: Algebraische Zahlentheorie
Host 1: Otmar Venjakob, Heidelberg
Host 2: Massimo Bertolini, Essen

Francesco Maggi, Austin
Workshop 1429: Calculus of Variations
Host: Camillo De Lellis, Zürich

James McKernan, Cambridge MA
Workshop 1435: Komplexe Analysis
Host: Stefan Kebekus, Freiburg

Yum-Tong Siu, Cambridge MA
Workshop 1435: Komplexe Analysis
Host: Stefan Kebekus, Freiburg

Craig Westerland, Minneapolis
Workshop 1438: Topologie
Host: Nathalie Wahl, Copenhagen

Todd Arbogast, Austin
Workshop 1439: Reactive Flows in Deformable, Complex Media
Host 1: Barbara Wohlmuth, München
Host 2: Jan Martin Nordbotten, Bergen
Host 3: Iuliu Sorin Pop, Eindhoven

Zhi-Ming Ma, Beijing
Workshop 1443: Dirichlet Form Theory and its Applications
Host: Michael Röckner, Bielefeld

Kiran S. Kedlaya, La Jolla
Workshop 1444: Valuation Theory and Its Applications
Host 1: Andrea Pulita, Montpellier
Host 2: Philippe Gabriel Michel, Lausanne
Host 3: Gabriel Paternain, Cambridge UK

Hsien-Kuei Hwang, Taipei
Workshop 1445a: Probability, Trees and Algorithms
Host: Ralph Neininger, Frankfurt

Chris Rasmussen, San Diego
Workshop 1450: Mathematics in Undergraduate Study Programs: Challenges for Research and for the Dialogue between Mathematics and Didactics of Mathematics
Host: Reinhard Hochmuth, Hannover


S. Yamada


H. Thomas


W. Helton


R.-O. Buchweitz


B. Reznick


T. A. Nevins


B. D. Wick


A. P. Carvalho Goncalves


S. S. Kudla

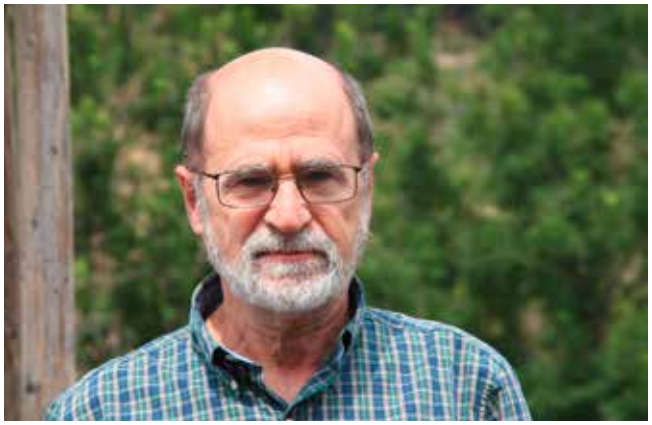

K. M. Khanin

D. Khoshnevisan

F. Maggi

A. Petrunin

J. McKernan



I. Dolgachev

Y.-T. Siu

H. R. Darmon

C. Westerland

T. Arbogast

H.-K. Hwang

Z.-M. Ma

C. Rasmussen

K. S. Kedlaya

2.5. Miniworkshops

Miniworkshop 1409a

23.02. – 01.03.2014 **Kähler Groups**
Organizers: Dieter Kotschick, München
Domingo Toledo, Salt Lake City

Abstract
The workshop brought together 16 participants from Europe, the United States and India, all of whom are actively working in the subject, approaching it from different directions: some from complex algebraic geometry, and others from geometric group theory, or from differential geometry and analysis. We reviewed recent advances in the study of fundamental groups of compact Kähler manifolds, involving an interesting mix of complex geometry, harmonic maps and non-Abelian Hodge theory, and geometric group theory. There were also extensive discussions of open problems in the area.

Participants
Brunebarbe, Yohan (Bonn), Daniel, Jeremy (Paris), Delzant, Thomas C. (Strasbourg), Dimca, Alexandru (Nice), Eyssidieux, Philippe (Saint-Martin-d'Heres), Kapovich, Misha (Davis), Klingler, Bruno (Paris), Kotschick, Dieter (München), Koziarz, Vincent (Talence), Maubon, Julien (Vandoeuvre-les-Nancy), Mitra, Mahan (Dt. Howrah), Panov, Dmitri (London), Py, Pierre (Strasbourg), Schnell, Christian (Bonn), Toledo, Domingo (Salt Lake City), Wang, Botong (Notre Dame)

Miniworkshop 1409b

23.02. – 01.03.2014 **Negative Curves on Algebraic Surfaces**

Organizers: Sandra Di Rocco, Stockholm
Alex Küronya, Budapest
Stefan Müller-Stach, Mainz
Tomasz Szemberg, Krakow

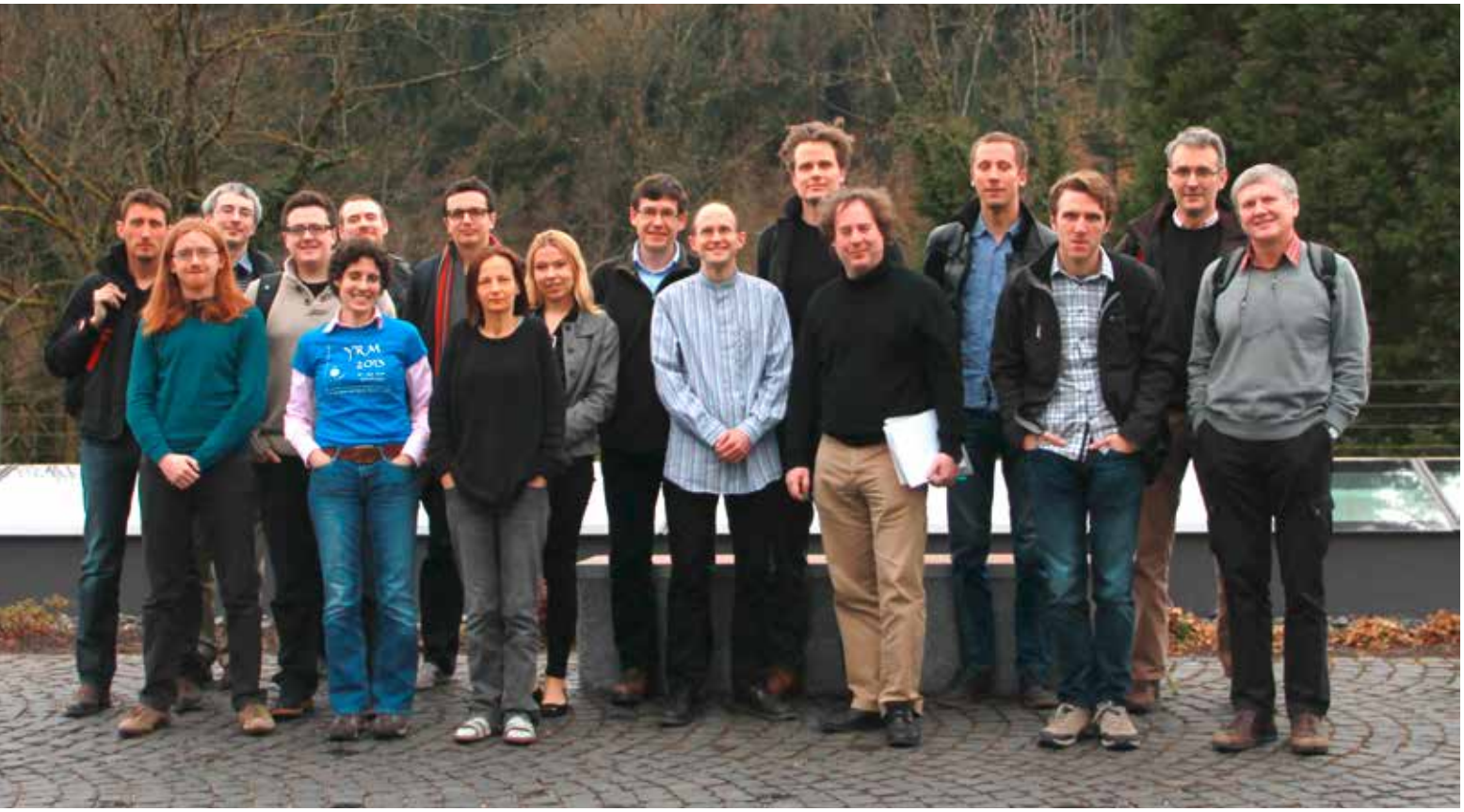
Abstract

Negative curves play a prominent role in the geometry of projective surfaces. They occur naturally as the irreducible components of exceptional loci of resolutions of surface singularities, at the same time, they are closely related to the geometry of the effective cone, and thus form an important building block of the Minimal Model Program. In the case of surfaces, classes of negative curves span extremal rays of the Mori cone. Any knowledge about them on a given surface reveals important information on linear series as well.

Participants

Bauer, Thomas (Marburg), Di Rocco, Sandra (Stockholm), Harbourne, Brian (Lincoln), Hörmann, Fritz (Freiburg), Huizenga, Jack (Chicago), Knutsen, Andreas Leopold (Bergen), Küronya, Alex (Budapest), Lesieutre, John (Cambridge), Lundman, Anders (Stockholm), Maclean, Catriona (Saint-Martin-d'Heres), Möller, Martin (Frankfurt), Müller-Stach, Stefan (Mainz), Ottem, John Christian (Cambridge), Pokora, Piotr (Krakow), Reschke, Paul (Ann Arbor), Samol, Sonia (Mainz), Szemberg, Tomasz (Krakow)

Miniworkshop 1409c



23.02. – 01.03.2014 **Batalin-Vilkovisky Algebras, Operads, and Hopf Algebroids**

Organizers: Vladimir Dotsenko, Dublin
Ulrich Krähmer, Glasgow

Abstract

A lot of research in homological algebra comes in one of two flavours: some subjects of study have their origins in algebraic topology the others in algebra and algebraic geometry. The two are strongly interacting, and problems and solutions have often found their way from one community into the other. Batalin-Vilkovisky algebras have cropped up recently in various places in both algebra and algebraic topology. Thus, we have decided to make these the central topic of the workshop. The two other topics of the workshop are promising directions for interaction, topics in which the two communities can learn from one another. The workshop brought together 17 researchers whose work involves Batalin–Vilkovisky algebras, operads, and related structures such as Gerstenhaber algebras and cyclic homology. It featured introductory lectures on some relevant topics followed by talks about recent research results.

Participants

Böhm, Gabriella (Budapest), Brzezinski, Tomasz (Swansea), Dotsenko, Vladimir (Dublin), Griffin, James (Glasgow), Kaufmann, Ralph (West Lafayette), Kowalzig, Niels (Roma), Krähmer, Ulrich (Glasgow), Le Grignou, Brice (Nice), Menichi, Luc (Angers), Merkulov, Sergei (Luxembourg), Oancea, Alexandru (Paris), Rejzner, Katarzyna (Heslington, York), Rovi, Ana (Glasgow), Slevin, Paul (Glasgow), Vallette, Bruno (Nice), Ward, Benjamin (Stony Brook), Young, Justin (Lausanne)

Miniworkshop 1416a

13.04. – 19.04.2014 **Mathematical Physics meets Sparse Recovery**

Organizers: David Gross, Freiburg
Felix Krahmer, Göttingen
Rachel Ward, Austin
Andreas Winter, Bellaterra

Abstract

In recent years, there have been several fruitful interchanges of methods between the fields of sparse and low-rank recovery on the one hand and quantum information theory on the other hand. One way to understand this seemingly surprising coincidence is that the analysis of vectorand matrix-valued randomized constructions plays an important role in both fields. An example is the realization that certain matrix-valued large deviation bounds can be employed to substantially simplify and generalize the analysis of low-rank matrix recovery schemes. In this workshop, the participants worked to identify and collaborate on further mathematical problems that are being researched in parallel by the two communities.

Participants

Bandeira, Afonso S. (Princeton), Cevher, Volkan (Lausanne), Groß, David (Freiburg), Guta, Madalin (Nottingham), Junge, Marius (Urbana), Krahmer, Felix (Göttingen), Küng, Richard (Freiburg), Liu, Yi-Kai (Gaithersburg), Mixon, Dustin (Wright), Pfander, Götz (Bremen), Rauhut, Holger (Aachen), Saab, Rayan (La Jolla), Stojanac, Zeljka (Aachen), Tropp, Joel A. (Pasadena), Ward, Rachel (Austin), Winter, Andreas (Bellaterra), Wolf, Michael M. (Garching)

Miniworkshop 1416b

13.04. – 19.04.2014 **Mathematical Models for Cancer Cell Migration**

Organizers: Andreas Deutsch, Dresden
Thomas Hillen, Edmonton
Christina Surulescu, Kaiserslautern
Michael Winkler, Paderborn

Abstract

Tumour cell invasion is an essential hallmark in the progression of malignant cancer. Thereby, cancer cells migrate through the surrounding tissue towards blood or lymph vessels which they penetrate and thus access the blood flow. They are carried by blood circulation to distant locations where they extravasate and develop new tumours. The invasive spread of cancer cells is highly complex. Mathematical models offer a powerful tool to gain insight into the complicated biological processess connected to tumour invasion and have also stimulated advanced mathematical research. In this meeting we covered the full spectrum between macroscopic PDE models and microscopic individual based models with the common goal of modelling cancer cell migration. Of particular interest was the derivation of macroscopic properties from microscopic details. Similar multiscale models have been used in other contexts (such as chemotaxis for example), and we gained some significant insight from the collaborations in this workshop. In this one week meeting we posted nine open ended problems, which will form the seed for new collaborations going far beyond this workshop.

Participants

Bellomo, Nicola (Torino), Deutsch, Andreas (Dresden), Eftimie, Raluca (Dundee), Engwer, Christian (Münster), Hatzikirou, Haralampos (Dresden), Hillen, Thomas (Edmonton), Hiremath, Sandesh (Kaiserslautern), Laurencot, Philippe (Toulouse), Preziosi, Luigi (Torino), Stinner, Christian (Kaiserslautern), Surulescu, Christina (Kaiserslautern), Swan, Amanda (Edmonton), Tao, Youshan (Shanghai), Tello del Castillo, Jose Ignacio (Madrid), Voss-Boehme, Anja (Dresden), Winkler, Michael (Paderborn), Wolf, Katarina (Nijmegen)

Miniworkshop 1416c

13.04. – 19.04.2014 **Infinite Dimensional Hopf Algebras**

Organizers:
Ken Brown, Glasgow
Ken Goodearl, Santa Barbara
Tom Lenagan, Edinburgh
James Zhang, Washington

Abstract

The workshop was well attended with 17 participants with broad geographic rep-resentation from four continents. This workshop was a nice blend of researchers with various backgrounds. In particular, three related but somewhat independent programmes of work on the algebraic structure of infinite dimensional Hopf algebras satisfying some finiteness conditions were well represented. These programmes are all experiencing vigourous activity in the present century. One is aimed at developing general structure theory for noetherian Hopf algebras; a second is concerned with the classification of pointed Hopf algebras; while the third looks to describe Hopf algebras of small growth and/or small coradical. The workshop brought together leading figures from all these programmes. Progress in the different directions was reviewed, connections and areas of overlap were identified, and joint plans for future research were developed.

Participants

Andruskiewitsch, Nicolás (Cordoba), Angiono, Iván (Cordoba), Brown, Ken A. (Glasgow), Goodearl, Kenneth R. (Santa Barbara), Heckenberger, Istvan (Marburg), Kirkman, Ellen E. (Winston-Salem), Kolb, Stefan (Newcastle upon Tyne), Launois, Stéphane (Canterbury), Lenagan, Thomas H. (Edinburgh), Lentner, Simon David (Hamburg), Lu, Diming (Hangzhou), Masuoka, Akira (Tsukuba), Montgomery, Susan (Los Angeles), Skryabin, Sergej (Kazan), Walton, Chelsea (Cambridge), Wu, Quan-Shui (Shanghai), Zhang, James (Seattle)

Miniworkshop 1440a

28.09. – 04.10.2014 **Asymptotic Statistics on Stratified Spaces**

Organizers: Aasa Feragen, Tübingen
Stephan Huckemann, Göttingen
Steve Marron, Chapel Hill
Ezra Miller, Durham

Abstract

Statistical analysis of non-Euclidean data such as data on manifolds is an active and established topic of research, for instance, in the statistical analysis of shape. However, many types of data naturally reside in metric spaces which are not smooth manifolds as a whole, rather they are unions of manifold strata of varying dimensions. These spaces form a key general family of geometric spaces for data analysis. Statistics in stratified spaces has recently found great interest in applications and mathematical theory building. While the fundamental theory is still in its beginnings, as a centerpiece the derivation and investigation of statistics and their asymptotics has materialized. Only a few basic results are known, but it is clear that the geometric constraints imposed by stratified spaces lead to unexpected asymptotic behavior of standard statistical properties, such as "stickiness" of means. It was the scope of the workshop to better understand fundamental relations between asymptotic behavior of statistical descriptors and global as well as local geometric and topological structures.

Participants

Eltzner, Benjamin (Göttingen), Feragen, Aasa (Copenhagen), Hotz, Thomas (Ilmenau), Huckemann, Stephan (Göttingen), Joshi, Sarang (Salt Lake City), Jung, Sungkyu (Pittsburgh), Király, Franz J. (London), Le, Huiling (Nottingham), Marron, James Stephen (Chapel Hill), Michor, Peter W. (Wien), Miller, Ezra (Durham), Mio, Washington (Tallahassee), Nye, Tom (Newcastle upon Tyne), Owen, Megan (Bronx), Skwerer, Sean (New Haven), Sommer, Stefan (Copenhagen), Sommerfeld, Max (Göttingen)

Miniworkshop 1440b

28.09. – 04.10.2014 **Einstein Metrics, Ricci Solitons and Ricci Flow under Symmetry Assumptions**

Organizers: Christoph Böhm, Münster
Jorge Lauret, Cordoba
McKenzie Wang, Hamilton

Abstract

Symmetry reduction methods play an important role in the study of Einstein metrics, Ricci solitons and Ricci flow. The general aim of this miniworkshop was to gather researchers who have expertise in the construction of geometric examples and to survey and discuss the singularity properties of homogeneous Ricci flows and the existence question for Ricci solitons, in light of the known rigidity results and general properties. Particular topics focused on were the Alekseevskii conjecture for noncompact homogeneous Einstein spaces, the homogeneous Ricci flow and shrinking solitons.

Participants

Böhm, Christoph (Münster), Cortés, Vicente (Hamburg), Dancer, Andrew (Oxford), Gordon, Carolyn (Hanover), Heber, Jens (Kiel), Jablonski, Michael (Norman), Jentsch, Tillmann (Stuttgart), Kerr, Megan M. (Wellesley), Lafuente, Ramiro (Cordoba), Lauret, Jorge (Cordoba), Nikolayevsky, Yuri (Melbourne), Nikonorov, Yury (Vladikavkaz), Payne, Tracy (Pocatello), Sakane, Yusuke (Osaka), Will, Cynthia (Cordoba), Woolgar, Eric (Edmonton, Alberta), Wylie, William C. (Syracuse)

Miniworkshop 1440c

28.09. – 04.10.2014 **Differentiable Ergodic Theory, Dimension Theory and Stable Foliations**

Organizers: Eugen Mihailescu, Bucharest
Bernd Stratmann, Bremen

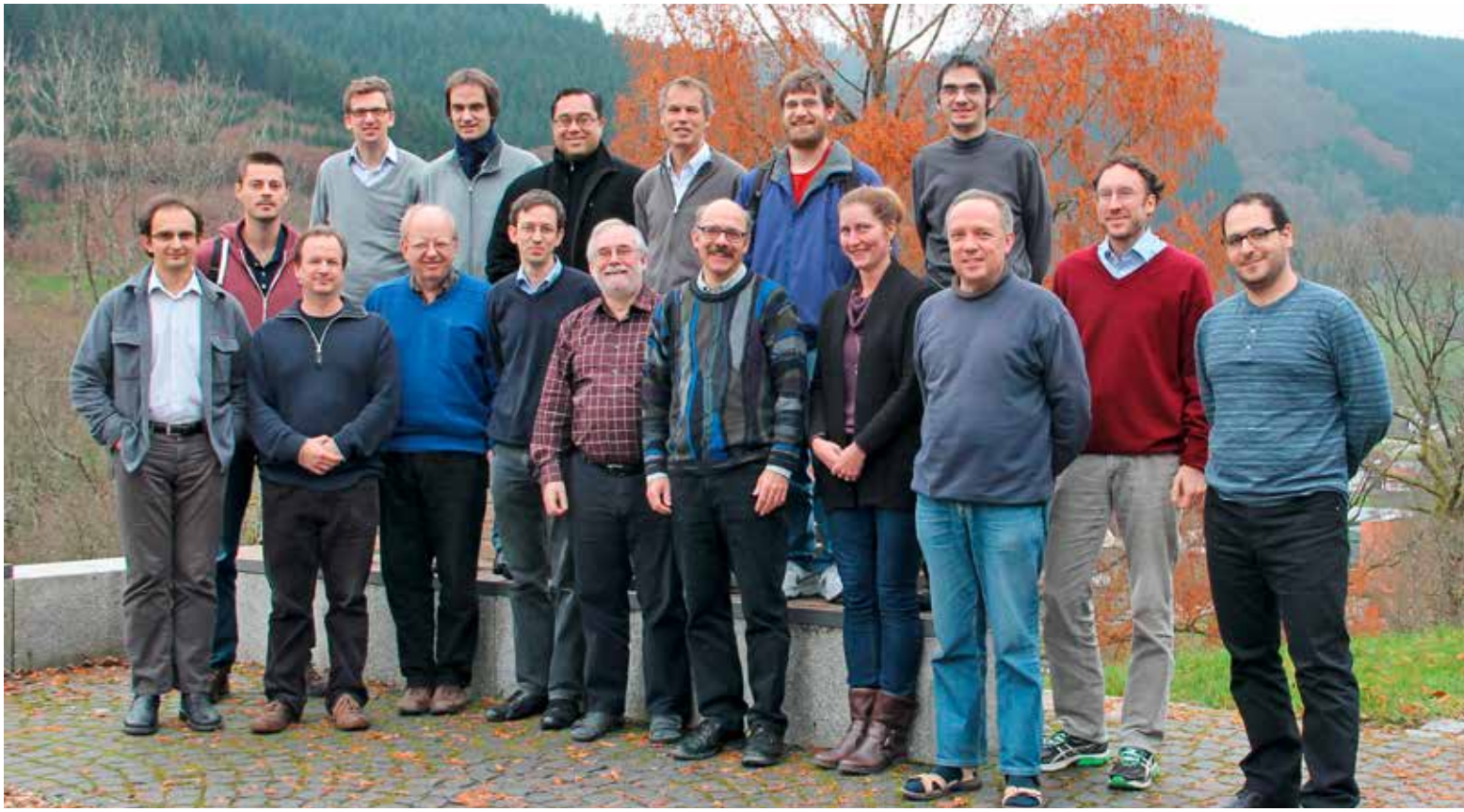
Abstract

The mini-workshop Differentiable Ergodic Theory, Dimension Theory and Stable Foliations brought together experts in thermodynamical formalism, hyperbolic dynamics and dimension theory from several countries. The geographic representation was broad, from Europe, USA and Japan. All participants gave interesting 1-hour talks, and there was organized also an open problem session, where directions for future work and many open problems were discussed. Among the topics presented/discussed in the workshop, there were ones related to dimension theory and probability measures on fractals, various types of hyperbolicity, systems with overlaps, complex dynamics and iterated function systems.

Participants

Barany, Balazs (Coventry), Coudène, Yves (Brest), Gröger, Maik (Bremen), Jaerisch, Johannes (Osaka), Keßeböhmer, Marc (Bremen), Mayer, Volker (Villeneuve d'Ascq), Mihailescu, Eugen (Bucharest), Persson, Tomas (Lund), Saussol, Benoit (Brest), Schmeling, Jörg (Lund), Soos, Anna (Cluj Napoca), Urbanski, Mariusz (Denton), Zdunik, Anna (Warszawa), Zielicz, Anna (Bremen)

Miniworkshop 1449a



30.11. – 06.12.2014 **Dynamical versus Diffraction Spectra in the Theory of Quasicrystals**

Organizers: Michael Baake, Bielefeld
David Damanik, Houston
Uwe Grimm, Milton Keynes

Abstract

The dynamical (or von Neumann) spectrum of a dynamical system and the diffraction spectrum of the corresponding measure dynamical system are intimately related. While their equivalence in the case of pure point spectra is well understood, this workshop aimed at an appropriate extension to systems with mixed spectra, building on recent developments for systems of finite local complexity and for certain random systems from the theory of point processes. Another focus was the question for connections between Schrödinger and dynamical spectra.

Participants

Baake, Michael (Bielefeld), Clark, Alexander (Leicester), Damanik, David (Houston), Fernique, Thomas (Villetaneuse), Fillman, Jake (Houston), Frank, Natalie P. (Poughkeepsie), Gähler, Franz (Bielefeld), Gorodetski, Anton (Irvine), Grimm, Uwe (Milton Keynes), Huck, Christian (Bielefeld), Kellendonk, Johannes (Villeurbanne), Kösters, Holger (München), Lenz, Daniel (Jena), Richard, Christoph (Erlangen), Strungaru, Nicolae (Edmonton), van Enter, Aernout C.D. (AK Groningen), Yessen, William N. (Houston)

Miniworkshop 1449b

30.11. – 06.12.2014 **Eigenvalue Problems in Surface Superconductivity**

Organizers: Virginie Bonnaillie-Noel, Paris
Hynek Kovarik, Brescia
Konstantin Pankrashkin, Orsay

Abstract

The aim of the meeting was to discuss several classes of Schrödinger equations appearing within the Ginzburg-Landau theory of superconductivity. The related problems are discussed from several perspectives including semiclassical analysis, PDE in non-smooth domains, geometric spectral theory and operator theory, which should provide a new insight into various phenomena appearing in superconducting systems.

Participants

Bonnaillie-Noel, Virginie (Paris), Correggi, Michele (Roma), Daners, Daniel (Sydney), Dauge, Monique (Rennes), Fournais, Soren (Aarhus), Freitas, Pedro (Lisboa), Helffer, Bernard (Orsay), Kennedy, James (Stuttgart), Kovarik, Hynek (Brescia), Krejcirik, David (Rez (near Prague)), Lotoreichik, Vladimir Y. (Graz), Pankrashkin, Konstantin (Orsay), Popoff, Nicolas (Marseille), Portmann, Fabian (Copenhagen), Raymond, Nicolas (Rennes), Ruszkowski, Bartosch (Stuttgart)

Miniworkshop 1449c

30.11. – 06.12.2014 **Reflection Positivity in Representation Theory, Stochastics and Physics**

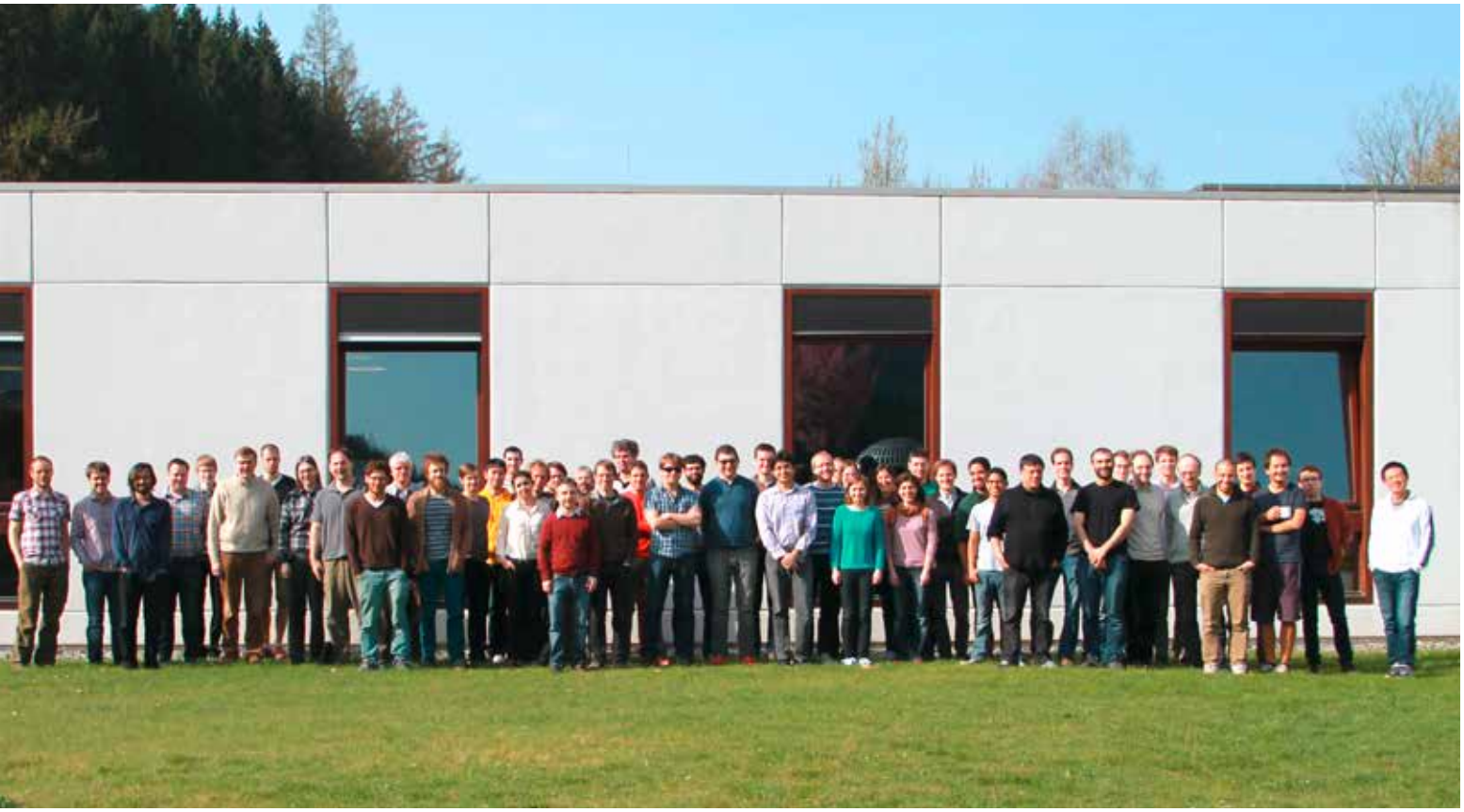
Organizers: Karl-Hermann Neeb, Erlangen
Gestur Olafsson, Baton Rouge
Palle Jorgensen, Iowa City

Abstract
This workshop was organized around the concept of reflection positivity, a central theme at the crossroads of the theory of representations of Lie groups, harmonic analysis, stochastic processes, and constructive quantum field theory. It employs tools and ideas from different branches of mathematics. The workshop consisted of seventeen scientific presentations and four problem sessions focused around nineteen problems from mathematics and physics. The program was intrinsically interdisciplinary and included talks covering different aspects of reflection positivity.

Participants
Alldridge, Alexander (Köln), Gordina, Masha (Storrs), Jaffe, Arthur (Cambridge), Janssens, Bas (Utrecht), Jorgensen, Palle E. T. (Iowa City), Lechner, Gandalf (Leipzig), Moellers, Jan (Columbus), Mourao, Jose (Erlangen), Neeb, Karl-Hermann (Erlangen), Olafsson, Gestur (Baton Rouge), Osterwalder, Konrad (Zürich), Wiedenmann, Stefan (Erlangen), Yngvason, Jakob (Wien), Zellner, Christoph (Erlangen)

2.6. Arbeitsgemeinschaften

Arbeitsgemeinschaft 1414



30.03. – 05.04.2014 **Superrigidity**

Organizers: Uri Bader, Haifa
Alex Furman, Chicago
Jesse Peterson, Nashville

Abstract

The purpose of the Arbeitsgemeinschaft was to review old and new phenomenas of rigidity in mathematics. Rigidity problems were studied since decades and are still very attractive and dynamical areas of research. Rigidity is an interdisciplinary area of mathematics which combines elements of ergodic theory, Lie groups, actions of groups, von Neumann algebras and others. To deal with such a variety of material to cover the talks were divided into sections. Usually in each section first we discussed an appropriate classical rigidity results followed by recent ones. When it was possible, the focus was put on particular examples which illustrated the general theorems.

Participants

Abert, Miklos (Budapest), Alekseev, Vadim (Göttingen), Ando, Hiroshi (Copenhagen), Björklund, Michael (Göteborg), Bouljihad, Mohamed (Lyon), Boutonnet, Remi (Lyon), Campagnolo, Caterina (Geneve), Cantrell, Michael (Chicago), Carderi, Alessandro (Lyon), De Chiffre, Marcus (Leipzig), de Laat, Tim (Leuven), De La Cruz Mengual, Carlos A. (Zürich), Deninger, Christopher (Münster), Deprez, Steven (Copenhagen), de Santiago, Rolando (Iowa City), Duchesne, Bruno (Vandoeuvre-les-Nancy), Finkelshtein, Vladimir (Chicago), Furman, Alex (Chicago), Gaboriau, Damien (Lyon), Galatan, Alin (Los Angeles), Hoff, Daniel (La Jolla), Hurtado, Sebastian (Berkeley), Kammeyer, Holger (Bonn), Klopsch, Benjamin (Düsseldorf), Lécureux, Jean (Orsay), Lederle, Waltraud (Zürich), Le Maitre, Francois (Lyon), Lodha, Yash (Ithaca), Marcinkowski, Michal (Wroclaw), Masbaum, Gregor (Paris), Meesschaert, Niels (Leuven), Olivier, Baptiste (Haifa), Parekh, Sandeepan (Nashville), Petersen, Henrik Densing (Lausanne), Pieters, Hester (Genève 4), Pogorzelski, Felix (Jena), Pooya, Sanaz (Mashhad, Khorasan, Razavi), Pozzetti, Maria Beatrice (Zürich), Przytycki, Piotr (Warszawa), Puschnigg, Michael (Marseille), Raum, Sven (Lyon), Sabok, Marcin (Warszawa), Sauer, Roman (Karlsruhe), Schlicht, Peter (Lausanne), Stulemeijer, Thierry (Louvain-la-Neuve), Thom, Andreas B. (Leipzig), Tornier, Stephan (Zürich), Verraedt, Peter (Leuven), Wen, Chenxu (Nashville), Winkelmann, Jörg (Bochum)

Arbeitsgemeinschaft 1441

05.10. – 10.10.2014 **Totally Disconnected Groups**

Organizers: Pierre-Emmanuel Caprace, Louvain-la-Neuve
Nicolas Monod, Lausanne

Abstract

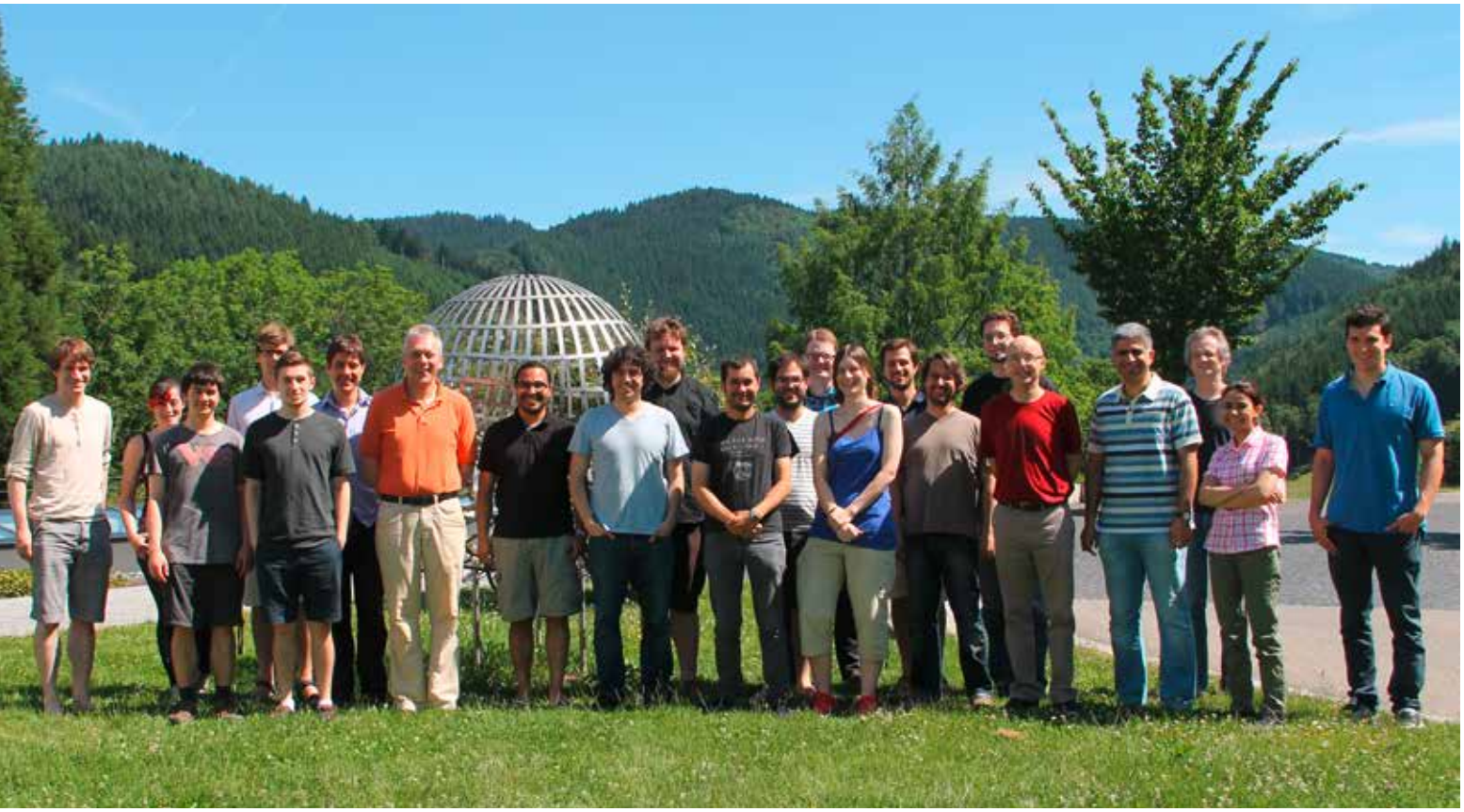
Locally compact groups are ubiquitous in the study of many continuous or discrete structures across geometry, analysis and algebra. Every locally compact group is an extension of a connected group by a totally disconnected group. The connected case has been studied in depth, notably using Lie theory, a culminating point being reached in the 1950s with the solution to Hilbert's 5th problem. The totally disconnected case, by contrast, remains full of challenging questions. A series of new results has been obtained in the last twenty years, and today the activity in this area is witnessing a sharp increase. These texts report on the recent Arbeitsgemeinschaft on this topic.

Participants

Bartholdi, Laurent (Göttingen), Baumgartner, Udo (Rheinfelden), Brehm, Albrecht (Rostock), Burger, Marc (Zürich), Caprace, Pierre-Emmanuel (Louvain-la-Neuve), Castellano, Ilaria (Bari), Cesa, Morgan (Salt Lake City), Cohen, Michael (Fargo), Costa da Silva, Ana Filipa (Gent), Coulon, Remi (Rennes), De Chiffre, Marcus (Leipzig), de Cornulier, Yves (Orsay), Duchesne, Bruno (Vandoeuvre-les-Nancy), Dumont, Thibaut (Lausanne), Faltings, Gerd (Bonn), Furman, Alex (Chicago), Gal, Swiatoslaw R. (Wroclaw), Garncarek, Lukasz (Warszawa), Garrido, Alejandra (Oxford), Gelander, Tsachik (Rehovot), Gheysens, Maxime (Lausanne), Gismatullin, Jakub (Wroclaw), Glasner, Yair (Beer Sheva), Goffer, Gil (Haifa), Grüninger, Matthias (Würzburg), Gulko, Dennis (Beer Sheva), Hume, David (Louvain-La-Neuve), Klopsch, Benjamin (Düsseldorf), Kramer, Linus (Münster), Lazarovich, Nir (Haifa), Le Boudec, Adrien (Orsay), Lederle, Waltraud (Zürich), Le Maitre, Francois (Louvain-La-Neuve), Marquis, Timothee (Erlangen), Marton Toth, Laszlo (Budapest), McCallum, Rupert (Münster), Mellick, Samuel (Budapest), Monod, Nicolas (Lausanne), Mozes, Shahar (Jerusalem), Pillon, Thibault (Neuchatel), Radu, Nicolas (Louvain-La-Neuve), Reid, Colin (Callaghan), Rollin, Rafaela Maria (Karlsruhe), Sauer, Roman (Karlsruhe), Schlage-Puchta, Jan-Christoph (Rostock), Schlicht, Peter (Lausanne), Stulemeijer, Thierry (Louvain-la-Neuve), Szoke, Nora Gabriella (Lausanne), Tessera, Romain A. (Orsay), Thom, Andreas B. (Dresden), Tornier, Stephan (Zürich), Wesolek, Phillip (Louvain-La-Neuve), Willis, George A. (Callaghan), Wilson, John S. (Oxford)

2.7. Oberwolfach Seminare

Oberwolfach Seminar 1424a



08.06. – 14.06.2014 **Moduli Spaces of Riemannian Metrics**
Organizers: Wilderich Tuschmann, Karlsruhe
David J. Wraith, Maynooth

Abstract
The topics of this Seminar cut across a variety of geometric and topological areas, so participants will had exposure to a wide range of contemporary geometric and topological ideas, with moduli spaces of Riemannian metrics as the unifying theme. The material was organized into 'strands', with each strand focusing on a particular technique or family of techniques. The relevant topological and geometric background was developed as necessary. There were two main strands. (i) How analyzing the soul can lead to moduli space results for non-compact manifolds with non-negative sectional curvature. (ii) Moduli spaces of closed manifolds with positive Ricci or positive scalar curvature and the Kreck-Stolz s-invariant. In addition a third strand, namely an introduction to the work of Farrell and Ontaneda on moduli and Teichmüller spaces in negative and non-positive sectional curvature, was presented and developed as time permitted.

Participants
Armstrong, Gavin K. (Eugene), Berry, Emma (Co. Kildare), Bettiol, Renato (Notre Dame), Blatt, Simon (Karlsruhe), Galaz-Garcia, Fernando (Karlsruhe), Gimeno Garcia, Vicent (Castellon), González Alvaro, David (Madrid), Guijarro, Luis (Madrid), Herrmann, Martin (Karlsruhe), Kerin, Martin (Münster), Kudryashov, Alexei (Co. Kildare), Makrooni, Mohammad Adib (Galway), Mendes, Ricardo (Münster), Müller, Olaf (Regensburg), Radeschi, Marco (Münster), Röer, Malte (Karlsruhe), Siejakowski, Rafael M. (Singapore), Siffert, Anna (Bochum), Tuschmann, Wilderich (Karlsruhe), Wiemeler, Michael (Karlsruhe), Wraith, David J. (Co. Kildare), Zarei, Masoumeh (Karlsruhe)

Oberwolfach Seminar 1424b

08.06. – 14.06.2014 **Recent Methods in Sphere Packing and Optimization**

Organizers: Christine Bachoc, Bordeaux
Henry Cohn, Cambridge MA
Frank Vallentin, Köln

Abstract

In recent years, semidefinite relaxations have become increasingly important in discrete geometry, coding theory, and related geometric optimization problems. In the form of linear and semidefinite programming bounds, they encompass the best asymptotic bounds known for many of these problems, as well as the exact solution of a number of cases of special interest. In this seminar, we explored their implications for the classical sphere packing problem: how densely can congruent balls be placed into Euclidean space without overlap? Furthermore, we examined a number of related topics, such as error-correcting codes, more general packing problems, independence and chromatic numbers of graphs, ground states of physical systems, etc. What ties all these problems together is nontrivial semidefinite constraints on correlation functions, and we examined how to make use of these constraints.

Participants

Bachoc, Christine (Talence), Berg, Sören Lennart (Magdeburg), Braun, Oliver (Aachen), Cohn, Henry (Cambridge), DeCorte, Evan (Delft), de Courcy-Ireland, Matthew (Princeton), de Laat, David (Delft), Dostert, Maria (Köln), Dursthoff, David (Aachen), Eberhardt, Jens (Aachen), Friese, Erik (Rostock), Kallus, Yoav (Princeton), Kellner, Kai (Frankfurt), Krupp, Stefan (Köln), Kusner, Wöden (Pittsburgh), Pap, Julia (Budapest), Rolfes, Jan Hendrik (Köln), Schönnenbeck, Sebastian (Aachen), Siccha, Sergio (Aachen), Simanek, Brian (Nashville), Su, Yujian (Nashville), Vallentin, Frank (Köln), Vlasiuk, Oleksandr (Nashville), von Heymann, Frederik (Köln), Williams, Luke D. (Coventry)

Oberwolfach Seminar 1442a

12.10. – 18.10.2014 **K-Theory for Group C*-Algebras and Semigroup C*-Algebras**

Organizers: Joachim Cuntz, Münster
Siegfried Echterhoff, Münster
Xin Li, London
Guoliang Yu, College Station

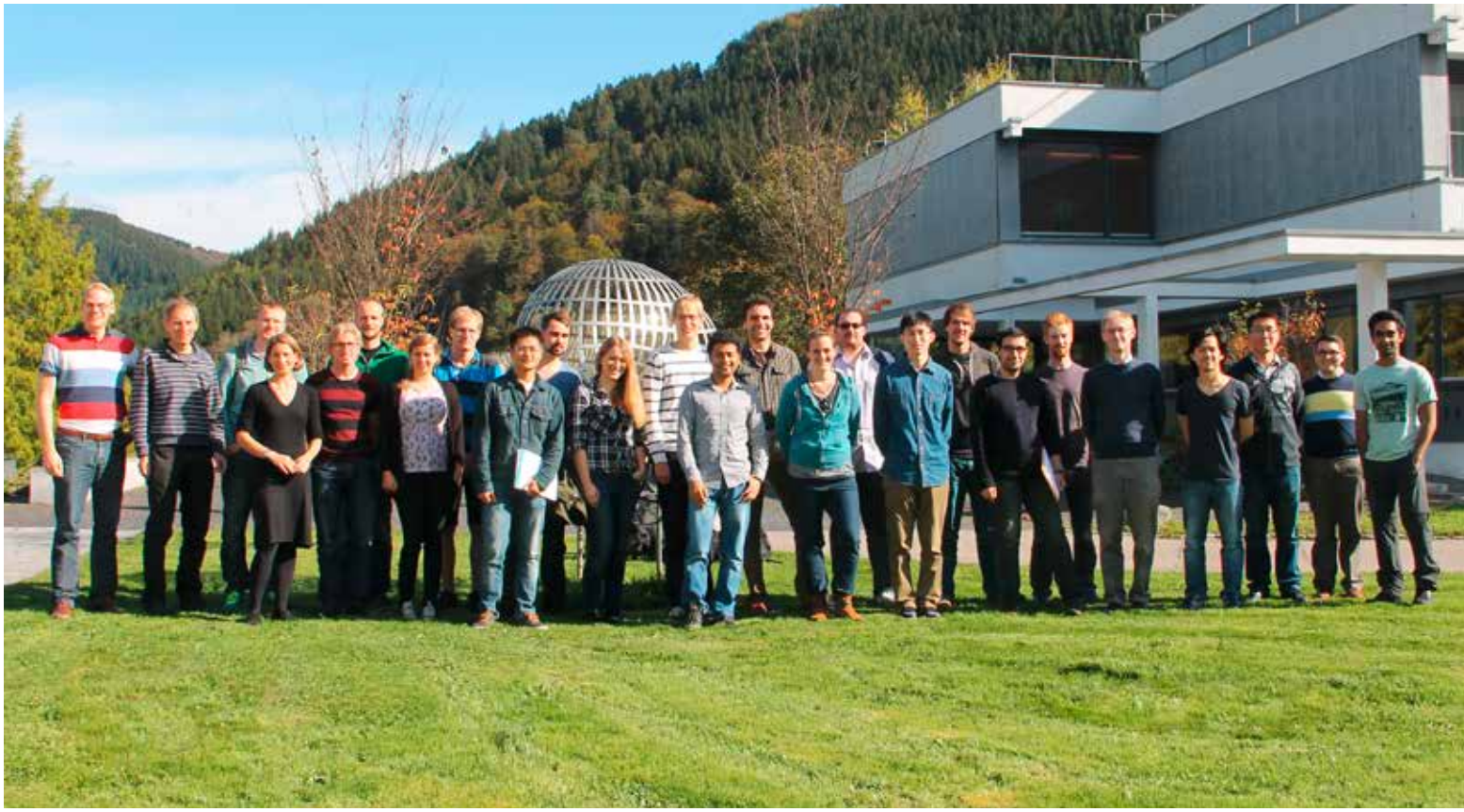
Abstract

C*-algebras generated by unitary representations of discrete or, more generally, locally compact groups, are among the most classical and intensely studied examples of C*-algebras. One reason is that they are closely related to the representation theory of the corresponding group. Another reason is that such C*-algebras, for instance associated with the fundamental group of a manifold, arise naturally in classification and index problems in geometry. The determination of the K-theoretic invariants of such C*-algebras is a particularly challenging problem. At the same time it is of great interest since these invariants are connected to index invariants and topological obstructions in geometry. Paul Baum and Alain Connes proposed a formula for the K-theory of the reduced C*-algebra of a group that would permit, in principle, its computation. This Baum-Connes conjecture has attracted a lot of attention. It has been verified for very large classes of groups and has led to the development of a host of new techniques. More recently also the C*-algebras generated by the regular representation of a semigroup have been studied in more detail. Intriguing examples of such semigroups come from algebraic number theory. The K-theory of the algebra in this case is related to natural number theoretic concepts.

Participants

Barlak, Selcuk (Münster), Bentmann, Rasmus (Göttingen), Bönicke, Christian (Münster), Bosa, Joan (Glasgow), Browne, Sarah Louise (Sheffield), Chakraborty, Sayan (Münster), Cuntz, Joachim (Münster), De Chiffre, Marcus (Dresden), Dowerk, Philip (Leuven), Echterhoff, Siegfried (Münster), Engel, Alexander (Regensburg), Finn-Sell, Martin (Wien), Hong, Seunghun (Göttingen), Huang, Huichi (Münster), Li, Kang (Copenhagen), Li, Xin (London), Norling, Magnus Dahler (Oslo), Omland, Tron (Tempe), O'Sullivan, David (Sheffield), Pooya, Sanaz (Neuchatel), Raum, Sven (Kyoto), Shanmuga Sundaram, Sundar (Chennai), Sharifi, Kamran (Münster), Tepoyan, Vardan (Yerevan), Winges, Christoph (Münster), Wu, Jianchao (Münster), Wulff, Christopher (Augsburg), Yu, Guoliang (College Station)

Oberwolfach Seminar 1442b



12.10. – 18.10.2014 **High Frequency Approximations**

Organizers: Caroline Lasser, München
Olof Runborg, Stockholm
Anders Szepessy, Stockholm

Abstract

The seminar studied the numerical approximation for partial differential equations in the high frequency regime, when solutions have the form $a(t,y,\varepsilon)e^{i\Phi(t,y)/\varepsilon}$ where $1/\varepsilon >> 1$ is the large high frequency parameter. Examples include the wave equation, the Schrödinger equation, or Maxwell equations. High frequency equations pose difficult multiscale problems, since the wavelength $\varepsilon << 1$ is short compared to the overall size of the computational domain, and direct simulation techniques are very expensive if not unfeasible for such problems.

Participants

Ameres, Jakob (Garching), Bader, Philipp (Valencia), Buchholz, Simone (Karlsruhe), Delamotte, Kieran (Paris), Dietert, Helge (Cambridge), Döpfner, Kirian (Wien), Fang, Jun (Irvine), Gaim, Wolfgang (Tübingen), Ghaani Farashahi, Arash (Wien), Hall, Eric (Stockholm), Hoel, Hakon (Oslo), Kadir, Ashraful (Stockholm), Keller, Johannes (Garching bei München), Kieri, Emil (Uppsala), Lasser, Caroline (Garching bei München), Li, Xinchun (Shanghai), Lie, Han Cheng (Berlin), Ma, Zheng (Shanghai), Malenova, Gabriela (Stockholm), Runborg, Olof (Stockholm), Sandberg, Mattias (Stockholm), Singh, Pranav (Cambridge), Szepessy, Anders (Stockholm), Trigila, Giulio (Garching), Troppmann, Stephanie (Garching)

Oberwolfach Seminar 1448a

23.11. – 29.11.2014 **Analysis of Compressible Navier Stokes Equations and Related Topics**

Organizers: Eduard Feireisl, Prague
David Gérard-Varet, Paris
Rupert Klein, Berlin
Antonin Novotny, Toulon

Abstract

The main goal of the Seminar was to present and discuss the state of the art of the mathematical theory of complete fluid systems, with the emphasis put on the underlying thermodynamical principles. Highlighting the new emerging trends we aimed to inspire young researchers in their future activities. The Seminar activities were initiated by a series of tutorial courses focused on the following topics: Fundamental problems of well-posedness and stability of the systems of partial differential equations arising in the modeling of compressible, viscous, and/or heat conducting fluids; several concepts of weak solutions, admissibility criteria, weak formulation based on the laws of thermodynamics; multiscale analysis of complete fluid systems, dependence on the shape of physical domains, the role of boundary conditions; asymptotic behavior of solutions, their qualitative properties, singular limits

Participants

Angelopoulos, Yannis (Toronto), Bispen, Georgij (Mainz), Buchmüller, Pawel (Düsseldorf), Caravenna, Laura (Padova), Dell'Oro, Filippo (Praha), Feireisl, Eduard (Praha), Gérard-Varet, David (Paris), Götze, Martin C. (Berlin), Hosek, Radim (Praha), Klein, Rupert (Berlin), Klotzky, Jens (Würzburg), Kostianko, Anna (Guildford, Surrey), Michálek, Martin (Praha), Novotny, Antonin (La Garde), Perrin, Charlotte (Le Bourget du Lac), Pirner, Marlies (Würzburg), Trageser, Jeremy (Lincoln), Xie, Zhihui (Chicago), Zabensky, Josef (Ostrava), Zakerzadeh, Hamed (Aachen), Zube, Stephanie (Zürich)

Oberwolfach Seminar 1448b

23.11. – 29.11.2014 **Projection Based Model Reduction: Reduced Basis Methods, Proper Orthogonal Decomposition, and Low Rank Tensor Approximations**

Organizers: Bernard Haasdonk, Stuttgart
Anthony Nouy, Nantes
Mario Ohlberger, Münster
Stefan Volkwein, Konstanz

Abstract

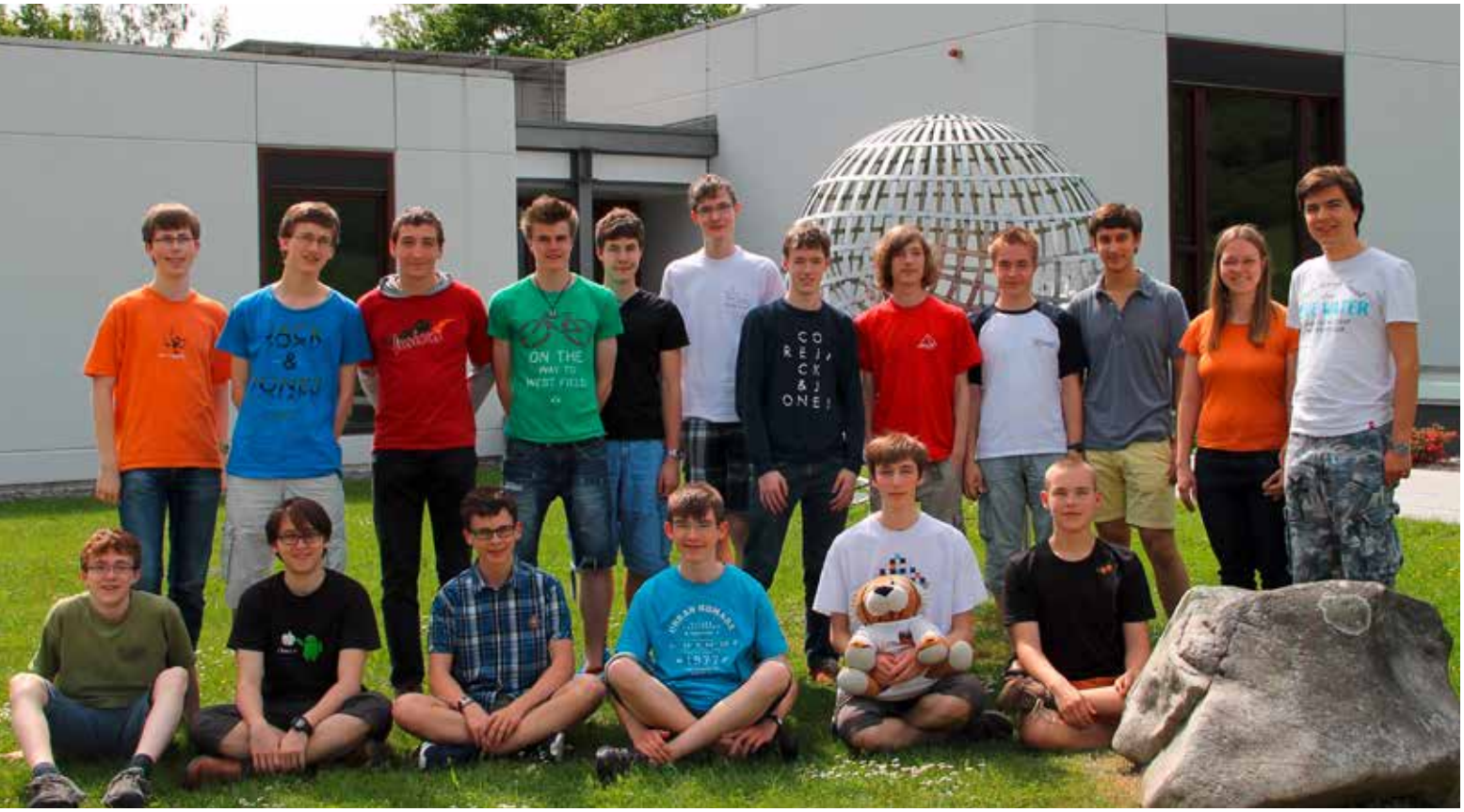
Many physical, chemical, biomedical, and technical processes can be described by means of partial differential equations or dynamical systems. In recent years, multi-physics and multi-scale problems have become a particular focus of applied mathematical research. A numerical treatment of such problems is usually very time consuming and thus requires the development of efficient discretization schemes that are often realized on large parallel computing environments. In addition, these problems often need to be solved repeatedly for many varying parameters, introducing a curse of dimensionality when the solution is also viewed as a function of these parameters. In recent years there has been a tremendous effort in developing efficient model reduction approaches to deal with such problems. The seminar introduced these approaches both from a theoretical and numerical perspective.

Participants

Ahmedov, Bahodir (Aachen), Banisch, Ralf (Berlin), Bonomi, Diana (Milano), Burkovska, Olena (Garching), Casper, Thorben (Darmstadt), da Silva, Jose Pedro (Wuppertal), Dölz, Jürgen (Basel), Fabrini, Giulia (Paris), Fumagalli, Ivan (Milano), Garmatter, Dominik (Stuttgart), Giraldi, Loic (Nantes), Goyal, Pawan (Magdeburg), Gruber, Felix Josef (Aachen), Grundel, Sara (Magdeburg), Grunert, Dennis (Stuttgart), Haasdonk, Bernard (Stuttgart), Héas, Patrick (Rennes), Herzet, Cedric (Rennes), Kazaz, Lorin (Winterbach), Klewinghaus, Angela (Aachen), Koltai, Peter (Berlin), Kühn, Christian (Wien), Litsarev, Mikhail Sergeevich (Skolkovo), Löbhard, Caroline (Berlin), Mahlstedt, Mirco (Garching), Mayerhofer, Antonia (Ulm), Miles, James (Brighton), Montier, Laurent (Houppeville), Nahrstaedt, Janja (Hamburg), Neureither, Lara (Potsdam), Nielsen, Adam (Berlin), Nouy, Anthony (Nantes), Ohlberger, Mario (Münster), Olivier, Clement (Palaiseau), Pagani, Stefano (Milano), Peitz, Sebastian (Paderborn), Peters, Michael (Basel), Rakhuba, Maxim (Moscow), Rave, Stephan (Münster), Resseguier, Valentin (Rennes), Rogg, Sabrina (Konstanz), Ryll, Christopher (Berlin), Sauerbrei, Anna (Braunschweig), Schmidt, Andreas (Stuttgart), Schulze, Philipp (Berlin), Sirkovic, Petar (Lausanne), Ullmann, Sebastian (Darmstadt), Volkwein, Stefan (Konstanz), von Schirp, Andrea (Berlin), Youett, Jonathan (Berlin), Zahm, Olivier (Nantes)

2.8. Fortbildungsveranstaltungen/Training weeks

Trainings- und Abschlussseminar für die Internationale Mathematik-Olympiade 1421a



17.05. - 24.05.2014 **Trainings- und Abschluß-Seminar für die Internationale Mathematik-Olympiade**

Organizers: Hans-Dietrich Gronau, Rostock
Hanns-Heinrich Langmann
Jürgen Prestin

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

Participants
Max Aehle (Affalterbach, Baden-Württemberg), Linus Behn (Bonn), Christian Bernert (Bückeburg), Tim Blödtner (Halle), Richard Gräßler (Chemnitz), Vincent Grande (Leipzig), Pascal Hein (Trier), Felix Hilsky (Falkensee), Lars Munser (Magdeburg), Matthias Paulsen (Miesbach), Stefan Rabenstein (Erlangen), Adrian Riekert (Pinneberg), Konrad von der Gönna (Jena), Ferdinand Wagner (Leipzig), Arne Wolf (Markkleeberg) und Jonas Wolter (Glückstadt)

Lehrerfortbildung 1445b

02.11. – 08.11.2014 **Differentialgleichungen**

Organizers: Ernst Kuwert, Freiburg
Tobias Malkmus, Freiburg
Martin Nolte, Freiburg

Abstract

Die meisten Objekte und Vorgänge in Geometrie, Natur und Technik werden durch Differentialgleichungen modelliert. Es ist die Aufgabe der Mathematik, die beobachtbaren Phänomene analytisch zu begründen. Bei gewöhnlichen Differentialgleichungen und bei linearen partiellen Differentialgleichungen gibt es dazu eine gut entwickelte Theorie. Inzwischen wurden auch für nichtlineare partielle Differentialgleichungen interessante, grundlegende Konzepte entdeckt. Der Fokus des Seminars lag auf partiellen Differentialgleichungen. Vorab wurden gewöhnliche Differentialgleichungen diskutiert, um einen Zugang zu finden und Gemeinsamkeiten zu beleuchten. Neben den klassischen Darstellungsformeln für Lösungen wurden wir modernere Techniken vorgestellt, wobei die Variationsmethoden einen Schwerpunkt bildeten. Insgesamt war es das Ziel nicht eine vollständige Theorie zu präsentieren, sondern exemplarisch die Aussagekraft der Analysis in Anwendungen.

Participants

Bornhofen, Matthias (Stegen), Burster, Gereon (Gundelfingen), Castillo-Schulz, Benjamin (Ravensburg), Fischer, Bert (Schwäbisch Gmünd), Fix, Michael (Heidelberg), Fritzsche, Eberhard (Besigheim), Fusenig, Stefan (Backnang), Grinberg, Natalia (Karlsruhe), Hinko, Anja (Beilstein), Knopf, Ruth (Bühl), Kuwert, Ernst (Freiburg), Malkmus, Tobias (Freiburg), Neubauer, Siegfried (Villingen-Schwenningen), Nolte, Martin (Freiburg), Renner, Martin (Karlsruhe), Schiffer, Manuel (Salem), Schlagenhauf, Reiner (Ludwigsburg), Stocki, Peter (Heidenheim)

2.9. Research in Pairs

Die folgenden Forscher nahmen 2014 am Research in Pairs Programm teil:

Montaldi, James Anthony (Manchester) 05.01.-25.01.2014
Roberts, Mark (Guildford)

Paradan, Paul-Emile (Montpellier) 12.01.-25.01.2014
Vergne, Michèle (Paris)

Bruggeman, Roelof W. (Utrecht) 12.01.-25.01.2014
Choie, Young Ju (Pohang)
Diamantis, Nikolaos (Nottingham)

Thäle, Christoph (Bochum) 09.02.-21.02.2014
Schulte, Matthias (Karlsruhe)

Evans, David E. (Cardiff) 16.02.-01.03.2014
Gannon, Terry J. (Edmonton)

Franz, Uwe (Besancon) 23.02.-08.03.2014
Kula, Anna (Krakow)
Lindsay, J. Martin (Lancaster)
Skeide, Michael (Campobasso)

Ruggeri, Tommaso (Bologna) 02.03.-15.03.2014
Sugiyama, Masaru (Nagoya)

Chaio, Claudia Alicia (Mar del Plata) 09.03.-22.03.2014
Malicki, Piotr (Torun)

Felix, Yves (Louvain-la-Neuve) 16.03.-29.03.2014
Halperin, Stephen (College Park)
Thomas, Jean-Claude (Angers)

Moroianu, Andrei (Versailles) 23.03.-05.04.2014
Semmelmann, Uwe (Stuttgart)

Olevskii, Alexander (Tel Aviv) 30.03.-19.04.2014
Ulanovskii, Alexander (Stavanger)

Ignat, Radu (Toulouse) 06.04.-19.04.2014
Nguyen, Luc (Princeton)
Slastikov, Valeriy (Bristol)
Zarnescu, Arghir Dani (Brighton)

Launois, Stéphane (Canterbury) 20.04.-03.05.2014
Lenagan, Thomas H. (Edinburgh)

Parker, Christopher W. (Birmingham) 20.04.-03.05.2014
Rowley, Peter J. (Manchester)

Genovese, Giuseppe (Paris) 27.04.-24.05.2014
Lucà, Renato (Madrid)
Valeri, Daniele (Trieste)

De Nittis, Giuseppe (Erlangen) 04.05.-17.05.2014
Lein, Max (Toronto)
Seri, Marcello (Erlangen)

Harder, Günter (Bonn) 04.05.-10.05.2014
Raghuram, Anantharam (Pune)

Allahbakhshi, Mahsa 18.05.-31.05.2014
(Santiago de Chile)
Antonioli, John (Victoria)

Haettel, Thomas (Montpellier) 18.05.-31.05.2014
Kielak, Dawid (Bonn)
Schwer, Petra (Münster)

Lupton, Gregory M. (Cleveland) 25.05.-07.06.2014
Smith, Samuel Bruce (Philadelphia)

The following researchers attended the Research in Pairs program in 2014:

Kauffman, Louis H. (Chicago) 01.06.-28.06.2014
Manturov, Vassiliy Olegovich (Moscow)

Anulova, Svetlana V. (Moscow) 01.06.-28.06.2014
Mai, Hilmar (Berlin)
Veretennikov, Alexander (Leeds)

Aubrun, Guillaume (Villeurbanne) 08.06.-21.06.2014
Szarek, Stanislaw Jerzy (Cleveland)

Hausel, Tamas (Lausanne) 22.06.-05.07.2014
Letellier, Emmanuel (Caen)
Rogriguez Villegas, Fernando (Austin)

Fauser, Bertfried (Egham) 29.06.-19.07.2014
Jarvis, Peter David (Hobart Tas)
King, Ronald C. (Southampton)

Finashin, Sergey (Ankara) 29.06.-19.07.2014
Kharlamov, Viatcheslav (Strasbourg)

Berenstein, Arkady (Eugene) 20.07.-02.08.2014
Retakh, Vladimir (Piscataway)

Boltje, Robert (Santa Cruz) 20.07.-02.08.2014
Danz, Susanne (Kaiserslautern)
Müller, Jürgen (Jena)

Kobayashi, Toshiyuki (Tokyo) 27.07.-09.08.2014
Speh, Birgit (Ithaca)

Gurjar, Rajendra V. (Mumbai) 03.08.-16.08.2014
Koras, Mariusz (Warszawa)
Miyanishi, Masayoshi (Sanda)
Russell, K. Peter (Montreal)

Roy, Sutanu (Toronto) 03.08.-30.08.2014
Woronowicz, Stanislaw Lech (Warszawa)

Fiedler, Bernold (Berlin) 04.08.-16.08.2014
Matano, Hiroshi (Tokyo)
Mochizuki, Atsushi (Saitama)

Batyrev, Victor V. (Tübingen) 14.09.-27.09.2014
Moreau, Anne (Futuroscope Chasseneuil)
Yu, Rupert Wei Tze (Reims)

Kienzler, Reinhold (Bremen) 14.09.-27.09.2014

González Merino, Bernardo (Murcia) 05.10.-25.10.2014
Henze, Matthias (Berlin)

Grbic, Jelena (Southampton) 05.10.-25.10.2014
Terzic, Svjetlana (Podgorica)

Panina, Gaiane (St. Petersburg) 05.10.-18.10.2014
Streinu, Ileana (Northampton)

Ganz, Melanie (Copenhagen) 19.10.-01.11.2014
Konukoglu, Ender (Charlestown)

Angermann, Lutz (Clausthal-Zellerfeld) 02.11.-15.11.2014
Shestopalov, Youri V. (Gävle)
Smirnov, Youri V. (Penza)
Yatsyk, Yasyl V. (Kharkiv)

Oganian, Albert (Schwäbisch Gmünd) 02.11.-06.11.2014

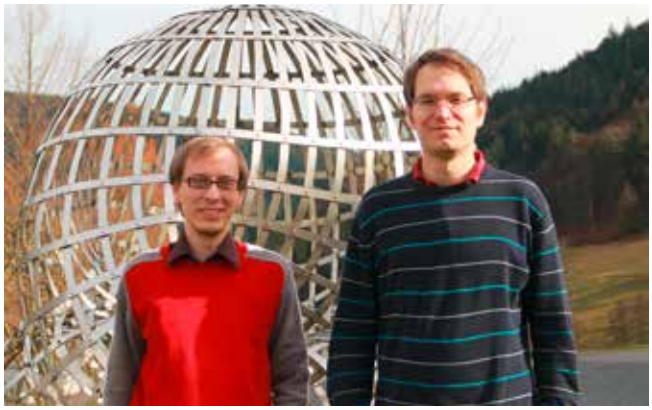
Altmann, Robert (Berlin) 16.11.-29.11.2014
Heiland, Jan (Magdeburg)

Cheltsov, Ivan (Edinburgh) Shramov, Konstantin (Moscow)	07.12.-20.12.2014
De Shalit, Ehud (Jerusalem) Goren, Eyal Z. (Montreal)	07.12.-20.12.2014

J. A. Montaldi, M. Roberts

P.-E. Paradan, M. Vergne

R. Bruggeman, Y. Choie, N. Diamantis



C. Thäle, M. Schulte

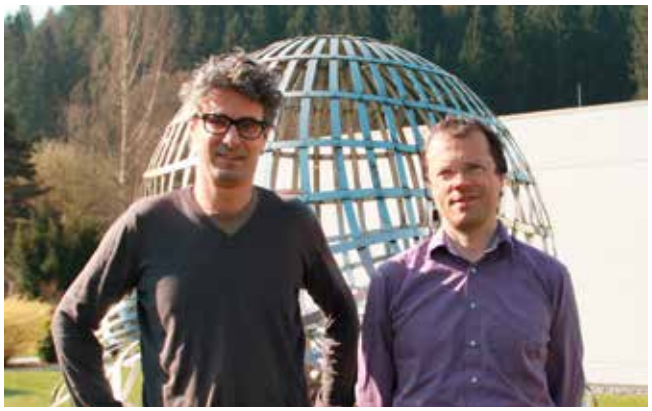
T. Gannon, D. Evans

M. Skeide, A. Kula, U. Franz, J. Lindsay

M. Sugiyama, T. Ruggeri

C. A. Chaio, P. Malicki

J. Thomas, S. Halperin, Y. Felix



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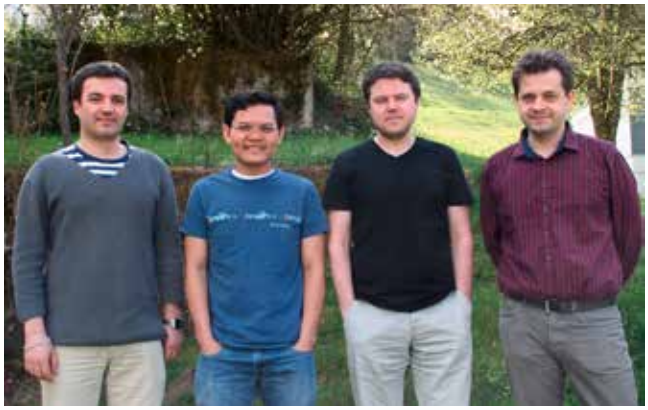

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C. Parker, P. Rowley

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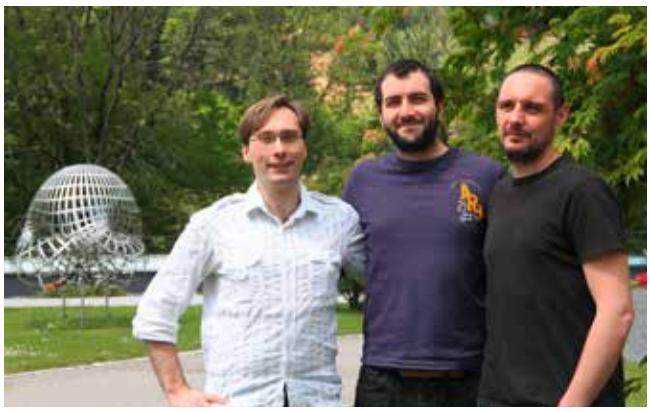

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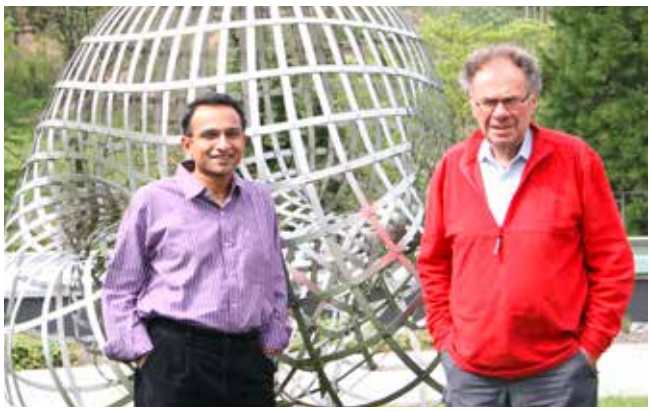

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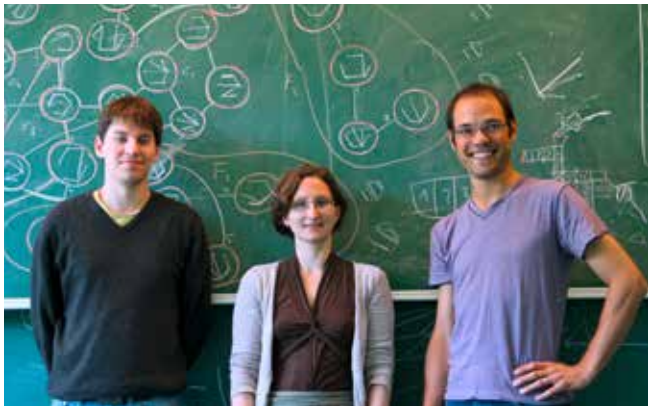

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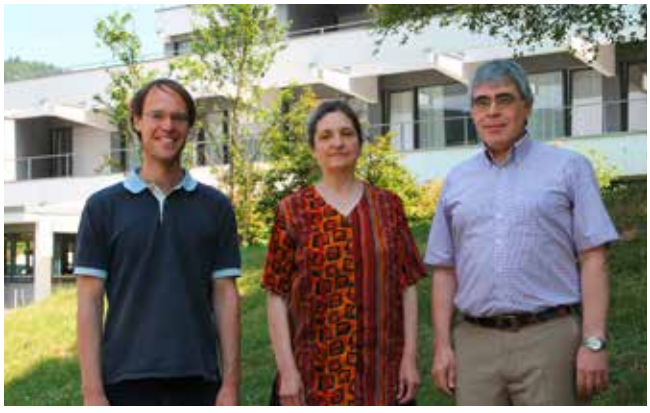
V. O. Manturov, L.H. Kauffman



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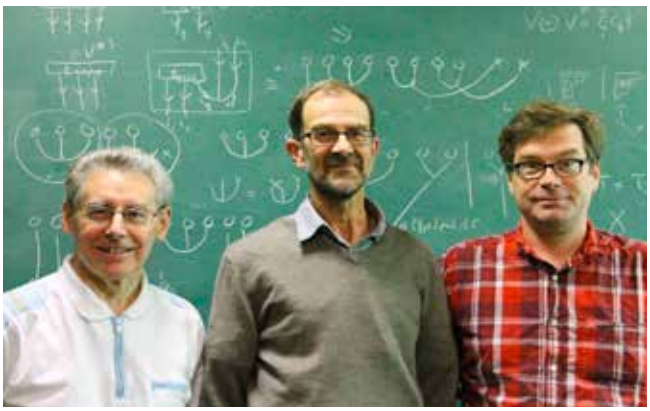
S. Szarek, G. Aubrun

F. Rodriguez-Villegas, T. Hausel



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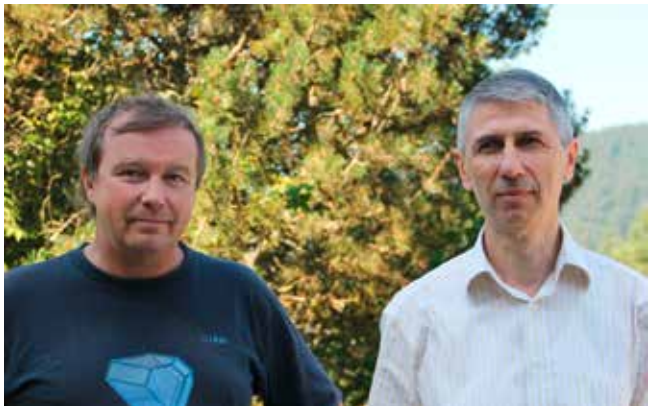

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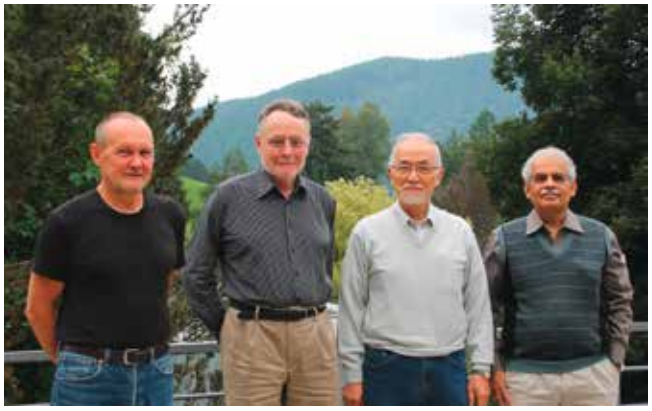
V. Retakh, A. Berenstein

R. Boltje, S. Danz

B. Speh, T. Kobayashi



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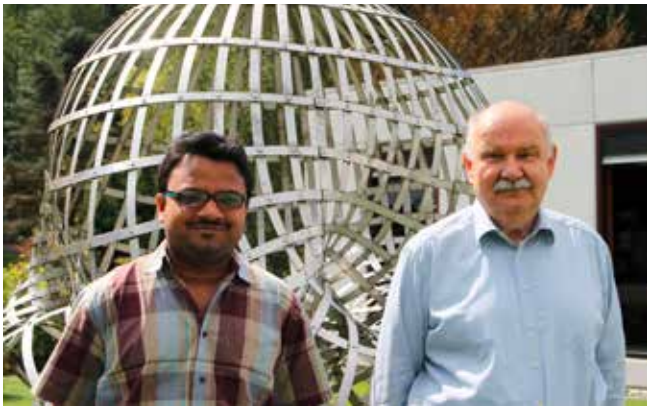
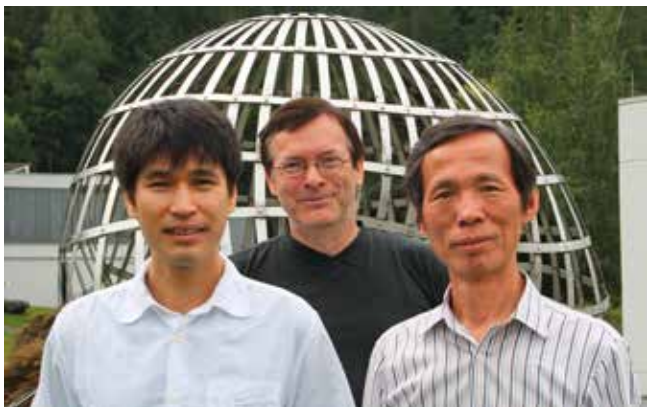


S. Roy, S. Woronowicz



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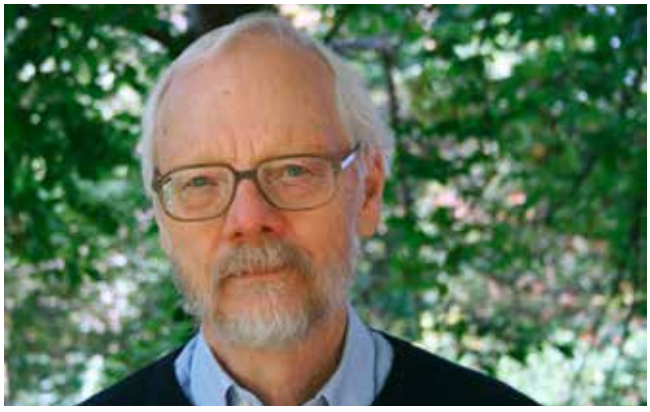
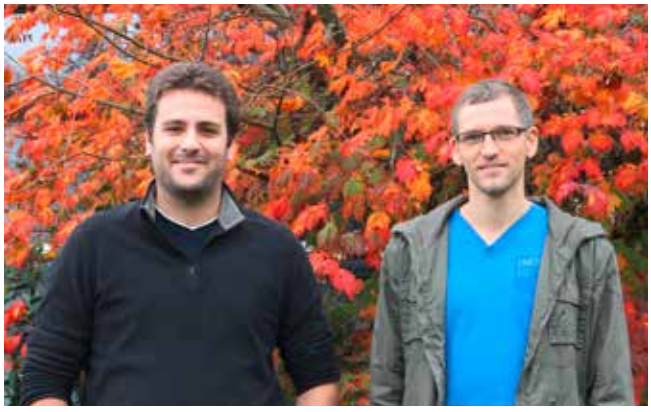
A. Moreau, R. Yu



R. Kienzler



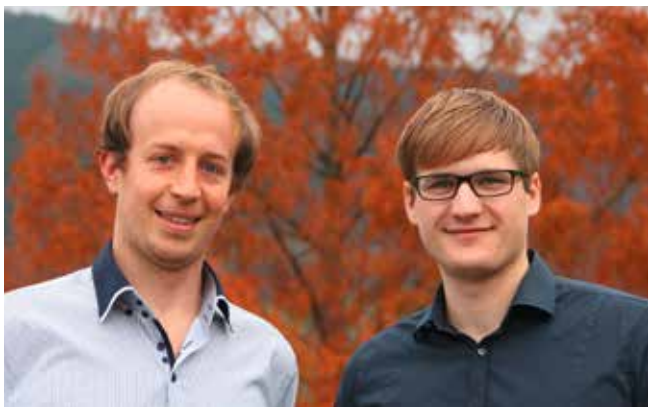
B. Gonzales Merino, M. Henze

J. Grbic, S. Terzic

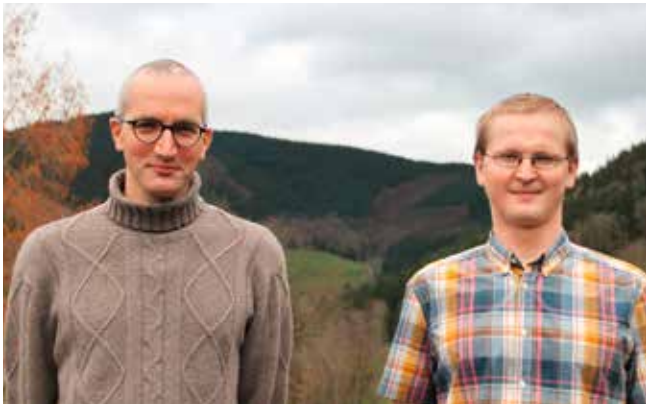
I. Streinu, G. Panina

E. Konukoglu, M. Ganz

L. Angermann, Y. Shestopalov, Y. Smirnov, V. Yatsyk



J. Heiland, R. Altmann



I. Cheltsov, K. Shramov

E. de Shalit, E. Goren

2.10. Oberwolfach Leibniz Fellows

2007 wurde am Mathematischen Forschungsinstitut Oberwolfach (MFO) ein neues Postdoktorandenprogramm eingeführt. Das 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.

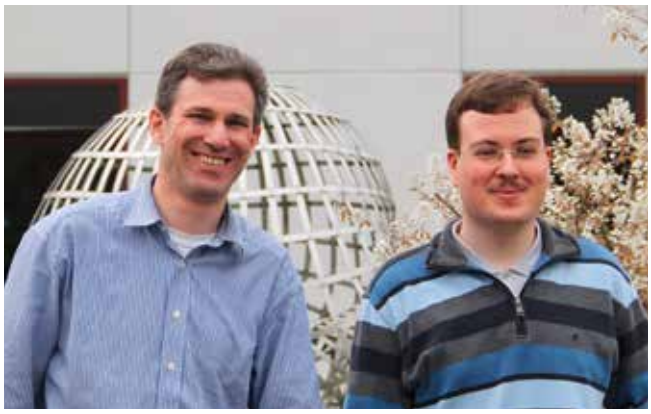
Beginning in 2007 the Mathematisches Forschungsinstitut Oberwolfach (MFO) has set up a new program for postdoctoral researchers. The focus of this program is to support outstanding young mathematical researchers in the realization of their own research projects during an important period of their scientific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

Király, Franz J. (London)	05.01.-11.01.2014
external guest researchers:	
Kreuzer, Martin (Passau)	05.01.-11.01.2014
Theran, Louis (Berlin)	05.01.-11.01.2014
Király, Franz J. (London)	31.03.-18.04.2014
external guest researchers:	
Buchner, Herbert (Cambridge)	30.03.-05.04.2014
Rodrigues, Miguel (London)	06.04.-12.04.2014
Müller, Klaus-Robert (Berlin)	13.04.-17.04.2014
Ziehe, Andreas (Berlin)	13.04.-18.04.2014
Nguyen, Hong Duc (Kaiserslautern)	31.03.-28.06.2014
external guest researcher:	
Le Quy, Thuong (Rennes)	15.06.-21.06.2014

Király, Franz J. (London)	04.05.-24.05.2014
external guest researchers:	
Blythe, Duncan (Berlin)	04.05.-09.05.2014
Ehler, Martin (Neuherberg)	11.05.-17.05.2014
Gräf, Manuel (Wien)	11.05.-17.05.2014
Kreuzer, Martin (Passau)	18.05.-24.05.2014
Theran, Louis (Berlin)	18.05.-24.05.2014
Brandenbursky, Michael (Montreal)	25.05.-27.06.2014
external guest researcher:	
Kedra, Jarek (Aberdeen)	26.05.-03.06.2014
Dann, Susanna (Columbia)	09.06.-05.09.2014
external guest researcher:	
Abardia, Judit (Frankfurt)	20.07.-23.07.2014
Abardia, Judit (Frankfurt)	31.08.-05.09.2014

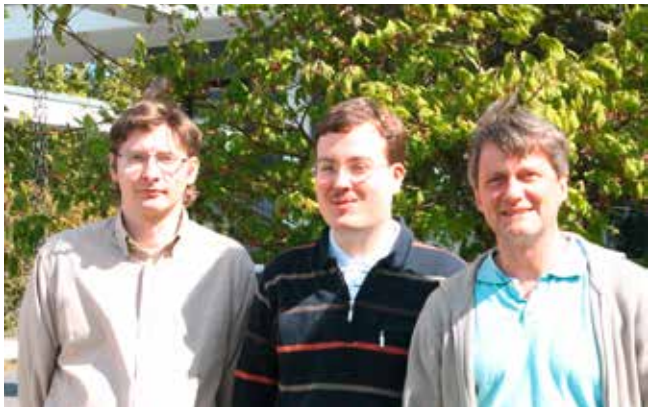
Király, Franz J. (London)	18.08.-30.08.2014
external guest researchers:	
Blythe, Duncan (Berlin)	24.08.-30.08.2014
Sejdinovic, Dino (London)	17.08.-22.08.2014
Bussas, Matthias (Potsdam)	19.08.-29.08.2014
Lauret, Emilio (Cordoba)	22.08.-24.11.2014
external guest researcher:	
Boldt, Sebastian (Berlin)	12.10.-17.10.2014
Boldt, Sebastian (Berlin)	09.11.-14.11.2014

M. Kreuzer, F. Király, L. Theran



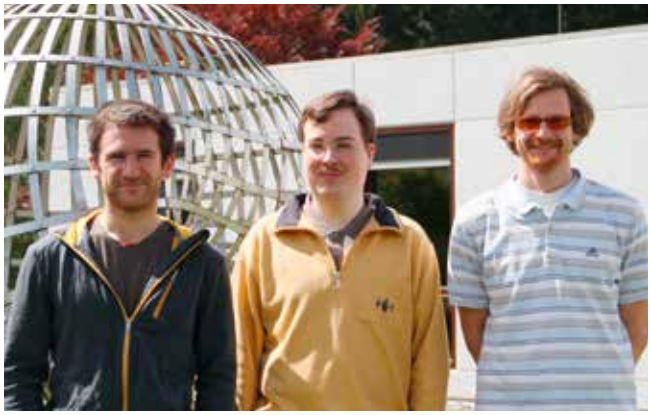
H. Buchner, F. Király

M. Rodriguez, F. Király



A. Ziehe, F. Király, K. Müller

T. Le Quy, H. Nguyen



M. Ehler, F. Király, M. Gräf

D. Blythe, F. Király, M. Bussas

J. Kedra, M. Brandenbursky

J. Abardia, S. Dann

S. Boldt, E. Lauret

2.11. Publikationen 2014

Das MFO unterstützt die Idee von Open Access. Daher sind alle Publikationen auf der Webseite www.mfo.de 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 2014 sind die Bände OWR 11.1 bis 11.4 mit mehr als 3.600 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 2014 wurden zwei Titel publiziert:

2.11. Publications 2014

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

Oberwolfach Reports (OWR)

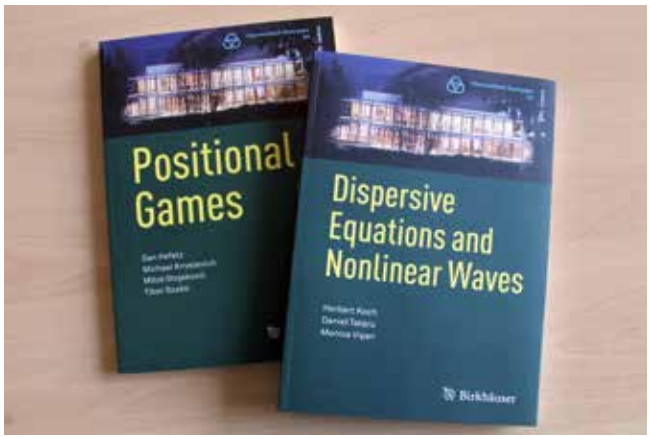
OWR is published in cooperation with the EMS publishing house and contains extended abstracts of the talks in the Workshops Mini-Workshops and Arbeitsgemeinschaften. In 2014, the issues OWR 11.1 to 11.4 were published with more than 3,600 pages in total.

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 2014, two books were published:

- Oberwolfach Seminars vol. 44
  Positional Games
  Hefetz, Dan; Krivelevich, Michael; Stojaković, Miloš; Szabó, Tibor. 2014

- Oberwolfach Seminars vol. 45
  Dispersive Equations and Nonlinear Waves
  Koch, Herbert; Tataru, Daniel; Vişan, Monica. 2014



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 2014 sind die folgenden Preprints erschienen:

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 2014:

- OWP 2014 - 19 (pdf, 477 kB)
  Title: An Explicit Formula for the Dirac Multiplicities on Lens Spaces
  Authors: Sebastian Boldt and Emilio A. Lauret
  (OWLF 2013/14)

- OWP 2014 - 18 (pdf, 580 kB)
  Title: Central Limit Theorems for the Radial Spanning Tree
  Authors: Matthias Schulte and Christoph Thäle
  (RiP 2014)

- OWP 2014 - 17 (pdf, 457 kB)
  Title: A Generalization of the Discrete Version of Minkowski's Fundamental Theorem
  Authors: Bernardo González and Matthias Henze
  (RiP 2014)

- OWP 2014 - 16 (pdf, 505 kB)
  Title: Cocharacter-Closure and the Rational Hilbert-Mumford Theorem
  Authors: Michael Bate, Sebastian Herpel, Benjamin Martin, and Gerhard Röhrle
  (RiP 2012)

- OWP 2014 - 15 (pdf, 299 kB)
  Title: Nonlinear Multi-Parameter Eigenvalue Problems for Systems of Nonlinear Ordinary Differential Equations Arising in Electromagnetics
  Authors: Lutz Angermann, Yury V. Shestopalov, Yury G. Smirnov and Vasyl V. Yatsyk
  (RiP 2014)

- OWP 2014 - 14 (pdf, 234 kB)
  Title: Abundance of 3-Planes on Real Projective Hypersurfaces
  Authors: S. Finashin, V. Kharlamov
  (RiP 2013)
- OWP 2014 - 13 (pdf, 303 kB)
  Title: Equidistribution of Elements of Norm 1 in Cyclic Extensions
  Authors: Kathleen L. Petersen and Christopher D. Sinclair
  (RiP 2013)
- OWP 2014 - 12 (pdf, 368 kB)
  Title: Random Dynamics of Transcendental Functions
  Authors: Volker Mayer and Mariusz Urbański
  (RiP 2014)
- OWP 2014 - 11 (pdf, 351 kB)
  Title: Generalized Killing Spinors and Lagrangian Graphs
  Authors: Andrei Moroianu and Uwe Semmelmann
  (RiP 2014)
- OWP 2014 - 10 (pdf, 281 kB)
  Title: Observability of Systems with Delay Convoluted Observation
  Authors: Erik I. Verriest and Anatoli F. Ivanov
  (RiP 2013)
- OWP 2014 - 09 (pdf, 347 kB)
  Title: Square Wave Periodic Solutions of a Differential Delay Equation
  Authors: Anatoli F. Ivanov and Erik I. Verriest
  (RiP 2013)
- OWP 2014 - 08 (pdf, 346 kB)
  Title: On Periodic Solutions and Global Dynamics in a Periodic Differential Delay Equation
  Authors: Anatoli F. Ivanov and Sergei I. Trofimchuck
  (RiP 2013)
- OWP 2014 - 07 (pdf, 983 kB)
  Title: Holomorphic Automorphic Forms and Cohomology
  Authors: Roelof Bruggeman, Youngju Choie, and Nikolaos Diamantis
  (RiP 2014)
- OWP 2014 - 06 (pdf, 516 kB)
  Title: On the Prediction of Stationary Functional Time Series
  Authors: Alexander Aue, Diogo Dubart Norinho, Siegfried Hörmann
  (RiP 2014)
- OWP 2014 - 05 (pdf, 472 kB)
  Title: Weak Expansiveness for Actions of Sofic Groups
  Authors: Nhan-Phu Chung and Guohua Zhang
  (RiP 2013)
- OWP 2014 - 04 (pdf, 772 kB)
  Title: Spherical Actions on Flag Varieties
  Authors: Roman Avdeev and Alexey Petukhov
  (OWLF 2013)
- OWP 2014 - 03 (pdf, 635 kB)
  Title: Spectral Triples and Finite Summability on Cuntz-Krieger Algebras
  Authors: Magnus Goffeng and Bram Mesland
  (RiP 2013)
- OWP 2014 - 01 (pdf, 447 kB)
  Title: Varieties of Invariant Subspaces Given by Littlewood-Richardson Tableaux
  Authors: Justyna Kosakowska and Markus Schmidmeier
  (RiP 2013)

Schnappschüsse moderner Mathematik

Schnappschüsse moderner Mathematik aus Oberwolfach erklären mathematische Ideen und Probleme in verständlicher Art und Weise. Sie werden von Teilnehmenden des wissenschaftlichen Programms am MFO geschrieben. Ein Team aus Editorinnen und Editoren unterstützt sie bei der Aufbereitung der komplizierten Sachverhalte für ein breites Publikum. Das MFO veröffentlicht die Schnappschüsse frei verfügbar unter einer Creative Commons Lizenz auf www.mfo.de/snapshots und www.imaginary.org/snapshots. Das Projekt wird von der Klaus Tschira Stiftung maßgeblich finanziert und wurde ebenfalls von der Oberwolfach Stiftung und dem MFO unterstützt.

2014 sind die folgenden Schnappschüsse erschienen:

Snapshots of modern mathematics

Snapshots of modern mathematics from Oberwolfach explain mathematical problems and ideas in an accessible and understandable way. They are written by participants of the scientific program at the MFO, who volunteer to explain an important aspect of their research. A team of editors assists them in communicating complicated matters to a broad audience. The MFO publishes the snapshots for free download under a Creative Commons license at www.mfo.de/snapshots and www.imaginary.org/snapshots. The project is funded by the Klaus Tschira Foundation and has also been supported by the Oberolfach Foundation and the MFO.

In 2014 the following snapshots have been published:

- No. 1/2014: Dirichlet Series
  Author: John E. McCarthy
  doi: 10.14760/SNAP-2014-001-EN
- No. 2/2014: Matrixfaktorisierungen
  Author: Wolfgang Lerche
  doi: 10.14760/SNAP-2014-002-DE
- No. 3/2014: The ternary Goldbach problem
  Author: Harald Helfgott
  doi: 10.14760/SNAP-2014-003-EN
- No. 4/2014: What does ">" really mean?
  Author: Bruce Reznick
  doi: 10.14760/SNAP-2014-003-EN
- No. 5/2014: Arrangements of lines
  Authors: Brian Harbourne and Thomas Szemberg
  doi: 10.14760/SNAP-2014-003-EN
- No. 6/2014: Statistics and dynamical phenomena
  Author: Howell Tong
  doi: 10.14760/SNAP-2014-006-EN
- No. 7/2014: Swallowtail on the shore,
  Authors: Ragnar-Olaf Buchweitz and Eleonore Faber
  doi: 10.14760/SNAP-2014-007-EN
- No. 8/2014: The Kadison-Singer problem
  Author: Alain Valette
  doi: 10.14760/SNAP-2014-008-EN
- No. 9/2014: Operator theory and the singular value decomposition
  Author: Gregory Knese
  doi: 10.14760/SNAP-2014-009-EN
- No. 10/2014: Drugs, herbicides and numerical simulation
  Authors: Peter Benner, Hermann Mena and René Schneider
  doi: 10.14760/SNAP-2014-010-EN

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 25 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

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 program approximately 25 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 will continue to be 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 program and the Oberwolfach Leibniz Fellow program, but also by the participants of the Workshop program. 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 program and the excellent working conditions, the library

Rahmenbedingungen für den persönlichen Gedankenaustausch ist 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 Spenden der Carl Friedrich von Siemens Stiftung sowie durch Sachspenden von Verlagen.

is an important factor for the high reputation of the MFO worldwide. In times of dramatically increasing prizes for scientific journals it is difficult to keep this level; this has only been possible because of support from the Carl Friedrich von Siemens Stiftung and book donations from publishing houses.

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.

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 cataloging of our library collection enormously.

3.2.1. Bestandsüberblick

Zum Jahresende 2014 belief sich der im elektronischen Katalog nachgewiesene Gesamtbestand an Büchern auf etwa 56.500 Bände. Hinzu kamen 29.700 Zeitschriftenbände. Darüber hinaus standen den Institutsgästen ca. 5.000 Dissertationen, 520 laufende Zeitschriften-Abonnements in gedruckter Form sowie ca. 5.000 lizenzierte elektronische Zeitschriften zur Verfügung.

3.2.1. Overview of the inventory

By the end of 2014 the stock of books included in our electronic catalog totaled approx. 56,500 volumes and approx. 29,700 volumes of bound journals. In addition to that, approx. 5,000 dissertations, 520 current subscriptions to journals as well as about 5,000 licensed electronic journals were available to the Institute's guests.

3.2.2. Bestandsentwicklung

Der Bestand an Büchern wurde im Jahr 2014 um insgesamt 1.386 Bände vermehrt. Davon hat die Bibliothek 717 Bände im Rahmen der ständigen Buchausstellung erhalten. Mit Mitteln der Siemens Stiftung wurden 239 Bücher erworben.

3.2.2. Development of the inventory

The book inventory increased in 2014 by 1,386 volumes in total; 717 of these were donations for the permanent book exhibition. 239 volumes were bought with means from the Siemens Stiftung.

Zum Jahresende 2014 hat das MFO 520 Zeitschriften laufend bezogen. Davon wurden 388 durch ein reguläres Abonnement gegen Rechnung bezogen. 76 Titel erhielten wir im Rahmen eines Tauschabkommens und weitere 56 Titel erhielten wir als Geschenk.

By the end of 2014, the Institute subscribed to 520 journals, 388 of those by regular subscription on account, 76 within an exchange agreement, and 56 were received as donations.

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 National- sowie sogenannten Allianzlizenzen. Das MFO hat im Rahmen dieser Nationallizenzen zusätzlich zu den etwa 600 regulären elektronischen Zeitschriftenabonnements weitere ca. 5.000 Zeitschriften elektronisch zur Verfügung stellen können.

In order to substantially improve the acquisition of digital scientific literature by German universities, research centers and scientific libraries, the DFG started in 2004 to finance national licenses or so called "Alliance Licenses". Within this program of German national licenses the Institute has been able to provide further 5,000 electronic journals in addition to the 600 regular electronic subscriptions.

3.2.3. Buchausstellung

Die ständige Buchausstellung gibt interessierten wissenschaftlichen Verlagen die Möglichkeit, ihre Neuerscheinungen im Bereich Mathematik

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

am MFO über einen längeren Zeitraum zu präsentieren. Einige der wichtigsten Verlagshäuser weltweit beteiligen sich teilweise mit ihrem gesamten mathematischen Programm daran. Insgesamt gingen 717 Bücher von 16 verschiedenen Verlagen im Rahmen der Buchausstellung in den Bibliotheksbestand ein.

Institute over a longer period. Some of the most important publishing houses worldwide use this platform to present their program in mathematical sciences. Consequently 717 books from 16 different publishing houses have become part of the library's collection within the year 2014.

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 2014 stark angewachsen. Neben den 788 institutseigenen Fotos kamen weitere aus verschiedenen Quellen hinzu. Besonders erwähnen möchten wir an dieser Stelle Prof. George M. Bergman, Berkeley, der regelmäßig seine neuesten Aufnahmen für die Oberwolfacher Sammlung zur Verfügung stellt.

Ende 2014 waren ca. 17.600 Fotos in der Datenbank enthalten.

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 digitalized 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 2014. Apart from the 788 Institute-own photos, further pictures have come from various sources. We want to give special recognition here to Prof. Greorge M. Bergman, Berkeley, who regularly provides his newest pictures for the Oberwolfach collection.

By the end of 2014 the database listed approx. 17,600 photographs.

3.3. IT

Zweck der IT am MFO ist es, den Gastforschern und den Verwaltungsmitarbeitern effiziente Arbeitsmöglichkeiten zu bieten. Neben dem WLAN-Zugang und einem Computer Pool beinhaltet dies Literaturrecherche und Zugriff auf online verfügbare Fachzeitschriften, die Nutzung mathematischer Software auf einem Computeserver, 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 Reports
- das Oberwolfach Digital Archive
- den Bibliothekskatalog
- die elektronischen Abonnements für anwesende Nutzer
- die Oberwolfach Photo Collection
- die Oberwolfach References on Mathematical Software

Desweiteren betreut die IT des MFO das Oberwolfacher Museum für Mineralien und Mathematik „MiMa". Dieses wird von der Gemeinde Oberwolfach, dem Verein der Freunde von

3.3. IT

The purpose of the IT at the MFO is to provide guest researchers and administrative staff with efficient working conditions. Besides wireless network access and computer rooms this 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 Reports
- the Oberwolfach Digital Archive
- the library catalog
- the subscribed electronic journals for local users
- the Oberwolfach Photo Collection
- the Oberwolfach References on Mathematical Software

Moreover the MFO IT group services the Museum for Minerals and Mathematics "MiMa". It is run jointly by the local authority, the association of friends of minerals and mining and the MFO – all

Mineralien und Bergbau Oberwolfach und dem MFO gemeinsam betrieben; im mathematischen Teil sind interaktive Exponate der preisgekrönten Wanderausstellung IMAGINARY dauerhaft zu sehen.

3.3.1. Bestand Ende 2014

Hardware

- Redundante Internetanbindung über das Deutsche Forschungsnetz (DFN-Verein) mit zwei 100 Mbit/s Standleitungen
- LAN mit Gigabit Ethernet Backbone und Fast Ethernet Peripherie
- SAN auf Gigabit und 10 Gigabit Ethernet Basis
- 2 Virtualisierungshosts mit 19 virtuellen Servern sowie 2 konventionelle Server, teils für zentrale Dienste, teils als Terminal Server für die Arbeitsplätze
- Im Wissenschaftsbereich 11 fest installierte Arbeitsplätze, ca. 18 Laptoparbeitsplätze, 11 Zimmer mit Netzwerkanschluß, WLAN
- 16 Arbeitsplätze im Verwaltungsbereich

Software

Auf dem allen Gastforschern zugänglichen Computeserver sind etwa 15 der am meisten nachgefragten wissenschaftlichen Softwaresysteme installiert, sowohl kommerzielle wie Maple, Mathematica und Magma als auch freie wie Singular, GAP, Cocoa und Surfer. Für den Tagungsbetrieb am MFO nutzen die Mitarbeiter die datenbankgestützte Software owconf (s. 3.3.2.).

3.3.2. owconf

Die Oberwolfach Conference Management Software „owconf" vereinigt Anforderungen aus den Bereichen Veranstaltungsmanagement, Hotelmanagement und wissenschaftliches Management (Begutachtung, Publikationen) und bildet damit das softwaremäßige Rückgrat des Institutsbetriebs. Wegen der speziellen Anforderungen und wegen der Notwendigkeit künftiger Anpassungen und Erweiterungen erfolgte die Entwicklung durch die IT des MFO selbst. 2014 wurde in erster Linie die Antragsverwaltung weiterentwickelt.

3.3.3. Erhöhung der Ausfallsicherheit

Zur Erhöhung der Ausfallsicherheit wurde ein zweiter Serverraum in einem anderen Gebäude geplant, gebaut und in Betrieb genommen. Die

seated at Oberwolfach. The maths section of the MiMa hosts interactive exhibits of the award-winning exhibition IMAGINARY.

3.3.1. Stock by the end of 2014

Hardware

- Redundant Internet connection via the Deutsches Forschungsnetz (DFN-Verein) with two 100 Mbit/s leased lines.
- Local Area Network with Gigabit Ethernet backbone and Fast Ethernet periphery
- SAN on a Gigabit and 10 Gigabit Ethernet basis
- 2 virtualisation hosts with 19 virtual servers plus 2 conventional servers, partly for central services, partly as terminal servers for the workplaces
- The scientific subnet offers 11 fixed terminals, ca. 18 workplaces for laptops, 11 rooms with network connection, and wireless network
- 16 workplaces in the administrative subnet

Software

About 15 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. The staff uses throughout the databased conference management software owconf (see 3.3.2.).

3.3.2. owconf

The Oberwolfach Conference Management Software "owconf" combines requirements from the fields of event management, hotel management and scientific management (reviewing, publications) and thus forms the software backbone of the management of the MFO. Because of the special requirements and due to the need of further adjustements and extensions the software was developed by the MFO IT staff itself. In 2014, the application process has been further developed and optimized.

3.3.3. Enhanced reliability

In order to ensure fail safe security, a second server room in another building has been planned, built and taken into operation. Systems

Systeme wurden, soweit noch nicht redundant vorhanden, gekauft und auf beide Serverräume verteilt, das Netzwerk entsprechend umstrukturiert. Der laufende Betrieb kann bei Ausfall eines Serverraums vom jeweils anderen Serverraum alleine gewährleistet werden.

3.3.4. Weitere Aktivitäten

Für dringende Arbeiten von unterwegs oder zuhause aus können die Mitarbeiter nun über VPN eine nahezu vollwertige Arbeitsumgebung erhalten. Dies erleichtert auch die Systemverwaltung erheblich. Die VPN-Einführung wurde durch geeignete Maßnahmen zur IT-Sicherheit flankiert.

3.4. Verwaltung und Hauswirtschaft

Aufgrund der Beschlüsse der Gemeinsamen Wissenschaftskonferenz (GWK) 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 11,72 besetzte Stellen für die wissenschaftliche Verwaltung (Organisation der Workshops, Öffentlichkeitsarbeit, Drittmittelprojekte), die Bibliothek, die IT sowie für die allgemeine Verwaltung (Finanzverwaltung, Beschaffungswesen, Personalsachbearbeitung, Vertragswesen, 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-Programmes und

have been bought to complete the redundant layout and have been distributed among both server rooms. The network has been adapted accordingly. Any of the server rooms suffices to provide the services in case the other one fails completely.

3.3.4 Further activities in 2014

For urgent matters dealt from at home or on the way, staff members will now be able to work with a nearly-perfect work-environment via VPN. This will also make the system administration much easier and has come with suitable measures concerning IT security.

3.4. Administration and housekeeping

According to the resolution of the Joint Science Conference (Gemeinsame Wissenschaftskonferenz GWK), the MFO as a member of the Leibniz Association, 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 proofed very convenient as it offers scientists the possibility to work at any time, which is used extensively.

The administration encompasses at the moment 11.72 positions, covering scientific administration (planning and organisation of the scientific program, public relation, third-party projects), 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 program 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 program and the Oberwolfach-Leibniz-Fellows program. The housekeeping department comprises

des Oberwolfach-Leibniz-Fellows-Programmes möglich. Der Hauswirtschaftsbereich umfasst insgesamt 13 Stellen für Küche und Zimmerservice sowie für die Pflege von Gebäuden und Grundstück.

13 positions for kitchen and room service as well as for the maintenance of the buildings and premises.

3.5. Finanzielle Übersicht

3.5. Financial overview

Gesamtübersicht

General overview

Erlöse 2014 (gerundet auf 1.000 €)	**Revenues 2014** (rounded)	
Zuwendung Bund/Länder	Benefits from the federation/ federal states	3.002.000
Drittmittel	Third party funds	532.000
Spenden	Donations	93.000
sonstige Einnahmen	Other income	133.000
zweckgebunde Reste aus 2013	Earmarked surpluses	417.000
Summe Erlöse	**Total revenues:**	**4.177.000**

Aufwendungen 2014 (gerundet auf volle 1.000 €)	**Expenses 2014** (rounded)	
Personalausgaben	Personnel department	1.504.000
Materialaufwand	Purchases	332.000
Aufwand für bezogene Leistungen	Expenses for drawn benefits	170.000
Abschreibungen	Consumption of fixed capital	119.000
sonstige Aufwendungen (inklusive Sachausgaben Bibliothek)	Other Expenses (with material expenses for the library)	1.019.000
Rückstellungen für zweckgebundene Reste	Provisions for earmarked surpluses	717.000
Investitionen	Investments	316.000
Summe Aufwendungen	**Total expenses:**	**4.177.000**

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 2014 bei 20%. Die zweckgebundenen Reste aus 2013 sind dabei nicht berücksichtigt.

Öffentliche Mittel

Das MFO erhielt im Haushaltsjahr 2014 insgesamt 3,002 Mio. Euro Zuwendung von Bund und Ländern.

Drittmittel

Die projektbezogenen Drittmittel rekrutierten sich im Haushaltsjahr 2014 insbesondere aus Mitteln der National Science Foundation (NSF), der Simons Foundation, der Carl Friedrich von Siemens Stiftung und der Klaus Tschira Stiftung.

Förderverein und Oberwolfach Stiftung

Zweckgebundene Spenden erhielt das MFO auch im Haushaltsjahr 2014 vom Förderverein und der Oberwolfach Stiftung. Die Gelder wurden für Reisekostenzuschüsse in besonderen Fällen und als Zuschuss zu Baumaßnahmen verwendet.

3.6. Dank

Ein besonders herzliches Dankeschön gilt den Zuwendungsgebern (Bund und Länder). Weiter gilt unser Dank allen Drittmittelgebern wie der Klaus Tschira Stiftung, der Deutschen Forschungsgemeinschaft (DFG), der Carl Friedrich von Siemens Stiftung, der National Science Foundation (NSF) und der Simons Foundation. 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 20%. Funds carried forward from 2013 are disregarded here.

Public funding

In the fiscal year 2014 the MFO received 3.002 million Euro funding from the federation and the federal states.

Third-party funds

Earmarked third party funds in the fiscal year 2014 are mainly composed of the grants from the National Science Foundation (NSF), the Simons Foundation, the Carl Friedrich von Siemens Foundation and the Klaus Tschira Foundation.

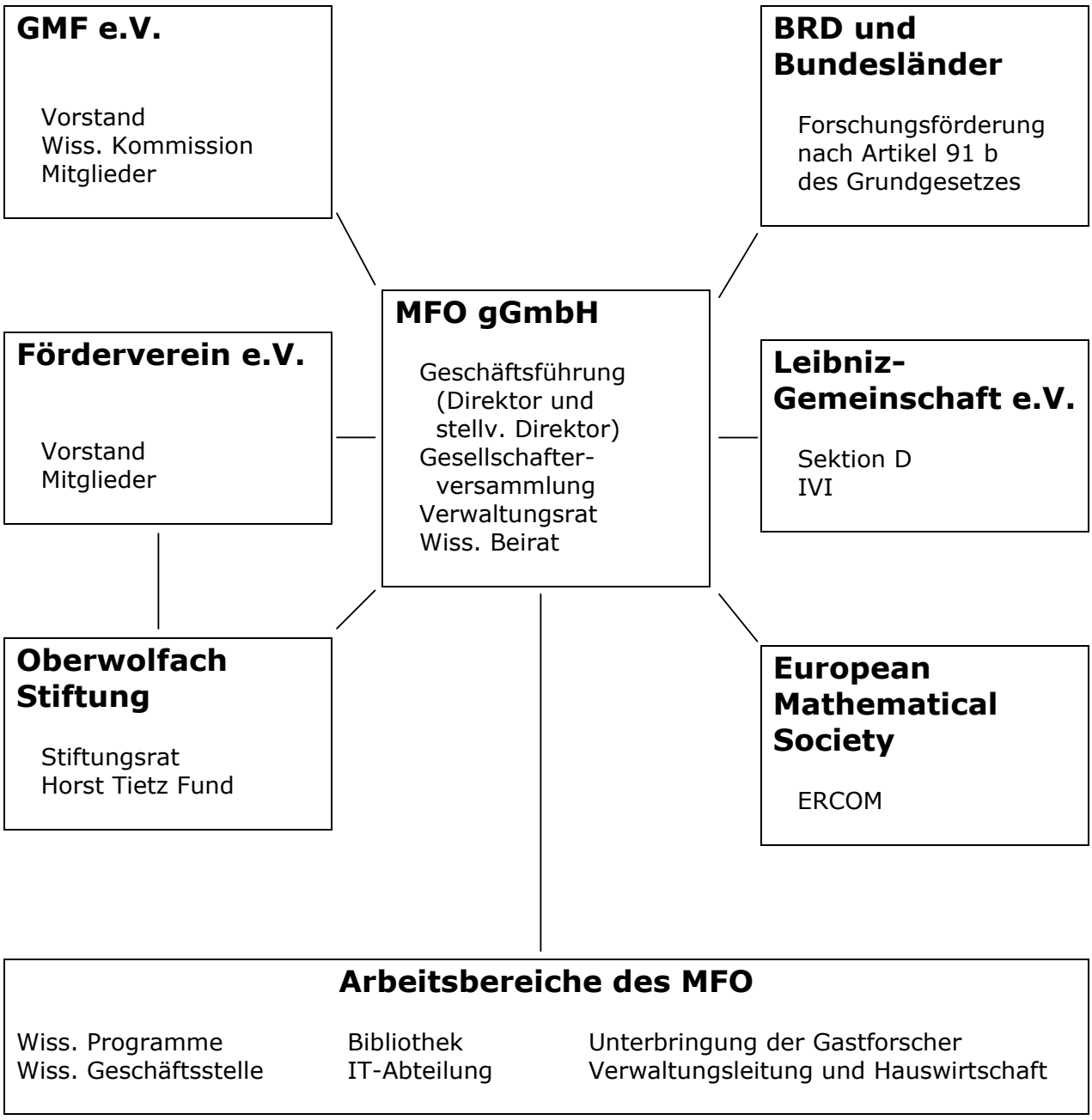
Förderverein and Oberwolfach Stiftung

Earmarked donations have been received by the Förderverein and the Oberwolfach Stiftung. These funds have been used to support travel costs for scientists in special cases and as additional support for building measures.

3.6. Acknowledgement

A particular thank-you goes to the Federation and the federal state of Baden-Württemberg for their financial support. We would also like to thank for the third-party funds received from the Klaus Tschira Foundation, the Deutsche Forschungsgemeinschaft (DFG), the Carl Friedrich von Siemens Stiftung, the National Science Foundation (NSF) and the Simons Foundation. Our special thank-you also goes to the Förderverein and the Oberwolfach Foundation for their important support of the MFO.

3.7. Organigramm



Erläuterungen

Das Mathematische Forschungsinstitut Oberwolfach (MFO) ist seit April 2005 eine gemeinnützige GmbH. Die Geschäftsführung des MFO besteht aus Direktor und stellvertretendem Direktor. Alleiniger 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. 80 Mitglieder, darunter die vier institutionellen Mitglieder DMV (Deutsche Mathematiker-Vereinigung), GAMM (Gesellschaft für angewandte Mathematik und Mechanik), EMS (European Mathematical Society) 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 etwa 600 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 Association 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 80 members, including four institutional members, namely DMV (Deutsche Mathematiker-Vereinigung), GAMM (Gesellschaft für angewandte Mathematik und Mechanik), EMS (European Mathematical Society) 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 about 600 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 (2014)

Wissenschaftliche Verwaltung	**Scientific Administration**	
Direktor	Director	Prof. Dr. Gerhard Huisken
Stellvertretender Direktor	Vice Director	Prof. Dr. Dietmar Kröner
Wissenschaftlicher Administrator	Scientific Administrator	apl. Prof. Dr. Stephan Klaus
Wissenschaftliche Mitarbeiterin	Scientific Assistant	Dr. Tatjana Ruf
Wissenschaftliche Mitarbeiter im Projekt IMAGINARY	Scientific Assistants in the project IMAGINARY	Dr. Andreas Daniel Matt, Christian Stussak
Sekretärinnen für Workshops, RiP und Seminare	Secretaries for Workshops, RiP and Seminars	Silke Okon Andrea Schillinger
Verwaltung	**Administration**	
Verwaltungsleitung	Head of Administration	Susanne Riester
Sekretärinnen im Gästebüro	Secretaries in the guest office	Annette Disch, Petra Lein, Katrin Schmid
Bibliothekarinnen	Librarians	Verena Franke, Ivonne Vetter
Sekretärin der Bibliothek	Library Secretary	Gisela Lehmann
Systemverwalter	System Administrators	Helmut Kastenholz, Christoph Weber
Hauswirtschaft	**Housekeeping**	
Hauswirtschaftsleiterin	Housekeeping Manager	Charlotte Endres
Hausmeister	Caretaker	Helmut Breithaupt
Weitere Beschäftigte	Further Housekeeping Staff	11 full time equivalent

Verwaltungsrat des MFO/Administrative Council of the MFO
(Mitglieder/Members 2014)

Tania Bolius	Ministerium für Wissenschaft, Forschung und Kunst, Stuttgart, (Vorsitzende/Chair)
Dr. Ralph Dieter	Bundesministerium für Bildung und Forschung, Bonn, (stellvertretender Vorsitzender/Vice Chair)
Prof. Dr. Jean-Pierre Bourguignon	President of the European Research Council
Prof. Dr. Friedrich Götze	Fakultät für Mathematik, Universität Bielefeld
Prof. Dr. Wolfgang Lück	Director of HIM (Hausdorff Institute for Mathematics), Mathematisches Institut Universität Bonn
Friedrich Simson	Ministerium für Wirtschaft und Wissenschaft, Saarbrücken
Dr. h.c. Klaus Tschira	Geschäftsführer der Klaus Tschira Stiftung gGmbH, Heidelberg
Dr. Indra Willms-Hoff	VolkswagenStiftung, Hannover
Prof. Dr. Günter M. Ziegler	Institut für Mathematik, Freie Universität Berlin

Wissenschaftlicher Beirat des MFO/Scientific Advisory Board of the MFO
(Mitglieder/Members 2014)

Prof. Dr. Wolfgang Lück, Bonn (Chair)
Prof. Dr. Ulrike Tillmann, Oxford (Vice Chair)
Prof. Dr. Ingrid Daubechies, Princeton
Prof. Dr. Ragni Piene, Oslo
Prof. Dr. Alfio Quarteroni, Lausanne
Prof. Dr. Madhu Sudan, Cambridge MA

Gesellschaft für Mathematische Forschung e.V. (GMF)

Vorstand der GMF/Head of the GMF
(Mitglieder/Members 2014)

Prof. Dr. Friedrich Götze, Bielefeld	Vorstandsvorsitzender der GMF/ Chair of the GMF
Prof. Dr. Günter M. Ziegler, Berlin	Vorsitzender der Wissenschaftlichen Kommission/ Chair of the Scientific Committee
Prof. Dr. Joachim Schwermer	Schatzmeister/ Treasurer

Wissenschaftliche Kommission der GMF/Scientific Committee of the GMF
(Mitglieder/Members 2014)

Prof. Dr. Günter M. Ziegler, Berlin (Chair)
Prof. Dr. Franck Barthe, Toulouse
Prof. Dr. Michel Brion, Grenoble
Prof. Dr. Bas Edixhoven, Leiden
Prof. Dr. Ben J. Green, Oxford
Prof. Dr. Uffe Haagerup, Copenhagen
Prof. Dr. Martin Hairer, Coventry
Prof. Dr. Ursula Hamenstädt, Bonn
Prof. Dr. Rupert Klein, Berlin
Prof. Dr. Gerard Laumon, Paris
Prof. Dr. Bernard Leclerc, Caen
Prof. Dr. Christian Lubich, Tübingen
Prof. Dr. Enno Mammen, Mannheim
Prof. Dr. Felix Otto, Leipzig
Prof. Dr. Michael Rathjen, Leeds
Prof. Dr. Tristan Rivière, Zürich
Prof. Dr. Thomas Schick, Göttingen
Prof. Dr. Bernd Siebert, Hamburg
Prof. Dr. Catharina Stroppel, Bonn
Prof. Dr. Endre Süli, Oxford
Prof. Dr. Xavier Tolsa, Barcelona
Prof. Dr. Wendelin Werner, Orsay
Prof. Dr. Jean-Christophe Yoccoz, Paris

New books published by the European Mathematical Society

Individual members of the EMS, member societies or societies with a reciprocity agreement (such as the American, Australian and Canadian Mathematical Societies) are entitled to a discount of 20% on any book purchases, if ordered directly at the EMS Publishing House.

Della Dumbaugh (University of Richmond, USA) and Joachim Schwermer (University of Vienna, Austria)
Emil Artin and Beyond – Class Field Theory and *L*-Functions (Heritage of European Mathematics)
ISBN 978-3-03719-146-0. 2015. 245 pages. Hardcover. 17 x 24 cm. 68.00 Euro

This book explores the development of number theory, and class field theory in particular, as it passed through the hands of Emil Artin, Claude Chevalley and Robert Langlands in the middle of the twentieth century. Claude Chevalley's presence in Artin's 1931 Hamburg lectures on class field theory serves as the starting point for this volume. From there, it is traced how class field theory advanced in the 1930s and how Artin's contributions influenced other mathematicians at the time and in subsequent years. Given the difficult political climate and his forced emigration as it were, the question of how Artin created a life in America within the existing institutional framework, and especially of how he continued his education of and close connection with graduate students, is considered. In particular, Artin's collaboration in algebraic number theory with George Whaples and his student Margaret Matchett's thesis work "On the zeta-function for ideles" in the 1940s are investigated. A (first) study of the influence of Artin on present day work on a non-abelian class field theory finishes the book. The volume consists of individual essays by the authors and two contributors, James Cogdell and Robert Langlands, and contains relevant archival material.

Martina Bečvářová (Czech Technical University and Charles University, Prague, Czech Republic) and Ivan Netuka (Charles University, Prague, Czech Republic)
Karl Löwner and His Student Lipman Bers – Pre-war Prague Mathematicians (Heritage of European Mathematics)
ISBN 978-3-03719-144-6. 2015. 310 pages. Hardcover. 17 x 24 cm. 78.00 Euro

K. Löwner, Professor of Mathematics at the German University in Prague (Czechoslovakia), was dismissed from his position because he was a Jew, and emigrated to the USA in 1939. Earlier, he had published several outstanding papers in complex analysis and a masterpiece on matrix functions. In particular, his ground-breaking parametric method in geometric function theory from 1923, which led to Löwner's celebrated differential equation, brought him world-wide fame and turned out to be a cornerstone in de Branges' proof of the Bieberbach conjecture. L. Bers was the final Prague Ph.D. student of K. Löwner. His dissertation on potential theory (1938), completed shortly before his emigration and long thought to be irretrievably lost, was found in 2006. It is here made accessible for the first time, with an extensive commentary, to the mathematical community.
This text is based on an extensive archival search and presents an in-depth account of the lives of both mathematicians, with special emphasis on the pre-war period.

Jean-Pierre Bourguignon (IHÉS, Bures-sur-Yvette, France), Oussama Hijazi (Université de Lorraine, Nancy, France), Jean-Louis Milhorat (Université de Nantes, France), Andrei Moroianu (Université de Versailles-St Quentin, France) and Sergiu Moroianu (Institutul de Matematică al Academiei Române, București, Romania)
A Spinorial Approach to Riemannian and Conformal Geometry (EMS Monographs in Mathematics)
ISBN 978-3-03719-136-1. 2015. 462 pages. Hardcover. 16.5 x 23.5 cm. 78.00 Euro

The book gives an elementary and comprehensive introduction to Spin Geometry, with particular emphasis on the Dirac operator which plays a fundamental role in differential geometry and mathematical physics. After a self-contained presentation of the basic ingredients, a systematic study of the spectral properties of the Dirac operator on compact spin manifolds is carried out. The classical estimates on eigenvalues and their limiting cases are discussed and several applications of these ideas are presented, including spinorial proofs of the Positive Mass Theorem or the classification of positive Kähler–Einstein contact manifolds. Representation theory is used to explicitly compute the Dirac spectrum of compact symmetric spaces. The special features of the book include a unified treatment of Spin^c and conformal spin geometry, an overview with proofs of the theory of elliptic differential operators on compact manifolds based on pseudodifferential calculus, a spinorial characterization of special geometries, and a self-contained presentation of the representation-theoretical tools needed in order to apprehend spinors. This book will help advanced graduate students and researchers to get more familiar with this domain of mathematics.

EMS Monograph Award Winner 2014

Patrick Dehornoy (Université de Caen, France) with François Digne (Université de Picardie Jules-Verne, Amiens), Eddy Godelle (Université de Caen, France), Daan Krammer (University of Warwick, Coventry, UK) and Jean Michel (Université Denis Diderot Paris 7, France)
Foundations of Garside Theory (EMS Tracts in Mathematics, Vol. 22)
ISBN 978-3-03719-139-2. 2015. 710 pages. Hardcover. 17 x 24 cm. 108.00 Euro

This text is a monograph in algebra, with connections toward geometry and low-dimensional topology. It mainly involves groups, monoids, and categories, and aims at providing a unified treatment for those situations in which one can find distinguished decompositions by iteratively extracting a maximal fragment lying in a prescribed family. Initiated in 1969 by F. A. Garside in the case of Artin's braid groups, this approach turned out to lead to interesting results in a number of cases, the central notion being what the authors call a Garside family. At the moment, the study is far from complete, and the purpose of this book is both to present the current state of the theory and to be an invitation for further research.
There are two parts: the bases of a general theory, including many easy examples, are developed in Part A, whereas various more sophisticated examples are specifically addressed in Part B. The exposition is essentially self-contained. It should be easy to use the text as a textbook. The first part of the book can be used as the basis for a graduate or advanced undergraduate course.

Sylvia Serfaty (Université Pierre et Marie Curie (Paris VI), France, and New York University, USA)
Coulomb Gases and Ginzburg–Landau Vortices (Zurich Lectures in Advanced Mathematics)
ISBN 978-3-03719-152-1. 2015. 165 pages. Softcover. 17 x 24 cm. 34.00 Euro

The topic of this book is systems of points in Coulomb interaction, in particular, the classical Coulomb gas, and vortices in the Ginzburg–Landau model of superconductivity. The classical Coulomb and Log gases are classical statistical mechanics models, which have seen important developments in the mathematical literature due to their connection with random matrices and approximation theory. At low temperature, these systems are expected to "cristallize" to so-called Fekete sets, which exhibit microscopically a lattice structure. The Ginzburg–Landau model, on the other hand, describes superconductors. In superconducting materials subjected to an external magnetic field, densely packed point vortices emerge, forming perfect triangular lattice patterns.
This book describes these two systems and explores the similarity between them. The book gives a self-contained presentation of results on the mean field limit of the Coulomb gas system, with or without temperature, and of the derivation of the renormalized energy. It also provides a streamlined presentation of the similar analysis that can be performed for the Ginzburg–Landau model, including a review of the vortex-specific tools and the derivation of the critical fields, the mean-field limit and the renormalized energy.

Olivier Lablée (Université Joseph Fourier Grenoble 1, Saint Martin d'Hères, France)
Spectral Theory in Riemannian Geometry (EMS Textbooks in Mathematics)
ISBN 978-3-03719-151-4. 2015. 197 pages. Hardcover. 16.5 x 23.5 cm. 38.00 Euro

Spectral theory is a diverse area of mathematics that derives its motivations, goals and impetus from several sources. In particular, the spectral theory of the Laplacian on a compact Riemannian manifold is a central object in differential geometry. From a physical point a view, the Laplacian on a compact Riemannian manifold is a fundamental linear operator which describes numerous propagation phenomena: heat propagation, wave propagation, quantum dynamics, etc. Moreover, the spectrum of the Laplacian contains vast information about the geometry of the manifold.
This book gives a self-contained introduction to spectral geometry on compact Riemannian manifolds. Starting with an overview of spectral theory on Hilbert spaces, the book proceeds to a description of the basic notions in Riemannian geometry. Then its makes its way to topics of main interests in spectral geometry. The topics presented include direct and inverse problems. Addressed to students or young researchers, the present book is a first introduction in spectral theory applied to geometry. For readers interested in pursuing the subject further, this book will provide a basis for understanding principles, concepts and developments of spectral geometry.

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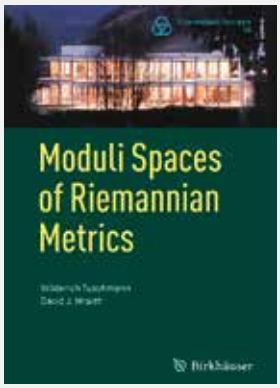

W. Tuschmann, D. J. Wraith
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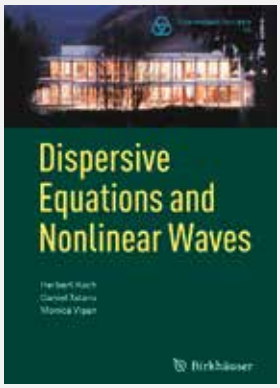

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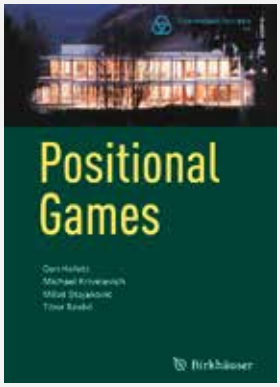

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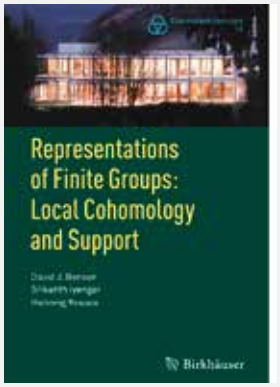

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