

Mathematisches
Forschungsinstitut
Oberwolfach

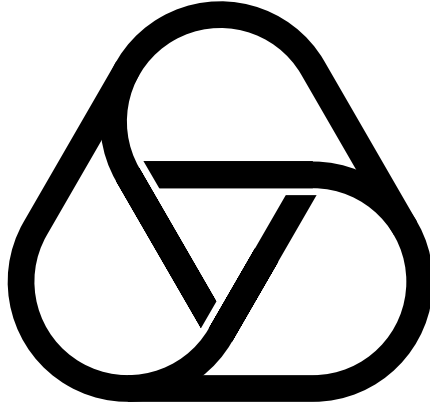
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Gerhard Huisken (Bildrechte/image credits: Gerd Fischer)

Vorwort des Direktors

Das Jahr 2021 war erneut ein schwieriges Jahr für uns. Wie schon im Vorjahr waren die wissenschaftlichen Aktivitäten des MFO von den Auswirkungen der Covid-19 Pandemie betroffen. Immerhin war das Institut durchgehend geöffnet und fast alle Veranstaltungen konnten zumindest hybrid durchgeführt werden. Glücklicherweise nahm ab dem Sommer 2021 auch die Anzahl der in Präsenz Teilnehmenden wieder zu, ebenso wie der Anteil an internationalen Gästen, begünstigt durch die sehr hohe Immunisierungsquote unter den Forscherinnen und Forschern. Abgesehen von einzelnen positiven Tests gab es keine Fälle, in denen sich eine Infektion am Institut weiterverbreitete. Bezogen auf das gesamte Jahr verminderten nationale und internationale Reisebeschränkungen sowie die Verweigerung von Dienstreisegenehmigungen aber teilweise immer noch die Anreise vieler Gäste. Sich ändernde rechtliche Vorgaben mussten immer wieder neu kommuniziert und umgesetzt werden.

Das MFO reagierte auf die schwierigen Bedingungen mit der Einführung und Erprobung neuer Formate sowie mit der weiteren Verbesserung seiner Videokonferenzsysteme. Sie werden dazu auf den folgenden Seiten dieses Berichts ausführliche Informationen finden. Als Beispiel möchte ich die Tandem-Workshops nennen. deren Ziel war es, die Interaktion mit Forscherinnen und Forschern aus weit entfernten Regionen

Director's foreword

2021 was another difficult year for us. As in the previous year, the scientific activities of the MFO were affected by the Covid-19 pandemic. At least, the Institute was open all the time and almost all scientific activities could be held in hybrid form. Fortunately, from the summer of 2021 onwards, the number of participants in attendance increased again, as did the proportion of international guests, favored by the very high immunization rate among the researchers. Apart from a few positive tests there was no case of the infection spreading among guests. However, for the year as a whole, national and international travel restrictions and the refusal of business travel permits still prevented the arrival of many guests. Frequently changing legal requirements had to be communicated and implemented time and again.

The MFO responded to the difficult conditions by introducing and testing new formats for scientific activities and further improving its video conferencing systems. You will find detailed information on the following pages of this report. I would like to mention the Tandem-Workshops as an example. Their goal was to maintain interaction with researchers from far-flung regions of the world who were particularly affected by

der Welt, die besonders von der Isolation und den Reisebeschränkungen betroffen waren, aufrecht zu erhalten. Ende 2020 nahm das MFO daher Kontakt mit dem RIMS in Japan und mit dem MATRIX Institut in Australien auf. Im Ergebnis wurden gemeinsame Tandem-Workshops ausgeschrieben (MATRIX-MFO und MFO-RIMS), von denen die ersten drei im September 2021 stattfanden. Bedauerlicherweise konnten sich die Teilnehmenden aus Japan und Australien zum geplanten Zeitpunkt weder im MATRIX Institut noch im RIMS in Präsenz treffen, da beide Länder immer noch restriktive Lockdown Richtlinien hatten. Stattdessen schalteten sie sich per Zoom dem Präsenz-Workshop in Oberwolfach zu. Trotz dieser Schwierigkeiten bei der Realisierung möchten wir Tandem-Workshops als bereichernde Ergänzung unseres Miniworkshop Programms auch in Zukunft ermöglichen um weite Entfernungen zu überbrücken.

Generell strebt das Institut jedoch wieder einen Rückgang der Online-Teilnahmen an seinen wissenschaftlichen Programmen an. Die neuen audio-visuellen Möglichkeiten zur Online-Teilnahme sollen dann nur noch in Ausnahmefällen genutzt werden (z.B. Schwangerschaft, Kinderbetreuung, Reiseverbote). Diese Zielrichtung wird gestärkt durch die Rückmeldungen, die wir von den Tagungsleiterinnen und Tagungsleitern erhalten. Die Hybridveranstaltungen des MFO werden als bestmögliche Alternative unter Pandemiebedingungen bewertet. Wesentliche Anteile der traditionellen Oberwolfach-Workshops – die intensiven persönlichen Diskussionen, die spontane Zusammenarbeit in Kleingruppen, der informelle Austausch, das Netzwerken etc. – können dadurch jedoch nicht ersetzt werden. Insgesamt scheint sich eine gewisse „Online-Müdigkeit“ unter den Wissenschaftlerinnen und Wissenschaftlern ausgebreitet zu haben, auch bedingt durch die Zusatzbelastungen in der Lehre.

Der Wunsch nach persönlicher Zusammenarbeit zeigt sich auch in den vielen Bewerbungen für längerfristige Aufenthalte von Kleingruppen, die wir in Folge unserer Ausschreibung der „Oberwolfach Research Fellows“ (OWRF) erhielten. Die hohe Resonanz hat uns dazu bewogen, OWRF ab Ende 2021 als das neue Dachformat für Langzeitaufenthalte (bisher „Research in Pairs“ und „Oberwolfach Leibniz Fellows“) am MFO einzusetzen.

Bei all den Schwierigkeiten, mit denen Forschende in den beiden vergangenen Jahren zu kämpfen hatten, freut es mich ganz besonders, dass wir wieder neue Mitglieder für die ehrenamtliche Arbeit in der Wissenschaftlichen Kommission und im Wissenschaftlichen Beirat

isolation and travel restrictions. At the end of 2020, the MFO therefore contacted the RIMS in Japan and the MATRIX institute in Australia. As a result, joint Tandem-Workshops were advertised (MATRIX-MFO and MFO-RIMS), the first three of which took place in September 2021. Unfortunately, the participants from Japan and Australia could not meet in person at the MATRIX institute or the RIMS at the planned time, as both countries still had restrictive lockdowns. Instead, they connected to the face-to-face workshop in Oberwolfach via Zoom. Despite these difficulties in the implementation, we would like to continue Tandem-Workshops as an enriching supplement to our Mini-Workshop program, in order to bridge far distances.

In general, however, the Institute is aiming for a decrease in online participation in its scientific programs. The new audio-visual capabilities for online participation should be reserved for special circumstances such as pregnancy, childcare or government travel restrictions. This is strengthened by the feedback we receive from the meetings' organizers. The hybrid events of the MFO are considered as the best possible alternative under pandemic conditions. However, significant aspects of the traditional Oberwolfach Workshops – the intensive personal discussions, the spontaneous cooperation in small groups, the informal exchange, networking etc. – cannot be replaced by online communication. Overall, a certain "online fatigue" seems to have spread among scientists, also due to the additional workload in teaching.

The desire for personal cooperation is as well reflected in the many applications for long-term stays of small groups that we received as a result of our call for applications for the "Oberwolfach Research Fellows" (OWRF). The great response has persuaded us to establish OWRF as the new umbrella format for long-term stays (previously "Research in Pairs" and "Oberwolfach Leibniz Fellows") at the MFO from the end of 2021.

Facing all the difficulties that researchers have had to struggle with in the past two years, I am particularly pleased that we have again been able to recruit new members for the honorary work in the Scientific Committee and the Scientific Advisory Board. Thomas Schick took

gewinnen konnten. Im Wissenschaftlichen Beirat übernahm Thomas Schick den Vorsitz als Nachfolger von Wolfgang Lück. Annette Huber-Klawitter ist neue stellvertretende Vorsitzende in der Nachfolge von Ulrike Tillmann. Ich danke allen Mitgliedern, die sich in den Gremien des MFO einbringen, für Ihre wertvolle Unterstützung!

Erfreulicherweise konnten wir außerdem Peter Scholze für die Leitungsgruppe der Arbeitsgemeinschaften gewinnen. Er wird in dieser Position Gerd Faltings ersetzen, für dessen langjährigen Einsatz wir sehr dankbar sind. Weitere Mitglieder der Lenkungsgruppe sind Martin Hairer und Andreas Thom. Ein herzliches Dankeschön für Ihr Engagement!

Eine Sonderveranstaltung war im Juli 2021 ein Symposium im Hybrid-Format über „Mathematical Epidemiology: Coronavirus and Communication“, das führende internationale Experten der Modellierung der Corona-Pandemie zusammenführte.

Zum zweiten Mal wurde das Institut außerdem zum deutschen Prüfungszentrum für die Internationale Mathematik-Olympiade (IMO), die in diesem Jahr erneut dezentral und virtuell organisiert werden musste.

Im Oktober des Jahres konnten wir zwar online aber doch in feierlichem Rahmen den Oberwolfach Preis an Oscar Randal-Williams übergeben, nachdem im Vorjahr die Preisverleihung leider vollständig abgesagt werden musste. Der Oberwolfach Preis wird gemeinsam mit der Oberwolfach Stiftung vergeben, die auch das Preisgeld bereitstellt.

Mit Trauer erfüllte uns die Nachricht vom Tod Detlef Schneidawinds, der seit 2014 Vorsitzender des Stiftungsrats der Oberwolfach Stiftung war. Seine Verdienste werden in einem Nachruf gewürdigt.

Neben dem wissenschaftlichen Bereich gab es auch im Infrastrukturbereich wieder einige Neuerungen. Auf der Terrasse des Gästehauses im 3. Stock wurde eine weitere Außentafel angebracht. Terrassen und Balkongeländer wurden saniert und erneuert. Das Institut investierte weiterhin stark in Nachhaltigkeit und Unabhängigkeit bei der Versorgung. Im Juli 2021 nahm das MFO seine eigene Ladestation für Elektroautos in Betrieb. Im Dezember wurde eine Photovoltaikanlage auf dem Dach der Bibliothek installiert. Für die finanzielle Unterstützung bei dieser und anderen Maßnahmen bedanke ich mich ganz herzlich beim Förderverein des MFO und der Oberwolfach Stiftung.

over the chair of the Scientific Advisory Board, succeeding Wolfgang Lück. Annette Huber-Klawitter is the new vice chair, succeeding Ulrike Tillmann. I would like to thank all members who are involved in the MFO committees for their invaluable support!

Fortunately, we were also able to win Peter Scholze for the supervising group of the Arbeitsgemeinschaften (study groups). He will replace Gerd Faltings in this position, for whose many years of engagement we are very grateful. Other members of the supervising group are Martin Hairer and Andreas Thom. Many thanks for your commitment!

A special event was a hybrid-format symposium on “Mathematical Epidemiology: Coronavirus and Communication” in July 2021, which brought together leading international experts in modeling the corona pandemic.

For the second time, the Institute became the German examination center for the International Mathematical Olympiad (IMO), which again had to be organized decentrally and virtually this year.

In October, we were happy to present the Oberwolfach Prize to Oscar Randal-Williams online in a ceremonial setting, after the award ceremony unfortunately had to be canceled completely the previous year. The Oberwolfach Prize is awarded jointly with the Oberwolfach Foundation, which also provides the prize money.

We were saddened by the death of Detlef Schneidawind, who had been chairman of the Oberwolfach Foundation board since 2014. His merits are recognized in an obituary.

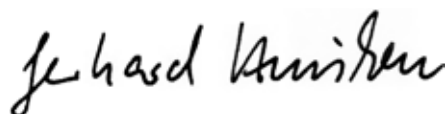
In addition to the scientific activities, there were also some innovations in the infrastructure. Another outdoor blackboard was installed on the terrace of the guest house on the 3rd floor. Terraces and balcony railings were renovated and renewed. The Institute continued to invest heavily in sustainability and self-sufficiency. In July 2021, the MFO put its own charging station for electric cars into operation. In December, a photovoltaic system was installed on the roof of the library. I would like to express my sincere thanks to the Friends of the Oberwolfach and the Oberwolfach Foundation for their financial support for this and other measures.

Auch unseren Zuwendungsgebern aus Bund und Ländern, sowie unseren Drittmittelgebern möchte ich ein herzliches Dankeschön aussprechen. Die Carl Friedrich von Siemens Stiftung hilft uns bei der Förderung des wissenschaftlichen Nachwuchses in den Oberwolfach Seminaren, die in diesem Jahr glücklicherweise wieder stattfinden konnten, sowie in der Bibliothek. Die National Science Foundation der USA unterstützt den wissenschaftlichen Nachwuchs bei den Reisekosten und die Simons Foundation fördert die Zusammenarbeit von Forschenden in und außerhalb Europas. Die Oberwolfach Stiftung unterstützt uns immer wieder bei wichtigen Infrastrukturprojekten und stellt zudem die Finanzierung der Oberwolfach Foundation Fellowship bereit.

Ein großes Dankeschön gilt außerdem all unseren Mitarbeiterinnen und Mitarbeitern für ihren besonderen Einsatz in dieser schwierigen Zeit, die mehrfach zu außergewöhnlichen Belastungen geführt hat. Nicht lange vor dem Beginn der Pandemie, bei unserem Jubiläum im Jahr 2019, lobten Festredner und Gäste die große Strahlkraft des Instituts, betonten die Vorfreude der Forschenden bei der Anreise nach Oberwolfach und beschrieben das Hochgefühl und die besondere Stimmung während eines Forschungsaufenthalts. Gemeinsam ist es uns gelungen, das Institut trotz aller Widrigkeiten und notwendigen Anpassungen als einen solch besonderen Ort zu erhalten, wie uns die Rückmeldungen der anwesenden Gäste bestätigen.

I would also like to thank our funding agencies at the federal and state levels, as well as our third-party donors. The Carl Friedrich von Siemens Foundation helps us to promote junior scientists in the Oberwolfach Seminars, which fortunately could take place again this year, and supports our library. The US National Science Foundation supports junior scientists with travel expenses and the Simons Foundation promotes collaboration between researchers in and outside of Europe. The Oberwolfach Foundation repeatedly supports us in important infrastructure projects and in addition provides the financing for the Oberwolfach Foundation Fellowship.

A big thank-you also goes to all our employees for their special commitment during these difficult times which often led to additional burdens. Not long before the beginning of the pandemic, at our anniversary in 2019, speakers and guests praised the Institute's great appeal, emphasized the researchers' happiness when traveling to Oberwolfach and described the sense of delight and special atmosphere during a research stay. Together we have managed to preserve the Institute as such a special place, despite all the challenges and necessary adjustments, as the feedback from the guests on site confirms to us.



Gerhard Huisken

1. Institutsnachrichten

1.1. Neuerungen im wissenschaftlichen Programm

Im Jahr 2021 wurden die Hybrid- und Online-Workshops, die 2020 aufgrund der Corona-Pandemie erstmals angeboten wurden, fortgeführt. Ergänzend wurden neue Formate für die Zusammenarbeit zwischen Gruppen an verschiedenen Orten erprobt. Die bisherigen Langzeitprogramme „Research in Pairs“ und „Oberwolfach Leibniz Fellows“ wurden unter dem neuen Dachformat „Oberwolfach Research Fellows“ flexibler gestaltet. Mit den neu ausgeschriebenen „networking activities“ beabsichtigt das MFO eine noch stärkere Förderung von Vielfalt, Chancengleichheit und Vernetzung in der mathematischen Forschung.

„Research in Pairs“ wird zu „Oberwolfach Research Fellows“

Seit 2020 bietet das MFO die Möglichkeit, sich für eine „Oberwolfach Research Fellowship“ (OWRF) innerhalb der bestehenden Programme „Research in Pairs“ und „Oberwolfach Leibniz Fellows“ zu bewerben. Angesichts der Herausforderungen der Corona-Krise für die Wissenschaftswelt sollte dieses Angebot Wissenschaftlerinnen und Wissenschaftlern, insbesondere dem wissenschaftlichen Nachwuchs, eine Perspektive geben. Mit seiner erweiterten Flexibilität erwies sich das Programm als großer Erfolg und wir erhielten viele Bewerbungen. 2021 wurde daher beschlossen, dass OWRF das neue Dachformat für längerfristige Forschungsaufenthalte in Oberwolfach werden soll. Damit wird aus dem bisherigen „Research in Pairs“-Programm das neue „Oberwolfach Research Fellows“-Programm, einschließlich der Möglichkeit für Nachwuchswissenschaftler und Nachwuchswissenschaftlerinnen, sich für eine „Oberwolfach Leibniz Fellowship“ mit finanzieller Förderung zu bewerben.

Tandem-Workshops mit MATRIX und RIMS

Im Jahr 2020 schrieb das MFO gemeinsam mit dem Australian Mathematical Research Institute MATRIX und dem Research Institute for Mathematical Sciences (RIMS) in Kyoto erstmals Tandem-Workshops aus.

An einem Tandem-Workshop können pro Institut 10-20 Personen teilnehmen, die auf die übliche, intensive Weise vor Ort miteinander interagieren können. Zusätzlich können sie sich mit den Teilnehmerinnen und Teilnehmern des jeweiligen Tandem-Instituts per Videokonferenz austauschen, Vorträge streamen und gemeinsam

1. News from the Institute

1.1. Novelties in the scientific program

In 2021, the hybrid and online workshops, which were offered for the first time in 2020 due to the corona pandemic, were continued. In addition, new formats for cooperation between groups at different locations were tested. The previous long-term programs „Research in Pairs“ and „Oberwolfach Leibniz Fellows“ have been made more flexible under the new umbrella format „Oberwolfach Research Fellows“. With the newly advertised „networking activities“, the MFO intends to promote diversity, equal opportunities and networking in mathematical research even more.

„Research in Pairs“ becomes „Oberwolfach Research Fellows“

In 2020 the MFO started to offer the possibility to apply for an „Oberwolfach Research Fellowship“ (OWRF) within the existing programs „Research in Pairs“ and „Oberwolfach Leibniz Fellows“. Facing the challenges of the corona crisis for the scientific world, this offer was meant to provide a perspective for scientists, in particular for junior scientists. With its enhanced flexibility the program proved to be a great success and the Institute received many applications. In 2021 it was therefore decided that OWRF should become the new umbrella format for longer term research stays in Oberwolfach. Thus, the former „Research in Pairs“ program evolves to the new „Oberwolfach Research Fellowship“, including the possibility for junior researchers to apply for an „Oberwolfach Leibniz Fellowship“ with financial support.

Tandem-Workshops with MATRIX and RIMS

Together with the Australian Mathematical Research Institute MATRIX and the Research Institute for Mathematical Sciences (RIMS) in Kyoto the MFO called for applications for Tandem-Workshops in 2020 for the first time.

In a Tandem-Workshop 10-20 people at each participating institute can interact with each other in the usual, intensive way on site. In addition, they can communicate with the participants of the respective tandem institute via video conference, stream lectures and discuss. The first workshops in this format were planned

diskutieren. Die ersten Workshops in diesem Format waren für 2021 geplant. Aufgrund der noch andauernden Pandemie und den damit verbundenen Einschränkungen in den jeweiligen Ländern konnten sich die Teilnehmerinnen und Teilnehmer in Japan und Australien leider nicht wie geplant an einem Ort treffen, sondern schalteten sich größtenteils virtuell dem Treffen in Oberwolfach zu. Grundsätzlich stieß das neue Format aber auf positive Resonanz. Für 2022 und 2023 wurden bereits weitere Tandem-Workshops ausgeschrieben.

Small collaborations

Aufgrund der weltweiten Reisebeschränkungen angesichts der Corona-Pandemie hatte das MFO in bestimmten Wochen vor Juni 2021 begrenzte zusätzliche Kapazitäten. Das Institut rief deshalb Forscherinnen und Forscher dazu auf, Anträge für die kleine, einwöchige, interaktive Mini-Workshops oder Seminare zu stellen, die gemeinsam von Oberwolfach und ihrer eigenen Institution organisiert werden sollten. Beispielsweise konnte eine Gruppe von 4-10 Personen, die nach Oberwolfach reisen konnten, sich mit einer Gruppe ähnlicher Größe an einer weit entfernten Institution zusammenschließen. Die „small collaborations“ ermöglichten eine intensive persönliche Interaktion an jedem der beiden Orte, bereichert durch eine bestimmte Anzahl von gemeinsam durchgeführten virtuellen Vorträgen und Diskussionen.

Networking activities

Mit den „networking activities“ führte das MFO 2021 eine neue Kategorie von Workshops innerhalb seines wissenschaftlichen Programms ein. Das Ziel ist es, Chancengleichheit und Vielfalt noch stärker zu fördern und den Einfluss von Minderheiten in der Mathematik zu stärken. Das MFO ruft deshalb dazu auf, Anträge für Workshops mit ausgeprägten Vernetzungs- und Mentoringaktivitäten einzureichen. Vorschläge können innerhalb des Workshop-Programms (das auch halbe Workshops umfasst) und im Miniworkshop-Programm eingereicht werden. Die Fristen und Einreichungsverfahren sind dieselben wie für die traditionellen Formate. Die Wissenschaftliche Kommission wird Anträge für „networking activities“ auf der Grundlage der wissenschaftlichen Qualität und des Konzepts für Vernetzungs- und Mentoringaktivitäten diskutieren und entscheiden. Die Begutachtung erfolgt gleichzeitig aber unabhängig von den traditionellen Formaten.

for 2021. Due to the ongoing pandemic and the associated restrictions in the respective countries, the participants in Australia and Japan were unfortunately not able to meet in one place as previously planned, but mostly joined the meeting in Oberwolfach virtually. However, in general the new format met with a positive response. Further Tandem-Workshops have already been advertised for 2022 and 2023.

Small collaborations

Due to worldwide travel restrictions in view of the corona pandemic the MFO had limited additional capacity in specific weeks before June 2021. Therefore, the Institute invited applications from researchers who wanted to organize small scale, week-long interactive Mini-Workshops or seminars jointly between the MFO and their own institution. For example, a group of 4-10 researchers able to travel to Oberwolfach could team up with a group of similar size at an institution far away to run an activity combining intense personal interaction locally in each of the two places with a certain number of joint virtual lectures and discussions.

Networking activities

With the “networking activities” the MFO introduced a new category of workshops within its scientific program. The aim is to enhance gender and diversity, and to strengthen the impact of minorities in mathematics. The MFO therefore calls for proposals for workshops with a distinguished networking character including mentoring activities. Proposals can be submitted within the Workshop program (which also includes Workshops of half size) and the Mini-Workshop program. The deadlines and submission procedures are the same as for the traditional Workshops and Mini-Workshops. The Scientific Committee will discuss and decide proposals for networking activities based on the scientific quality and the concept for networking and mentoring activities. The review will take place at the same time but independently of the traditional formats.

1.2. Investitionen in die Infrastruktur

Das MFO investierte im Jahr 2021 weiterhin in die Nachhaltigkeit und Unabhängigkeit bei der Versorgung. Im Juli nahm das Institut seine eigene Ladestation für Elektroautos in Betrieb. Gäste und Personal können nun auf dem Parkplatz des Instituts E-Autos laden. Im Dezember wurde eine Photovoltaikanlage auf dem Dach der Bibliothek installiert, mit der das MFO einen großen Teil seines Strombedarfs selbst decken kann.



Photovoltaikanlage / Photovoltaicsystem

Die Videokonferenzanlagen in den Vortragsräumen wurden 2021 erweitert und verbessert. Hochwertige Deckenmikrofone, Matrixmischer und sehr gute Lautsprecher sorgen nun überall für eine hervorragende Tonqualität. Sogenannte Trackingkameras schwenken automatisch auf den korrekten Bildausschnitt wenn sich die vortragende Person von einer Tafel zur nächsten bewegt.



Automatisch schwenkende Deckenkamera / Automatically panning ceiling camera

Auch in die Verbesserung der Arbeitsbereiche der Gäste wurde investiert. Auf der Terrasse des Gästehauses im 3. Stock wurde eine weitere

1.2. Innovations in infrastructure

In 2021, the MFO continued to invest in sustainability and self-sufficiency. In July, the Institute put its own charging station for electric cars into operation. Guests and staff can now charge electric cars at the Institute's parking lot. In December, a photovoltaic system was installed on the roof of the library, with which the MFO can cover a large part of its electricity needs itself.



Ladestation für E-Autos / Charging station for electric cars

The video conferencing systems in the lecture halls were further enhanced in 2021. High-quality ceiling microphones, matrix mixers and very good loudspeakers now ensure excellent sound quality. So-called tracking cameras automatically pan to the correct section when the lecturer moves from one blackboard to the next.



Neue Außentafel auf einer erneuerten Terrasse / New outdoor blackboard on a renewed terrace

Investments have also been made in improving guest workspaces. Another outdoor blackboard was installed on the terrace of the guest house

Außentafel angebracht. Terrassen und Balkon-
geländer wurden saniert und erneuert.

Um den Zugang zum umliegenden Gelände und
die Nutzung eines Fußwegs zu erleichtern wurde
außerdem im Außenbereich der Bibliothek eine
neue Treppe angelegt.



Treppe an der Bibliothek / Staircase at the library

1.3. Verleihung des Oberwolfach Preises

Prof. Dr. Oscar Randal-Williams erhielt den
Oberwolfach Preis für seine herausragenden
Leistungen in der Geometrie und Topologie. Die
Preisverleihung fand am 16. Oktober 2021 im
Mathematischen Forschungsinstitut Oberwol-
fach statt.

Oscar Randal-Williams studierte und promo-
vierte in Oxford. Seit 2012 forscht und lehrt
er an der Universität Cambridge. Seine Arbeit
führte zu bedeutenden Fortschritten in der al-
gebraischen Topologie. Einen Einblick bietet
die nachfolgende Laudatio von Prof. Dr. Ulrike
Tillmann.



*Begrüßung durch Gerhard Huisken / Welcoming
speech by Gerhard Huisken*

on the 3rd floor. Terraces and balcony railings
were renovated and renewed.

In addition, a new staircase was built outside
the library to facilitate access to the surrounding
grounds and the use of an adjacent footpath.

1.3. Presentation of the Oberwolfach Prize

Prof. Dr. Oscar Randal-Williams received the
Oberwolfach Prize for his outstanding work in
geometry and topology. The award ceremony
took place on October 16, 2021 at the Mathe-
matisches Forschungsinstitut Oberwolfach.

Oscar Randal-Williams studied and received his
doctorate in Oxford. He has been researching
and teaching at the University of Cambridge
since 2012. His work led to significant advances
in algebraic topology. The laudation by Prof. Dr.
Ulrike Tillmann presented at the following pages
provides an insight.



*Laudatio von Ulrike Tillmann / Laudation by
Ulrike Tillmann*

Wegen der Einschränkungen durch die Corona-Maßnahmen fand die Preisverleihung per Videokonferenz statt. Der Preisträger und die Laudatorin wurden aus Großbritannien zugeschaltet. Vor Ort begrüßte Prof. Dr. Gerhard Huisken die anwesenden Gäste, mehrheitlich Mitglieder der Aufsichts- und Beratungsgremien des MFO sowie einige aktuell am MFO arbeitenden Forscherinnen und Forscher. Als Vorsitzende des Vereins zur Förderung des Mathematischen Forschungsinstituts Oberwolfach e.V. entrichtete Prof. Dr. Dr. h.c. Ursula Gather ein Grußwort. Der in diesem Jahr neugewählte Vorsitzende der Oberwolfach Stiftung, Prof. Dr. Thomas Peternell, schloss sich mit einem Grußwort an. Es folgte die Laudatio durch Prof. Dr. Ulrike Tillmann. In einem 40-minütigen Vortrag erläuterte der Preisträger dem interessierten Fachpublikum schließlich die Kernpunkte seiner aktuellen Forschungsarbeit, knüpfte dabei an das zuvor in der Laudatio Vorgelegte an und wies auf noch offene Fragen und Probleme hin.

Die Oberwolfach Stiftung und das Mathematische Forschungsinstitut Oberwolfach verleihen den Oberwolfach Prize circa alle drei Jahre an exzellente Nachwuchsforscherinnen und Nachwuchsforscher in unterschiedlichen mathematischen Gebieten. Über die Vergabe entscheidet die Wissenschaftliche Kommission der Gesellschaft für Mathematische Forschung. Der Preis ist mit 10.000 € dotiert.

Due to the restrictions imposed by the Corona pandemic, the award ceremony took place via video conference. The award winner and the laudator were connected from Great Britain. On site, Prof. Dr. Gerhard Huisken welcomed the guests, mostly members of the MFO's supervisory and advisory committees, as well as some researchers currently working at the MFO. The chairperson of the Friends of Oberwolfach, Prof. Dr. Dr. h.c. Ursula Gather, gave a short welcoming speech followed by the newly elected chairperson of the Oberwolfach Foundation, Prof. Dr. Thomas Peternell. Afterwards the laudatory speech was given by Prof. Dr. Ulrike Tillmann. Finally, in a 40-minute presentation, the award winner explained the main points of his current research work to the interested audience, referring to what was presented in the laudatory speech, and also pointed out open questions and problems.

The Oberwolfach Foundation and the Mathematisches Forschungsinstitut Oberwolfach award the Oberwolfach Prize to excellent junior researchers in various mathematical fields approximately every three years. The Scientific Committee of the Gesellschaft für Mathematische Forschung decides on the award. The prize is endowed with €10,000.



Bei der Preisübergabe / At the presentation of the award: Oscar Randal-Williams, Gerhard Huisken, Ursula Gather, Thomas Peternell

OBERWOLFACH PRIZE 2019
LAUDATIO FOR OSCAR RANDAL-WILLIAMS

ULRIKE TILLMANN

Oscar Randal-Williams received his DPhil in 2009 from the University of Oxford, spent two years as a post-doc in Copenhagen, and is now Professor at the University of Cambridge. Despite his short career so far he has had a profound and far reaching impact on geometric topology through his expansive research and engagement.

Manifolds are most central objects in geometry and topology. In joint work with Soren Galatius, Randal-Williams completed a program that generalised to higher dimensional manifolds simultaneously Harer stability for mapping class groups and Madsen and Weiss's celebrated work on Mumford's conjecture. It should be stated that it was not at all clear what even the statement of an analogue in higher dimensions might be yet alone how it should be proven.

To state the most basic case, one considers even dimensional manifolds that are connected sums of g copies of products of spheres

$$W_{g,1} = D^{2n} \# (S^n \times S^n) \# \dots \# (S^n \times S^n)$$

Let $\text{Diff}_\partial(W_{g,1})$ denote its group of diffeomorphisms that fix the boundary point-wise, and let $B\text{Diff}_\partial(W_{g,1})$ be its classifying space, also thought of as a topological moduli space for $W_{g,1}$. When $n = 1$, the manifold $W_{g,1}$ is an oriented surface of genus g with one boundary component and $B\text{Diff}_\partial(W_{g,1})$ has indeed the same homotopy type as Riemann's moduli space. Using parametrized surgery, a technique that they refined, Galatius and Randal-Williams prove homology stability for their moduli spaces

$$H^*(B\text{Diff}_\partial(W_{g,1})) \text{ is independent of } g \quad \text{for } * < g/2$$

and compute the rational cohomology of their limit spaces as g goes to infinity

$$H^*(B\text{Diff}_\partial(W_g, 1)) \simeq \mathbb{Q}[\kappa_c \mid c \in \mathcal{B}] \quad \text{for } g \rightarrow \infty$$

Here $2n \geq 6$ and \mathcal{B} is the set of monomials in the Euler and Pontryagin classes

$$\{e, p_{n-1}, \dots, p_{\lceil \frac{n+1}{4} \rceil}\}$$

To put this in context, algebraic topology can claim huge successes for the study of manifolds through the hands of the early pioneers of Thom, Milnor, Smale, Novikov, and others. However, progress then became slower. A major program from the 1970s and 1980s aims to study manifolds via stable homotopy and algebraic K -theory. Here one replaces a d -dimensional manifold M by successive thickenings of itself

$$M \rightsquigarrow M \times I \rightsquigarrow \dots \rightsquigarrow M \times I^k$$

where $I = [0, 1]$ is a unit interval. The limit of the associated moduli spaces is then computable via Waldhausen K -theory while information for M is deduced via Igusa's stability theorem, valid roughly in dimensions $* < d/3$. This puts a uniform bound on the information attainable via this methods for all d -dimensional

manifolds. Furthermore, despite sophisticated tools such as the cyclotomic trace, algebraic K -theory itself remains difficult to compute.

In this new approach a different stabilisation method is used. Instead of thickening the manifold M (and hence increasing its dimension), its complexity is increased by taking repeated connected sums with a fixed manifold, such as $Q = S^n \times S^n$ in even dimensions $d = 2n$

$$M \rightsquigarrow M\#Q \rightsquigarrow \dots \rightsquigarrow M\#_g Q$$

Galatius and Randal-Williams show that the limit of the associated moduli space is computable via (tangential) cobordism theory $\mathbf{MTSO}(2n)$ which at least rationally is completely understood.

These results have already led to imaginative and surprising applications. We mention just one such application. In joint work with Ebert and Botvinnik, Randal-Williams studies the space of positive curvature metrics

$$\mathcal{R}^{>0}(M) = \{\mathfrak{g} \mid \text{scal}(\mathfrak{g}) > 0\}$$

on a simply connected Spin manifold M of dimension $d \geq 6$. These spaces have initially been studied by Hitchin and more recently by Schick and collaborators. Randal-Williams and co-authors show that these spaces display a rich and highly complex topology. Surprisingly, as Randal-Williams shows in his more recent paper with Ebert, they form an object to which the powerful tools of stable homotopy theory can be applied.

In a rather different direction a third theme in Randal-Williams' research, higher algebra, provides a completely new approach to homology stability for a series of automorphism groups. In addition to a long foundational paper, jointly with Galatius and Kupers, he wrote two papers with applications to mapping class groups and general linear groups solving among other long standing problems going back 25 and 30 years. This is quite typical of Randal-Williams' work. He is not afraid to develop highly complex theory drawing on techniques from algebra, geometry or homotopy theory, and then to apply this to concrete questions often by means of hard and intricate computations.

For his impressive body of work, Oscar Randal-Williams has been awarded with the 2019 Oberwolfach Prize by the Oberwolfach Foundation.

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1.4. Symposium “Mathematical Epidemiology: Coronavirus and Communication”

The equations underlying mathematical models in epidemiology are analytically several notches simpler than equations used in for instance weather modelling. Nevertheless, the hard lessons learnt from over a year with COVID-19 indicate that in certain key aspects related to the data-driven nature of these problems, predicting the evolution of the coronavirus pandemic is much more difficult than predicting the weather: these aspects range from the interpretation, reliability and correct statistical analysis of available data to the modelling of the unpredictability of human nature, but also the different forms of communication between public controversy and scientific discourse.

The Symposium aimed to establish a scientific forum, primarily within the mathematical community, to exchange experiences from the past year, identify possible directions in which outward looking mathematics in particular can contribute to more reliable epidemic modelling in the future, and to discuss how to address the difficulties faced when the lines between mathematical theorem and policy advice start to blur.

Within the MFO program of “small collaborations” it brought together mathematicians from the section “Mathematics” within the German National Academy of Science Leopoldina with researchers worldwide engaged in the modelling of COVID-19.

Due to the pandemic the hybrid format allowed only a limited number of participants present in Oberwolfach, with additional online participation, e.g. from the mathematical section of the Leopoldina. There was a balance between in depth presentations on the different mathematical approaches, discussions of assumptions as well as of reliability of data, and discussions concerning scientific discourse and public communication of predictions in an environment of high public interest and controversy.



Organizers

Gerhard Huisken, Mathematisches Forschungsinstitut Oberwolfach
Stefan Müller, Hausdorff Center for Mathematics, Bonn
Felix Otto, MPI Mathematics in the Sciences, Leipzig
László Székelyhidi, Mathematisches Institut, Universität Leipzig

Talks

On assessment and scenarios – Mathematical models for the spread of COVID-19

Maria Vittoria Barbarossa (Frankfurt Institute for Advanced Studies)

In this talk I will shortly review our modeling work during the COVID-19 pandemic, with special application to the German data. The talk will touch aspects concerning the ascertainment ratio, the age distribution of cases/deaths, the application of non-pharmaceutical interventions and the compliance with those.

Challenges in monitoring and control of Covid-19

Lukas Böttcher (Frankfurt School)

My talk focuses on three key challenges in pandemic management: (i) confounding factors in monitoring mortality, (ii) achieving epidemic control with targeted interventions, and (iii) strategic vaccination under epidemiological uncertainty. In the first part of my talk, I will discuss how testing statistics and excess death data can be combined to improve estimation of mortality, which is complicated by several factors such as varied definitions of mortality, uncertainty in disease prevalence, and biased sampling. These and other confounding factors, such as reporting and processing delays, also limit the effectiveness of test-trace-and-isolate (TTI) interventions. To overcome limitations associated with standard (or “manual”) TTI, the second part of my talk will provide an overview of TTI interventions that use data assimilation (DA) on a contact network to estimate individual risk of infection. Network DA, which borrows techniques from weather forecasting for assimilating sparse data into massive and complex systems, utilizes diverse sources of health data and proximity data from mobile devices, and can be flexibly extended to incorporate additional uncertain data sources. In the third and last part of my talk, I will focus on identifying strategic vaccination protocols for prime-boost regimes under epidemiological uncertainty and limited vaccine supplies.

Combining scientific research with media contacts: some personal reflections

Tom Britton (Stockholm University)

During the covid-19 pandemic I have tried to combine methodological research on epidemic models (of which I have a long experience) with accepting to participate in many media requests regarding the ongoing covid-19 pandemic (of which I earlier had very little experience). This has been interesting and fun but sometimes stressful and hard. In the talk I will discuss some experiences I have made. Issues I will touch upon include: What should be modeled/estimated and how?, Should all issues be discussed in media?, What do to if you have been wrong?, How do you express lack of knowledge?

The 1927 epidemic model of Kermack & McKendrick: a success story or a tragicomedy?

Odo Diekmann (Utrecht University)

On June 15, 2021, the paper [1] had 48.206 downloads, since online publication in 1997, and 7994 citations, according to Google Scholar. So in that sense the paper is hugely successful. Yet the common understanding, that the paper is

about the SIR compartmental model, is a complete misconception. It appears that nobody actually reads the paper ...

The aim of the lecture is to exhibit, as in [2,3], the true contents and to argue that, with a small twist, see [4], the Kermack-McKendrick model can function as a very powerful tool for exploring control scenarios for specific diseases such as Covid-19.

- [1] Kermack, W. O., & McKendrick, A. G. (1927). A contribution to the mathematical theory of epidemics. *Proceedings of the Royal Society of London. Series A, Containing papers of a mathematical and physical character*, 115 (772): 700–721.
- [2] Breda, D., Diekmann, O., de Graaf, W. F., Pugliese, A. & Vermiglio, R. (2012): On the formulation of epidemic models (an appraisal of Kermack and McKendrick), *Journal of Biological Dynamics*, 6, sup2: 103–117.
- [3] Diekmann, O., Heesterbeek, J. A. P., Britton, T. (2012) *Mathematical Tools for Understanding Infectious Disease Dynamics*, Princeton University Press
- [4] Diekmann, O., Othmer, H.G., Planqué, R., Bootsma, M.C.J. (submitted) On discrete time epidemic models in Kermack-McKendrick form

Nonlinear Dynamics of Epidemic Waves

Frank Jülicher (Max Planck Institute for the Physics of Complex Systems)

Epidemic waves emerge from the collective interplay of large numbers of individuals and pathogens. They are examples of nonlinear excitations that are triggered in a nucleation event. After passing through an unstable growth phase, they stabilize and decline. Our work has aimed to identify general and robust features of these nonlinear waves and use the insight gained to interpret publicly available data.

While many factors influence the dynamics of epidemic waves, some factors stand out in that they can dramatically change the time course in ways that simple models can miss. A key example is population heterogeneity. We have modified the simple SIR model to capture effects of broad distributions of the susceptibility to infection in the population, without changing the mathematical simplicity of the SIR model. This heterogeneous SIR model captures power-law distributions by a single new parameter. We show that if the degree of heterogeneity in the population is not known, it is difficult to infer the effects of mitigation measures and that such effects can be weaker than is usually thought. We have focussed on data of the Covid-19 epidemics in Germany and propose a simple scenario that can quantitatively account for the observed time course. We present evidence that in 2020-2021 a sequence of four distinct self-limited waves, likely associated with different virus variants have passed through Germany and have now decayed. In this view of epidemic waves as stochastically triggered nonlinear excitations, the observed seasonality of epidemics is an example of stochastic resonance, where a weak periodic seasonal bias is amplified by the underlying nonlinear dynamic process.

Disease propagation and graph theory

László Lovász (Hungarian Academy of Science)

Disease propagation can be modeled by differential equations (mean field models in the language of statistical physics) or by local processes on networks. The advantage of the network model is that more features can be included in the model (geography, hierarchical structure, superspreaders, etc.); the disadvantage is that more data are needed for this, quite often much more than what is available. Can the substantial body of knowledge about graphs be used here? Can graph theory lead to recognizing new phenomena?

I will talk a bit about random graph models, and then show how classical results can be used to prove one phenomenon, namely that if the network has a denser

“central region”, then for low infection rates, an epidemic starting from the central region is worse than an epidemic starting from a uniformly distributed seed, while for higher infection rates, it is the other way around.

This is joint work with Domonkos Czifra, Márton Karsai, Julia Komjáthy and Gergely Ódor.

Modelling assumptions in statistics and forward simulation, proxy data for Corona and how estimators can be constructed

Stephan Luckhaus (Leipzig University)

I will very briefly discuss the result by Willy Feller (1939) that individual based stochastic epidemiological models have as their hydrodynamic limit a McKendrick equation. This means basically: Anything you can predict in the large number limit for your stochastic model, you can also predict by the kinetic equation.

But as some in the audience know, with my contribution I ran into censorship problems with NAL-live and arxiv. This had nothing to do with McKendrick, it was due to the discussion of data. So that is the focus of the talk: population wide data on one side and small studies with sample populations (order of magnitude 1000) and less than 100 infections (Vo, Gangelt, and a new study, published in May, on Corona in public transport in the Frankfurt region).

The work of the Hungarian COVID-19 Mathematical Modelling and Epidemiological Analysis Task Force

Gergely Röst (University of Szeged)

The Hungarian COVID-19 Mathematical Modelling and Epidemiological Analysis Task Force (also known as the “epimath team”) was assembled in March 2020, to provide in-depth epidemiological situation reports, forecasting, and scenario analysis to support evidence informed decision making during the COVID-19 pandemic. It is a multidisciplinary team of specialists from many institutions across the country, including mathematicians, medical doctors, epidemiologists, statisticians, network scientists, system biologists, public health experts, computer scientists and mathematical social scientists. Our aim was to integrate a wide range of competencies to tackle the complex public health, economical and societal challenges posed by the pandemic. This was an innovative initiative in Hungary, and in this talk we summarize how this team has worked and what has been achieved in the past sixteen months, regarding policy advisory and scientific research.

Panel Discussion

Parameter and data uncertainty in mathematical modelling

Andrew Azman (Baltimore), Nigel Goldenfeld (Chicago), Yvon Maday (Paris)

1.5. Nachruf

Detlef Schneidawind (1944 – 2021)



Detlef Schneidawind (Quelle: Munich Re)

Die Oberwolfach Stiftung und das Mathematische Forschungsinstitut Oberwolfach trauern um Detlef Schneidawind, der am 16. Juli 2021 nach schwerer Krankheit im Alter von 77 Jahren verstarb.

Detlef Schneidawind wurde am 23. Mai 1944 im Allgäu geboren. Nach seinem Studium der Rechtswissenschaften und der Betriebswirtschaft in München und Köln begann er 1973 als Sachbearbeiter in der Personalabteilung der Münchener Rück. Nach dann zehn Jahren als Leiter des Vorstandssekretariats übernahm er die Leitung eines Teilbereichs der Lebensrückversicherung. Parallel studierte er nochmals an der Universität Bayreuth und promovierte 1989 im Bereich der Erwachsenenpädagogik zum Thema „Erwachsenenbildung und Beruf: Funktion und Organisation der beruflichen Weiterbildung“. Von 1991 bis zu seinem Ruhestand im Jahr 2005 war er Mitglied des Vorstands der Münchener Rück und verantwortete die Lebens- und Krankenrückversicherung sowie den Bereich Personal. Von 2011 bis 2018 gehörte Detlef Schneidawind dem Aufsichtsrat der Nürnberger Beteiligungs-AG an, ab 2015 war er dessen Vorsitzender.

Zusätzlich engagierte er sich seit 2014 als Vorsitzender des Stiftungsrats der Oberwolfach Stiftung für die Förderung von Wissenschaft und Forschung am Mathematischen Forschungsinstitut Oberwolfach. Seine Expertise und Übersicht, seine Besonnenheit und Verlässlichkeit waren von außerordentlichem Wert für die Stiftung und das Institut. Für seinen langjährigen Einsatz sind wir ihm sehr dankbar.

Immer wieder zog sich Detlef Schneidawind auf seinen alten Bauernhof im Landkreis Lindau zurück, wo er – neben der Pflege seiner Obstbäume – im Ruhestand auch Zeit und Energie für das Schreiben von heimatverbundenen Kriminalgeschichten („Saufutter“, „Fallobst: Der Fall Wendelin Kolb“) und phantasievollen Kinderbüchern („Maximilian und die wundersame Nacht im Zirkus Safran“, „Die Taube Nessa aus Odessa“) fand.

Es war diese vielseitige und kreative Schaffenskraft, die Bereitschaft, immer wieder neue Wege zu gehen, verbunden mit Bodenständigkeit und Herzenswärme, die neben seinem großen Sachverstand und seiner Weitsicht beeindruckten. „Man muss fragen. Man muss lernen wollen. Und sich um Gottes Willen nicht einbilden, dass man sowieso schon alles weiß und dass die Erfahrung ausreicht“, sagte er 2003 in einem Interview mit der Süddeutschen Zeitung¹.

Die Oberwolfach Stiftung und das Mathematische Forschungsinstitut Oberwolfach werden ihn in dankbarer Erinnerung behalten.



Detlef Schneidawind (4. von rechts) bei der Sitzung des Stiftungsrats der Oberwolfach Stiftung im Jahr 2015 am MFO

¹ Süddeutsche Zeitung, 05.04.2003, „Man muss fragen“, aufgezeichnet von Gunthild Kupitz

2. Wissenschaftliches Programm

Das wissenschaftliche Programm wird vom Direktor in Zusammenarbeit mit der Wissenschaftlichen Kommission der Gesellschaft für Mathematische Forschung entschieden. Dieses Gremium basiert auf der ehrenamtlichen Arbeit von circa 20-25 hochkarätigen Mathematikern und Mathematikerinnen, welche die gesamte Breite der Mathematik vertreten. Die Wissenschaftliche Kommission begutachtet alle wissenschaftlichen Veranstaltungen des Instituts vor ihrer Genehmigung. 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 Aktivitäten

Das Mathematische Forschungsinstitut Oberwolfach hat sechs zentrale wissenschaftliche Programme: Workshops, Miniworkshops, die Oberwolfach Arbeitsgemeinschaft, die Oberwolfach Seminare, das Research in Pairs Programm und die Oberwolfach Leibniz Fellows. Im Rahmen dieser Programme gibt es spezielle Fördermöglichkeiten für den wissenschaftlichen Nachwuchs sowie etablierte Forscherinnen und Forscher.

Das Workshop Programm

Der Hauptteil des Programms besteht aus etwa 40 einwöchigen Workshops pro Jahr an denen jeweils ca. 50 Personen teilnehmen. Alternativ können zwei Workshops halber Größe parallel stattfinden. Die Workshops werden von international führenden Expertinnen und Experten der jeweiligen Fachgebiete organisiert. Teilnehmen kann nur, wer auf ihre Empfehlung hin vom Direktor persönlich eingeladen wurde.

Simons Visiting Professors

Das Simons Visiting Professors (SVP) Programm wird durch die Simons Foundation finanziert. Das Programm unterstützt jährlich bis zu 40 führende Forscherinnen und Forscher von außerhalb Europas, die eine Teilnahme an einem Oberwolfacher Workshop mit einem Aufenthalt an einer europäischen Universität kombinieren möchten. Die Höhe der Förderung beträgt 135 € pro Tag des Gastaufenthalts an der Universität und wird für bis zu zwei Wochen gezahlt. Die beteiligten Universitäten stellen Unterkünfte für die Dauer des Besuchs an der Universität zur Verfügung und tragen die Reisekosten innerhalb Europas zwischen Oberwolfach und der Universität. Über die Förderung entscheidet der Direktor auf Vorschlag der Organisatorinnen und Organisatoren eines Workshops.

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. The committee 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 activities

The Mathematisches Forschungsinstitut Oberwolfach focuses on six central scientific programs: Workshops, Mini-Workshops, the Oberwolfach Arbeitsgemeinschaft, the Oberwolfach Seminars, the Research in Pairs program, and the Oberwolfach Leibniz Fellows. Within these programs, there are special funding opportunities for junior researchers and established researchers.

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. Participation is subject to a personal invitation by the Director after recommendation of the organizers.

Simons Visiting Professors

The Simons Visiting Professors (SVP) program 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 € per day of the university visit. Additionally, the participating universities are required to provide 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 jeweils etwa 15 Teilnehmenden veranstaltet werden. Das Programm richtet sich besonders an den wissenschaftlichen Nachwuchs. Da über die Themen erst ein halbes Jahr im Voraus entschieden wird, ist es möglich, auf aktuelle Entwicklungen schnell zu reagieren. Im Rahmen des Mini-Workshop-Programms fanden 2021 außerdem „Tandem-Workshops“ und „small collaborations“ statt, bei denen Gruppen an zwei verschiedenen Orten über Videokonferenz miteinander interagierten.

Die Oberwolfach Arbeitsgemeinschaft

Die Idee der Arbeitsgemeinschaft ist es, sich unter Anleitung international anerkannter Spezialisten durch eigene Vorträge in ein neues, aktuelles Gebiet einzuarbeiten. Die Arbeitsgemeinschaft findet dreimal jährlich für jeweils eine Woche statt und wird von Prof. Dr. Martin Hairer, Prof. Dr. Peter Scholze und Prof. Dr. Andreas Thom organisiert. Sie richtet sich sowohl an den wissenschaftlichen Nachwuchs als auch an etablierte Forscherinnen und Forscher.

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 Promovierende und Postdoktoranden aus aller Welt. Das Ziel ist es, 25 Teilnehmerinnen und Teilnehmer in ein besonders aktuelles Arbeitsgebiet einzuführen.

Wir freuen uns, dass die Carl Friedrich von Siemens Stiftung die Oberwolfach Seminare von Sommer 2008 bis 2022 substanziell unterstützt.

Research in Pairs, Oberwolfach Leibniz Fellows und das neue Oberwolfach Research Fellows Programm

Ein weiterer Schwerpunkt sind längerfristige Forschungsaufenthalte von Einzelpersonen oder Kleingruppen. „Research in Pairs“ ermöglicht es jeweils zwei bis vier Forschungsgästen aus verschiedenen Institutionen am MFO gemeinsam an einem vorher festzulegenden Projekt zu arbeiten. Ein Aufenthalt dauert zwischen zwei Wochen und drei Monaten. Im Postdoktoranden-Programm „Oberwolfach Leibniz Fellows“ (OWLF) werden besonders qualifizierte Nachwuchsforscherinnen und -forscher in einer entscheidenden Phase ihrer wissenschaftlichen Laufbahn durch die Bereitstellung idealer

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. Since the subjects are fixed only half a year before the Mini-Workshops take place, they allow to react to recent developments. As part of the Mini-Workshop program, „Tandem-Workshops“ and „small collaborations“ also took place in 2021, in which groups in two different locations interacted with each other via video conference.

The Oberwolfach Arbeitsgemeinschaft

The idea of the Oberwolfach Arbeitsgemeinschaft (study group) is to learn about a new active topic by giving a lecture on it, guided by leading international specialists. The Arbeitsgemeinschaft meets three times per year for one week each time and is organized by Prof. Dr. Martin Hairer, Prof. Dr. Peter Scholze and Prof. Dr. Andreas Thom. It is aimed both at senior and junior researchers.

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.

We are pleased that the Carl Friedrich von Siemens Foundation substantially supports the Oberwolfach Seminars from summer 2008 to 2022.

Research in Pairs, Oberwolfach Leibniz Fellows and the new Oberwolfach Research Fellows program

A further main activity of the Institute are longer term research stays of individuals or small groups. „Research in Pairs“ is aimed at small groups of two to four researchers from different places working together at the Mathematisches Forschungsinstitut Oberwolfach for two weeks up to three months on a specific project. The focus of the postdoctoral program „Oberwolfach Leibniz Fellows“ (OWLF) is to support excellent junior researchers in an important period of their scientific career by providing ideal working conditions in an international atmosphere. Outstanding junior researchers can apply to carry

Arbeitsbedingungen in einem internationalen Umfeld gefördert. Einzelpersonen oder Kleingruppen können sich für die Durchführung eines Forschungsprojekts in Oberwolfach von einem bis zu drei Monaten bewerben.

2020, nach Ausbruch der Corona-Pandemie, schrieb das MFO erstmals die „Oberwolfach Research Fellowship“ (OWRF) innerhalb seiner bestehenden Langzeitprogramme aus. Seit Ende 2021 ist OWRF das neue, flexiblere Dachformat für längerfristige Forschungsaufenthalte in Oberwolfach. Aus „Research in Pairs“ wird nun „Oberwolfach Research Fellows“, einschließlich der Möglichkeit für Nachwuchswissenschaftlerinnen und Nachwuchswissenschaftler, sich für eine „Oberwolfach Leibniz Fellowship“ mit finanzieller Förderung zu bewerben.

Für OWRF können sich Gruppen von 2-4 Forschenden für einen Zeitraum von 1-4 Wochen bewerben. Nachwuchsforschende können sich auch als Einzelpersonen für einen Aufenthalt von bis zu 3 Monaten bewerben. Für sie ist außerdem eine finanzielle Förderung bis zur Höhe einer Postdoc-Stelle möglich. Anders als bisher können Personen mit OWLF-Förderung auch Teil einer OWRF-Gruppe sein.

Oberwolfach Leibniz Graduate Students

Seit Beginn des Jahres 2009 unterstützt das MFO die Teilnahme von im Durchschnitt fünf Oberwolfach Leibniz Graduate Students (OWLG) an den Oberwolfach Workshops. Gefördert werden exzellente Doktorandinnen und 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 OWLG reserviert sind und nicht durch etablierte Forscher besetzt werden dürfen.

US Junior Oberwolfach Fellows

Das MFO fördert die Teilnahme von herausragenden Nachwuchsforscherinnen und -forschern US-amerikanischer Universitäten in allen einwöchigen Programmen des Instituts. Diese Förderung ist möglich dank der Unterstützung der amerikanischen National Science Foundation (NSF).

Oberwolfach Foundation Fellows

Seit dem Jahr 2019 gibt es ein neues Förderprogramm der Oberwolfach Stiftung, das es dem MFO erlaubt, eingeladene exzellente Nachwuchsforscherinnen- und -forscher bei ihren Reisekosten zu unterstützen. Das MFO kann durchschnittlich einer Person pro Woche bis zu 1.000 € der Reisekosten erstatten. Bewerben

out a research project, individually or in small groups, for a period from one to three months.

In 2020, after the outbreak of the corona pandemic, the MFO announced the “Oberwolfach Research Fellowship” (OWRF) within its existing long-term programs for the first time. Since the end of 2021, OWRF has been the new, more flexible umbrella format for longer-term research stays in Oberwolfach. “Research in Pairs” now becomes “Oberwolfach Research Fellows”, including the opportunity for junior scientists to apply for an “Oberwolfach Leibniz Fellowship” with financial support.

Groups of 2-4 researchers can apply for a period of 1-4 weeks for OWRF. Junior researchers can also apply as individuals for a stay of up to 3 months. Financial support up to the amount of a postdoc position is also possible for them. Unlike before, people with OWLF funding can also be part of an OWRF group.

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 postdocs (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.

US Junior Oberwolfach Fellows

The MFO supports the participation of outstanding junior researchers from US universities in all weekly programs of the Institute. This is possible thanks to the support of the National Science Foundation (NSF).

Oberwolfach Foundation Fellows

Starting in 2019, there is a new grant of the Oberwolfach Foundation to support invited excellent junior researchers with regard to their travel to the MFO. This grant allows the MFO to reimburse travel expenses up to an amount of 1,000 € for one junior researcher on average in every week. Invited participants coming from

können sich alle eingeladenen Teilnehmerinnen und Teilnehmer, deren Promotion nicht länger als 10 Jahre zurückliegt, und die nachweislich von Orten mit unzureichender Unterstützung für den wissenschaftlichen Nachwuchs kommen.

Publikationen

Das MFO veröffentlicht insgesamt vier Publikationsreihen und unterstützt dabei die Idee von Open Access. Mit Ausnahme der Buchreihe „Oberwolfach Seminars“ sind alle Veröffentlichungen elektronisch frei verfügbar.

Die Buchserie „Oberwolfach Reports“ (OWR) wurde 2004 gegründet. In Zusammenarbeit mit EMS Press erscheint sie jährlich mit vier Ausgaben von insgesamt mehr als 3.000 Seiten als Print- und Onlineversion. Die OWR beinhalten erweiterte Kurzfassungen aller Vorträge der Workshops, Miniworkshops und Arbeitsgemeinschaften im Umfang von jeweils ein bis drei Seiten.

„Oberwolfach Seminars“ (OWS) ist eine Buchreihe in Zusammenarbeit mit dem Birkhäuser Programm des Springer Verlags (Basel), die den Inhalt der Oberwolfach Seminare für ein größeres Publikum zugänglich macht.

In den „Oberwolfach Preprints“ (OWP) werden hauptsächlich Resultate von längerfristigen Forschungsaufenthalten (RiP und OWLF bzw. OWRF) publiziert.

Die „Schnappschüsse moderner Mathematik aus Oberwolfach“ richten sich an die mathematisch interessierte Öffentlichkeit und 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.

Preise

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

places with insufficient support for junior researchers to the MFO, with Dr./Ph.D. not longer than 10 years ago, can apply.

Publications

The MFO has four distinct publication series and supports the idea of open access. Hence, all publications are freely available, with the exception of the book series “Oberwolfach Seminars”.

The Oberwolfach Reports (OWR) were initiated in 2004. In collaboration with EMS Press they appear quarterly as print and online edition. The four 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 during Workshops, Mini-Workshops and Arbeitsgemeinschaften, of one up to three pages per talk.

“Oberwolfach Seminars“ (OWS) is a book series in collaboration with the Birkhäuser program of Springer (Basel). In this series, the material of the Oberwolfach Seminars for junior researchers is made available to an even larger audience.

The “Oberwolfach Preprints“ (OWP) mainly contain research results related to a longer stay in Oberwolfach (RiP and OWLF resp. OWRF).

The “snapshots of modern mathematics from Oberwolfach“ address to everyone who is interested in mathematics and 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.

Prizes

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 achievements in changing fields of mathematics. Furthermore, 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.

Teilnahme am Leibniz MMS Netzwerk

Als Mitglied der Leibniz-Gemeinschaft nimmt das MFO am Netzwerk „Mathematical Modelling and Simulation“ (MMS) teil. Das Thema spielt in vielen Aktivitäten des Instituts eine Rolle. Im Jahr 2021 fanden insgesamt 21 einwöchige Veranstaltungen statt, die verschiedene Aspekte dieses Forschungsfeldes aufgriffen.

Banach Center – Oberwolfach Graduate Seminare

In Ergänzung zu den sechs jährlichen Oberwolfach Seminaren starteten im Jahr 2019 die „Banach Center – Oberwolfach Graduate Seminars“. Die Seminare werden in Zusammenarbeit mit dem Forschungsinstitut für Mathematik (Banach Center) der Polnischen Akademie der Wissenschaften (IMPAN) organisiert und finden im Konferenzzentrum Będlewo statt. Sie richten sich an Promovierende und Postdoktoranden aus der ganzen Welt.

Weitere Aktivitäten und Dienste

Das Institut war im Jahr 2021 zum zweiten Mal Austragungsort für die Internationale Mathematik-Olympiade. Aufgrund der Pandemie wurde der Wettbewerb dezentral und virtuell organisiert. Die deutschen Teilnehmer bearbeiteten ihre Klausuren in Oberwolfach.

Als Dienste für die Öffentlichkeit sind außerdem das Museum für Mineralien und Mathematik (MiMa), die Oberwolfach Fotosammlung und die Oberwolfach References for Mathematical Software (ORMS) zu nennen.

2.2. Jahresprogramm 2021

Im Jahr 2021 wurden während 39 Wochen 43 Workshops durchgeführt, 14 Miniworkshops während 9 Wochen, 6 Seminare während 3 Wochen und 2 Arbeitsgemeinschaften während 2 Wochen. Insgesamt nahmen ca. 3.000 Forscherinnen und Forscher aus aller Welt an allen Programmen teil, davon ca. 24% aus Deutschland, 39% aus anderen europäischen Ländern und 37% aus dem nichteuropäischen Ausland. Etwa ein Drittel konnte in Präsenz an den Veranstaltungen teilnehmen, wobei der Anteil im Verlauf des Jahres deutlich anstieg. Nachdem im ersten Halbjahr aufgrund der Beschränkungen lediglich ca. 15% der Teilnehmenden vor Ort sein konnten, waren es im zweiten Halbjahr mehr als die Hälfte.

Participation in the Leibniz MMS Network

As a member of the Leibniz Association, the MFO participates in the Leibniz network “Mathematical Modelling and Simulation” (MMS). The topic is present in many activities at Oberwolfach. In 2021 a total of 21 week-long events which covered various aspects of the MMS area of research took place.

Banach Center – Oberwolfach Graduate Seminars

In addition to the six annual Oberwolfach seminars, the “Banach Center – Oberwolfach Graduate Seminars” started in 2019. The seminars are organized in cooperation with the Institute of Mathematics (Banach Center) of the Polish Academy of Sciences (IMPAN) and take place at the conference center in Będlewo. They are aimed at doctoral candidates and postdocs from all around the world.

Further activities and services

In 2021 the Institute hosted the International Mathematical Olympiad for the second time. Due to the pandemic, the competition was organized decentralized and virtually. The German participants solved their tasks in Oberwolfach.

As further services provided for the general public the Museum for Minerals and Mathematics (MiMa), the Oberwolfach Photo Collection and the Oberwolfach References for Mathematical Software (ORMS) are to be mentioned.

2.2. Annual schedule 2021

In the year 2021 43 Workshops have taken place during 39 weeks, as well as 14 Mini-Workshops during 9 weeks, 6 seminars during 3 weeks and 2 Arbeitsgemeinschaften during 2 weeks. In total, more than 3,000 researchers from all over the world attended the Oberwolfach research program, about 24% from Germany, 39% from other European countries, and 37% from non-European countries (the slightly lower share this year is probably due to the travel restrictions). About a third were able to attend in person, with the proportion increasing significantly over the course of the year. After only about 15% of the participants were able to be on site in the first half of the year due to the restrictions, it was more than half in the second half of the year.

Das Institut legt großen Wert darauf, dass alle Gebiete der Mathematik und ihre Grenzgebiete, auch im Hinblick auf Anwendungen, vertreten sind. Das nachfolgende Tagungsprogramm belegt diese Politik.

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

<p>03.01. - 09.01.2021 Homogeneous Structures: Model Theory meets Universal Algebra (online meeting)</p> <p>Organizers: Manuel Bodirsky, Dresden Joanna Ochremiak, Talence Michael Pinsky, Wien/Prague</p>	<p>28.02. - 06.03.2021 Hyperbolic Balance Laws: Modeling, Analysis, and Numerics (hybrid meeting)</p> <p>Organizers: Remi Abgrall, Zürich Mauro Garavello, Milano Mária Lukáčová-Medvid'ová, Mainz Konstantina Trivisa, College Park</p>
<p>03.01. - 09.01.2021 Geometry, Dynamics and Spectrum of Operators on Discrete Spaces (online meeting)</p> <p>Organizers: David Damanik, Houston Matthias Keller, Potsdam Tatiana Nagnibeda, Geneva Felix Pogorzelski, Leipzig</p>	<p>07.03. - 13.03.2021 Homotopic and Geometric Galois Theory (online meeting)</p> <p>Organizers: Benjamin Collas, Bayreuth Pierre Dèbes, Villeneuve d'Ascq Hiroaki Nakamura, Osaka</p>
<p>10.01. - 16.01.2021 Nonstandard Finite Element Methods (hybrid meeting)</p> <p>Organizers: Daniele Boffi, Pavia Carsten Carstensen, Berlin Alexandre Ern, Paris Jun Hu, Peking</p>	<p>07.03. - 13.03.2021 Deep Learning for Inverse Problems (hybrid meeting)</p> <p>Organizers: Simon Arridge, London Peter Maaß, Bremen Carola Schönlieb, Cambridge UK</p>
<p>17.01. - 23.01.2021 Spatial Networks and Percolation (hybrid meeting)</p> <p>Organizers: Nina Gantert, München Julia Komjáthy, Eindhoven Peter Mörters, Köln Vincent Tassion, Zürich</p>	<p>14.03. - 20.03.2021 Homogenization Theory: Periodic and Beyond (online meeting)</p> <p>Organizers: Anne-Laure Dalibard, Paris Claude Le Bris, Marne La Vallée Panagiotis E. Souganidis, Chicago</p>
<p>24.01. - 30.01.2021 Logarithmic Vector Fields and Freeness of Divisors and Arrangements: New perspectives and applications (online meeting)</p> <p>Organizers: Takuro Abe, Fukuoka Alexandru Dimca, Nice Eva-Maria Feichtner, Bremen Gerhard Röhrle, Bochum</p>	<p>21.03. - 27.03.2021 Mathematical Foundations of Machine Learning (hybrid meeting)</p> <p>Organizers: Peter Bartlett, Berkeley Cristina Butucea, Palaiseau Johannes Schmidt-Hieber, Enschede</p>
<p>31.01. - 06.02.2021 Moduli spaces and Modular forms (hybrid meeting)</p> <p>Organizers: Jan Hendrik Bruinier, Darmstadt Gerard van der Geer, Amsterdam Valery Gritsenko, Villeneuve d'Ascq</p>	<p>28.03. - 03.04.2021 Geometric Numerical Integration (hybrid meeting)</p> <p>Organizers: Marlis Hochbruck, Karlsruhe Christian Lubich, Tübingen Robert McLachlan, Palmerston North Jesús María Sanz-Serna, Madrid</p>
<p>14.02. - 20.02.2021 Challenges in Optimization with Complex PDE-Systems (hybrid meeting)</p> <p>Organizers: Michael Hintermüller, Berlin Karl Kunisch, Graz Günter Leugering, Erlangen Elisabetta Rocca, Pavia</p>	<p>11.04. - 17.04.2021 Mathematical Foundations of Biological Organization (not realized)</p> <p>Organizers: Jean-Pierre Eckmann, Genève Karsten Kruse, Genève Lai-Sang Young, New York</p>
<p>21.02. - 27.02.2021 Applications of Optimal Transportation in the Natural Sciences (online meeting)</p> <p>Organizers: Jean-David Benamou, Le Chesnay Virginie Ehrlacher, Champs sur Marne Daniel Matthes, Garching</p>	<p>18.04. - 24.04.2021 Algebraic Groups (hybrid meeting)</p> <p>Organizers: Corrado De Concini, Rome Philippe Gille, Villeurbanne, Peter Littelmann, Köln</p>
	<p>25.04. - 01.05.2021 Computability Theory (hybrid meeting)</p> <p>Organizers: Vasco Brattka, Neubiberg Noam Greenberg, Wellington Iskander Kalimullin, Kazan Mariya Soskova, Madison</p>

- 02.05. - 08.05.2021 Foundations of Bayesian Inference for Complex Statistical Models (hybrid meeting)**
Organizers: Richard Nickl, Cambridge UK
Judith Rousseau, Oxford
Aad van der Vaart, Leiden
- 16.05. - 22.05.2021 Geometric Methods of Complex Analysis (hybrid meeting)**
Organizers: Bo Berndtsson, Göteborg
John Erik Fornæss, Trondheim
Nikolay Shcherbina, Wuppertal
- 30.05. - 05.06.2021 Mathematics and its Ancient Classics Worldwide: Translations, Appropriations, Reconstructions, Roles (hybrid meeting)**
Organizers: Karine Chemla, Paris
Vincenzo De Risi, Berlin/Paris
Antoni Malet, Barcelona
- 06.06. - 12.06.2021 Analysis, Geometry and Topology of Singular PDE (hybrid meeting)**
Organizers: Claire Debord, Paris
Rafe Mazzeo, Stanford
Paolo Piazza, Roma
Boris Vertman, Oldenburg
- 13.06. - 19.06.2021 Enumerative Geometry of Surfaces (hybrid meeting)**
Organizers: Gaëtan Borot, Bonn
Samuel Grushevsky, Stony Brook
Martin Möller, Frankfurt
- 20.06. - 26.06.2021 Classical Algebraic Geometry (hybrid meeting)**
Organizers: Olivier Debarre, Paris
David Eisenbud, Berkeley
Gavril Farkas, Berlin
Ravi Vakil, Stanford
- 27.06. - 03.07.2021 Analysis, Geometry and Topology of Positive Scalar Curvature Metrics (hybrid meeting)**
Organizers: Bernd Ammann, Regensburg
Bernhard Hanke, Augsburg
Anna Sakovich, Uppsala
- 27.06. - 03.07.2021 Numerical Methods for Fully Nonlinear and Related PDEs (hybrid meeting)**
Organizers: Sören Bartels, Freiburg
Susanne C. Brenner, Baton Rouge
Xiaobing Feng, Knoxville
Michael Neilan, Pittsburgh
- 04.07. - 10.07.2021 Differentialgeometrie im Grossen (hybrid meeting)**
Organizers: Richard Bamler, Berkeley
Ursula Hamenstädt, Bonn
Urs Lang, Zürich
Ben Weinkove, Evanston
- 11.07. - 18.07.2021 Dynamische Systeme (hybrid meeting)**
Organizers: Marie-Claude Arnaud, Paris
Helmut Hofer, Princeton
Michael Hutchings, Berkeley
Vadim Kaloshin, College Park
- 18.07. - 24.07.2021 Explicit Methods in Number Theory (hybrid meeting)**
Organizers: Karim Belabas, Talence
Bjorn Poonen, Cambridge MA
Fernando Rodriguez-Villegas, Trieste
- 25.07. - 31.07.2021 Partial Differential Equations (hybrid meeting)**
Organizers: Guido De Philippis, Trieste
Richard Schoen, Irvine
Felix Schulze, London
- 01.08. - 07.08.2021 Computation and Learning in High Dimensions (hybrid meeting)**
Organizers: Albert Cohen, Paris
Wolfgang Dahmen, Columbia
Ronald A. DeVore, College Station
Angela Kunoth, Köln
- 08.08. - 14.08.2021 Dynamics of Waves and Patterns (hybrid meeting)**
Organizers: Margaret Beck, Boston
Martina Chirilus-Bruckner, Leiden
Christian Kühn, Garching
Jens Rademacher, Bremen
- 15.08. - 21.08.2021 Computational Group Theory (hybrid meeting)**
Organizers: Bettina Eick, Braunschweig
Derek Holt, Warwick
Gabriele Nebe, Aachen
Eamonn O'Brien, Auckland
- 22.08. - 28.08.2021 Automorphic Forms, Geometry and Arithmetic (hybrid meeting)**
Organizers: Gaetan Chenevier, Orsay
Tasho Kaletha, Ann Arbor
Stephen Kudla, Toronto
Sophie Morel, Princeton
- 29.08. - 04.09.2021 Mathematical Aspects of General Relativity (hybrid meeting)**
Organizers: Carla Cederbaum, Tübingen
Mihalis Dafermos, Princeton
Jim Isenberg, Eugene
Hans Ringström, Stockholm
- 12.09. - 18.09.2021 Quantum Groups – Algebra, Analysis and Category Theory (hybrid meeting)**
Organizers: Masaki Izumi, Kyoto
Sergey Neshveyev, Oslo
Dmitri Nikshych, Durham
Adam Skalski, Warsaw
- 19.09. - 25.09.2021 Homotopical Algebra and Higher Structures (hybrid meeting)**
Organizers: Michael Batanin, Prague
Andrey Lazarev, Lancaster
Muriel Livernet, Paris
Martin Markl, Prague
- 26.09. - 02.10.2021 Singularities (hybrid meeting)**
Organizers: Javier Fernandez de Bobadilla, Bilbao
Francois Loeser, Paris
András Némethi, Budapest
Duco van Straten, Mainz
- 03.10. - 09.10.2021 Statistics of Stochastic Differential Equations on Manifolds and Stratified Spaces (hybrid meeting)**
Organizers: Stephan Huckemann, Göttingen
Xue-Mei Li, London
Yvo Pokern, London
Anja Sturm, Göttingen

03.10. - 09.10.2021 **Geometry and Optimization in Quantum Information (hybrid meeting)**
 Organizers: Hamza Fawzi, Cambridge UK
 Omar Fawzi, Lyon
 Aram Harrow, Cambridge MA
 Monique Laurent, Amsterdam

31.10. - 06.11.2021 **Enveloping Algebras and Geometric Representation Theory (hybrid meeting)**
 Organizers: Iain Gordon, Edinburgh
 Bernard Leclerc, Caen
 Michaela Varagnolo, Cergy-Pontoise

07.11. - 13.11.2021 **Combinatorial Optimization (hybrid meeting)**
 Organizers: Karen Aardal, Delft
 Satoru Iwata, Tokyo
 Volker Kaibel, Magdeburg
 Ola Svensson, Lausanne

14.11. - 20.11.2021 **Complexity Theory (hybrid meeting)**
 Organizers: Peter Bürgisser, Berlin
 Irit Dinur, Rehovot
 Salil Vadhan, Cambridge MA

28.11. - 04.12.2021 **Applied Harmonic Analysis and Data Science (hybrid meeting)**
 Organizers: Ingrid Daubechies, Durham
 Gitta Kutyniok, Berlin
 Holger Rauhut, Aachen
 Thomas Strohmer, Davis

12.12. - 18.12.2021 **Convex Geometry and its Applications (hybrid meeting)**
 Organizers: Shiri Artstein-Avidan, Tel Aviv
 Franck Barthe, Toulouse
 Monika Ludwig, Vienna

Miniworkshops

07.02. - 13.02.2021 **Non-semisimple Tensor Categories and Their Semisimplification (online meeting)**
 Organizers: Nicolás Andruskiewitsch, Cordoba
 Pavel Etingof, Cambridge MA
 Christoph Schweigert, Hamburg

07.02. - 13.02.2021 **Geometrical Models in the 19th Century: An International Comparison (not realized)**
 Organizers: June Barrow-Green, Milton Keynes
 Klaus Volkert, Wuppertal

07.02. - 13.02.2021 **Nonpositively Curved Complexes (online meeting)**
 Organizers: Damian Osajda, Wrocław
 Piotr Przytycki, Montreal
 Petra Schwer, Magdeburg

21.03. - 27.03.2021 **Small Collaboration: Numerical Analysis of Electromagnetic Problems (hybrid meeting)**
 Organizers: Fleurianne Bertrand, Twente
 Matthias Schlottbom, Twente
 Gerhard Starke, Essen

11.04. - 17.04.2021 **Small Collaboration: Modeling Phenomena from Nature by Hyperbolic Partial Differential Equations (hybrid meeting)**
 Organizers: Christian Klingenberg, Würzburg
 Qin Li, Madison
 Marlies Pirner, Würzburg

09.05. - 15.05.2021 **Analysis of Data-driven Optimal Control (hybrid meeting)**
 Organizers: Lars Grüne, Bayreuth
 Kirsten Morris, Waterloo

09.05. - 15.05.2021 **Mathematics of Dissipation – Dynamics, Data and Control (hybrid meeting)**
 Organizers: Sara Grundel, Magdeburg
 Volker Mehrmann, Berlin
 Jacquélien M.A. Scherpen, Groningen
 Felix L. Schwenninger, Enschede/
 Hamburg

09.05. - 15.05.2021 **Newton-Okounkov Bodies and Mirror Symmetry (not realized)**
 Organizers: Dave Anderson, Columbus
 Alex Küronya, Frankfurt
 Konstanze Rietsch, London

04.07. - 07.07.2021 **Symposium on Mathematical Epidemiology: Coronavirus and Communication (hybrid meeting)**
 Organizers: Gerhard Huisken, Oberwolfach
 Stefan Müller, Bonn
 Felix Otto, Leipzig
 László Székelyhidi, Leipzig

29.08. - 04.09.2021 **Small Collaboration: Advanced Numerical Methods for Nonlinear Hyperbolic Balance Laws and Their Applications (hybrid meeting)**
 Organizers: Song Jiang, Beijing
 Jiequan Li, Beijing
 Mária Lukáčová-Medvid'ová, Mainz
 Gerald Warnecke, Magdeburg

05.09. - 11.09.2021 **MATRIX-MFO Tandem Workshop: Invariants and Structures in Low-Dimensional Topology (hybrid meeting)**
 Organizers: Stefan Friedl, Regensburg
 Jessica Purcell, Monash
 Arunima Ray, Bonn
 Stephan Tillmann, Sydney

05.09. - 11.09.2021 **MFO-RIMS Tandem Workshop: Symmetries on Polynomial Ideals and Varieties (hybrid meeting)**
 Organizers: Gunnar Fløystad, Bergen
 Satoshi Murai, Tokyo
 Cordian Riener, Konstanz
 Kohji Yanagawa, Osaka

12.09. - 18.09.2021 **MATRIX-MFO Tandem Workshop/Small Collaboration: Rough Wave Equations (hybrid meeting)**

Organizers: Dorothee Frey, Karlsruhe
Zihua Guo, Clayton
Andrew Hassell, Canberra
Pierre Portal, Canberra
Jan Rozendaal, Warszawa
Po Lam Yung, Canberra

17.10. - 23.10.2021 **Three Facets of R-Matrices (hybrid meeting)**

Organizers: Sachin Gautam, Columbus
Andrey Smirnov, Chapel Hill
Curtis Wendlandt, Columbus
Masahito Yamazaki, Kashiwa

05.12 - 11.12.2021 **(Anosov) (hybrid meeting)**

Organizers: Colin Guillarmou, Orsay
Benjamin Küster, Paderborn
Beatrice Pozzetti, Heidelberg
Tobias Weich, Paderborn

05.12 - 11.12.2021 **Scattering Amplitudes, Cluster Algebras, and Positive Geometries (hybrid meeting)**

Organizers: Nima Arkani-Hamed, Princeton
Hugh Thomas, Montreal
Lauren Williams, Cambridge MA

05.12 - 11.12.2021 **Variable Curvature Bounds, Analysis and Topology on Dirichlet Spaces (hybrid meeting)**

Organizers: Gilles Carron, Nantes
Batu Güneysu, Chemnitz
Matthias Keller, Potsdam
Kazuhiro Kuwae, Fukuoka

Oberwolfach Seminare

23.05. - 29.05.2021 **Cellular E_r -Algebras (hybrid meeting)**

Organizers: Soren Galatius, Kobenhavn
Alexander Kupers, Toronto
Oscar Randal-Williams, Cambridge UK

23.05. - 29.05.2021 **Introduction to Convex Integration (hybrid meeting)**

Organizers: Daniel Faraco, Madrid
Stefano Modena, Darmstadt
László Székelyhidi, Leipzig

24.10. - 30.10.2021 **Tropical Curves, Logarithmic Structures, and Enumerative Geometry (hybrid meeting)**

Organizers: Renzo Cavalieri, Fort Collins
Hannah Markwig, Tübingen
Dhruv Ranganathan, Cambridge UK

24.10. - 30.10.2021 **New Techniques in Resolution of Singularities (hybrid meeting)**

Organizers: Dan Abramovich, Providence
Anne Frühbis-Krüger, Oldenburg
Michael Temkin, Jerusalem
Jaroslaw Wlodarczyk, West Lafayette

21.11. - 27.11.2021 **The Cutoff Phenomenon for Finite Markov Chains (hybrid meeting)**

Organizers: Charles Bordenave, Marseille
Persi Diaconis, Stanford
Hubert Lacoïn, Rio de Janeiro
Justin Salez, Paris

21.11. - 27.11.2021 **Combinatorial and Geometric Knot Theory (hybrid meeting)**

Organizers: Colin C. Adams, Williamstown
Louis H. Kauffman, Chicago
Sofia Lambropoulou, Athens

Arbeitsgemeinschaften

04.04. - 10.04.2021 **Derived Galois Deformation Rings and Cohomology of Arithmetic Groups (hybrid meeting)**

Organizers: Frank Calegari, Chicago
Søren Galatius, Copenhagen
Akshay Venkatesh, Princeton

10.10. - 15.10.2021 **Thin Groups and Super-approximation (hybrid meeting)**

Organizers: Alireza Salehi Golsefidy, San Diego
Alex Kontorovich, Piscataway
Hee Oh, New Haven

17.10. - 23.10.2021 **Quantitative Stochastic Homogenization (not realized)**

Organizers: Antoine Gloria, Paris/Brussels
Felix Otto, Leipzig

Fortbildungen/Training activities

14.07. - 24.07.2021 **Internationale Mathematik-Olympiade (IMO)**

Organizers: Patrick Bauermann, Bonn
Eric Müller, Münster
Jürgen Prestin, Lübeck

2.3. Workshops

Workshop 2101a (online meeting)

03.01. – 09.01.2021

Homogeneous Structures: Model Theory meets Universal Algebra

Organizers:

Manuel Bodirsky, Dresden
Joanna Ochremiak, Talence
Michael Pinsker, Wien/Prague

Abstract

The workshop “Homogeneous Structures: Model Theory meets Universal Algebra” was centred around transferring recently obtained advances in universal algebra from the finite to the infinite. As it turns out, the notion of homogeneity together with other model-theoretic concepts like ω -categoricity and the Ramsey property play an indispensable role in this endeavour. The program featured 3 tutorials, each consisting of two talks, 12 one-hour talks as well as an open problem session.

Participants

Aterias, Albert (Barcelona, Catalonia), Barto, Libor (Praha), Bodirsky, Manuel (Dresden), Bodor, Bertalan (Dresden), Bradley-Williams, David (Düsseldorf), Braunfeld, Samuel (College Park), Bulatov, Andrei (Burnaby), Carvalho, Catarina (Hertfordshire), Chen, Hubie (London), Cherlin, Gregory L. (New Brunswick), Conant, Gabriel (Cambridge), Evans, David M. (London), Gillibert, Pierre (Wien), Hubička, Jan (Praha), Kaplan, Itay (Jerusalem), Kearnes, Keith (Boulder), Klin, Bartek (Warszawa), Knäuer, Simon (Dresden), Kompatscher, Michael (Praha), Konecny, Matej (Praha), Koponen, Vera (Uppsala), Kozik, Marcin (Kraków), Kubis, Wiesław (Praha), Kun, Gabor (Budapest), Kwiatkowska, Aleksandra (Münster), Macpherson, H. Dugald (Leeds), Maroti, Miklos (Szeged), Martin, Barnaby (Durham), Masulovic, Dragan (Novi Sad), Mayr, Peter (Boulder), Moorhead, Andrew (Lawrence), Mottet, Antoine (Praha), Nesetril, Jaroslav (Praha), Nguyen Van Thé, Lionel (Marseille), Ochremiak, Joanna (Talence), Opršal, Jakub (Durham), Paolini, Gianluca (Torino), Pech, Maja (Novi Sad), Pinsker, Michael (Wien), Pongracz, Andras (Debrecen), Quinn-Gregson, Thomas (Dresden), Rydval, Jakub (Dresden), Schindler, Clemens (Wien), Schneider, Friedrich Martin (Freiberg), Simon, Pierre (Berkeley), Thapper, Johann (Champs-sur-Marne), Torunczyk, Szymon (Warszawa), Tsankov, Todor (Villeurbanne), Valeriote, Matthew (Hamilton), Viola, Caterina (Oxford), Willard, Ross (Waterloo), Wrona, Michal (Kraków), Zhuk, Dmitriy (Moscow), Zivny, Stanislav (Oxford), Zucker, Andy (La Jolla)

Workshop 2101b (online meeting)

03.01. - 09.01.2021

Geometry, Dynamics and Spectrum of Operators on Discrete Spaces

Organizers:

David Damanik, Houston
Matthias Keller, Potsdam
Tatiana Smirnova-Nagnibeda, Geneva
Felix Pogorzelski, Leipzig

Abstract

Spectral theory is a gateway to fundamental insights in geometry and mathematical physics. In recent years the study of spectral problems in discrete spaces has gained enormous momentum. While there are some relations to continuum spaces, fascinating new phenomena have been discovered in the discrete setting throughout the last decade. The goal of the workshop was to bring together experts reporting about the recent developments in a broad variety of dynamical or geometric models and to reveal new connections and research directions.

Participants

Aizenman, Michael (Princeton), Anantharaman, Nalini (Strasbourg), Baake, Michael (Bielefeld), Bartmann, Philipp (Potsdam), Beckus, Siegfried (Potsdam), Boutet de Monvel, Anne Marie (Paris), Damanik, David (Houston), Dodziuk, Jozef (New York), Fischer, Florian (Potsdam), Frank, Rupert L. (Pasadena), Freiberg, Uta (Chemnitz), Grigorchuk, Rostislav (College Station), Hake, Philipp (Leipzig), Hamza, Eman (Cairo), Huang, Xueping (Nanjing), Kellendonk, Johannes (Villeurbanne), Keller, Matthias (Potsdam), Lenz, Daniel (Jena), Muench, Florentin (Leipzig), Peyrerimhoff, Norbert (Durham), Pogorzelski, Felix (Leipzig), Post, Olaf (Trier), Puchert, Simon (Jena), Rose, Christian (Potsdam), Schmidt, Marcel (Jena), Smilansky, Yotam (Piscataway), Smirnova-Nagnibeda, Tatiana (Genève), Solomon, Yaar (Beer-Sheva), Stollmann, Peter (Chemnitz), Strungaru, Nicolae (Edmonton), Sukaylo, Oleksiy (Jena), Takase, Alberto (Potsdam), Treviño, Rodrigo (College Park), Veselic, Ivan (Dortmund), Wirth, Melchior (Klosterneuburg), Wojciechowski, Radoslaw K. (Jamaica), Zimmermann, Elias (Leipzig), Zimmermann, Ian (Jena)



10.01. - 16.01.2021

Organizers:

Nonstandard Finite Element Methods

Daniele Boffi, Pavia
Carsten Carstensen, Berlin
Alexandre Ern, Paris
Jun Hu, Peking

Abstract

Finite element methodologies dominate the computational approaches for the solution to partial differential equations and nonstandard finite element schemes most urgently require mathematical insight in their design. The hybrid workshop vividly enlightened and discussed innovative non-conforming and polyhedral methods, discrete complex-based finite element methods for tensor-problems, fast solvers and adaptivity, as well as applications to challenging ill-posed and nonlinear problems.

Participants

Arnold, Douglas N. (Minneapolis), Beirao da Vega, Lourenco (Milano), Bertrand, Fleurianne (Enschede), Boffi, Daniele (Thurwal), Bonizzoni, Francesca (Wien), Brenner, Susanne C. (Baton Rouge), Burman, Erik (London), Cangiani, Andrea (Nottingham), Carstensen, Carsten (Berlin), Chen, Long (Irvine), Cockburn, Bernardo (Minneapolis), Delay, Guillaume (Paris), Demkowicz, Leszek F. (Austin), Di Pietro, Daniele (Montpellier), Droniou, Jerome (Clayton), Durán, Ricardo G. (Buenos Aires), Ern, Alexandre (Marne-la-Vallée), Gollistl, Dietmar (Jena), Gardini, Francesca (Pavia), Gedicke, Joscha (Bonn), Giacomini, Matteo (Barcelona, Catalonia), Gudi, Thirupathi (Bangalore, Bengaluru), Guermond, Jean-Luc (College Station), Guzman, Johnny (Providence), Hannukainen, Antti (Aalto), Heuer, Norbert (Macul, Santiago), Hu, Jun (Beijing), Huang, Jianguo (Shanghai Shi), Huang, Xuehai (Shanghai Shi), Kanschat, Guido (Heidelberg), Khot, Rekha (Powai, Mumbai), Kim, Mi-Young (Incheon), Larson, Mats G. (Umeå), Lederer, Philip (Wien), Lehrenfeld, Christoph (Göttingen), Liang, Yizhou (Beijing), Ma, Rui (Essen), Manzini, Gianmarco (Los Alamos), Ming, Pingbing (Beijing), Mulita, Ornela (Berlin), Nataraj, Neela (Powai, Mumbai), Neunteufel, Michael (Wien), Nocketto, Ricardo H. (College Park), Pani, Amiya Kumar (Powai, Mumbai), Park, Eun-Jae (Seoul), Perugia, Ilaria (Wien), Pignet, Nicolas (Palaiseau), Puttkammer, Sophie (Berlin), Qiu, Weifeng (Minneapolis), Rodriguez, Rodolfo (Concepción), Sauter, Stefan A. (Zürich), Schedensack, Mira (Leipzig), Schöberl, Joachim (Wien), Smears, Iain (London), Süli, Endre (Oxford), Sung, Li-yeng (Baton Rouge), Tran, Tien N. (Berlin), Wieners, Christian (Karlsruhe), Wu, Shuonan (Beijing), Xu, Jinchao (University Park), Zhang, Ran (Changchun), Zhang, Shangyou (Newark), Zhang, Zhimin (Beijing)



17.01. - 23.01.2021

Organizers:

Spatial Networks and Percolation

Nina Gantert, München
Julia Komjathy, Eindhoven
Peter Mörters, Köln
Vincent Tassion, Zürich

Abstract

The classical percolation problem is to find whether there is an infinite connected component in a random set created by removing edges from a d -dimensional lattice, independently at random. Since its introduction into the mathematical literature by Broadbent and Hammersley (1957) the subject of percolation has developed in many ways and is now one of the most exciting and active research areas in probability and statistical mechanics. In this workshop, we focused on current trends, including percolation on point sets with correlations, on spatial random graphs and networks with scale-free degree distribution or long-range edge distribution, percolation of random sets like level set of Gaussian fields or the vacant set of interlacements, conformally invariant percolation structures in the plane, and random walks or information diffusion on percolation clusters.

Participants

Amir, Gidi (Ramat-Gan), Aru, Juhan (Lausanne), Baldasso, Rangel (Ramat-Gan), Bartha, Zsolt (Eindhoven), Beffara, Vincent (Saint-Martin-d'Hères), Benjamini, Itai (Rehovot), Biskup, Marek (Los Angeles), Candellero, Elisabetta (Roma), Černý, Jiří (Basel), Contreras Salinas, Daniel Joaquin (Zürich), Dembin, Barbara (Zürich), Drewitz, Alexander (Köln), Duminil-Copin, Hugo (Genève), Fernley, John (Bath), Gantert, Nina (Garching bei München), Garban, Christophe (Villeurbanne), Gracar, Peter (Köln), Grauer, Arne (Köln), Hallqvist Elias, Olle (Budapest), Hartung, Lisa (Mainz), Heydenreich, Markus (München), Holden, Nina (Zürich), Hutchcroft, Thomas (Cambridge), Jacob, Emmanuel (Lyon), Jorritsma, Joost (Eindhoven), Junk, Stefan (Kyoto), Kerriou, Céline (Montréal), Köhler-Schindler, Laurin (Zürich), Komjathy, Julia (Eindhoven), König, Wolfgang (Berlin), Kozma, Gady (Rehovot), Last, Günter (Karlsruhe), Lengler, Johannes (Zürich), Linker, Amitai (Saint-Étienne), Lücktrath, Lukas (Köln), Lupu, Titus (Paris), Manolescu, Ioan (Fribourg), Mitsche, Dieter (Saint-Étienne), Mönch, Christian (Mainz), Mörters, Peter (Köln), Muirhead, Stephen (London), Nagel, Jan (Dortmund), Palö Forsström, Malin (Stockholm), Penrose, Mathew (Bath), Pete, Gabor (Budapest), Powell, Ellen G. (Durham), Prévost, Alexis (Cambridge), Ráth, Balázs (Budapest), Rodriguez, Pierre-Francois (London), Rokob, Sandor (Budapest), Sapozhnikov, Artem (Leipzig), Schmid, Dominik (Bonn), Sepulveda, Avelio (Villeurbanne), Severo, Franco (Genève), Sousi, Perla (Cambridge), Spertl, Matthias (Köln), Steif, Jeffrey E. (Göteborg), Sznitman, Alain-Sol (Zürich), Tassion, Vincent (Zürich), Thérét, Marie (Nanterre), Tóbiás, András (Berlin), Tokushige, Yuki (Garching bei München), Valesin, Daniel (Groningen), Vanneuville, Hugo (Zürich), Wu, Hao (Beijing), Yang, Xiaochuan (Bath)



24.01. - 30.01.2021

Logarithmic Vector Fields and Freeness of Divisors and Arrangements: New perspectives and applications

Organizers:

Takuro Abe, Fukuoka
Alexandru Dimca, Nice
Eva-Maria Feichtner, Bremen
Gerhard Röhrle, Bochum

Abstract

The central topic of the workshop was the notion of logarithmic vector fields along a divisor in a smooth complex analytic or algebraic variety, i.e., the vector fields on the ambient variety tangent to the divisor. Following their introduction by K. Saito for the purpose of studying the universal unfolding of an isolated singularity, this fundamental object has been the focus of studies in a wide range of mathematical fields such as algebra, algebraic geometry, singularity theory, root systems, (geometric) representation theory, combinatorics, (toric) topology, or symplectic geometry. In the last few years the logarithmic vector field approach has seen some unexpected and striking advances and deep applications. The aim of the workshop was to provide reports and to share these various new developments in the field.

Participants

Abe, Takuro (Fukuoka), Barakat, Mohamed (Siegen), Bath, Dan (West Lafayette), Bibby, Christin N. (Baton Rouge), Castro Jimenez, Francisco Jesus (Sevilla), Cohen, Daniel C. (Baton Rouge), Cuntz, Michael (Hannover), Delucchi, Emanuele (Fribourg), Denham, Graham (London), de Vries, Christopher (Bremen), Dimca, Alexandru (Nice), DiPasquale, Michael Robert (Fort Collins), Dotsenko, Vladimir (Strasbourg), Douglass, Matthew (Alexandria), Faber, Eleonore (Leeds), Faenzi, Daniele (Dijon), Falk, Michael (Flagstaff), Feichtner, Eva Maria (Bremen), Feigin, Misha (Glasgow), Granger, Michel (Angers), Harbourne, Brian (Lincoln), Kühne, Lukas (Leipzig), Macinic, Anca Daniela (Bucharest), Migliore, Juan C. (Notre Dame), Mond, David (Coventry), Mücksch, Paul (Bochum), Nagaoka, Takahiro (Kyoto), Narvaez Macarro, Luis (Sevilla), Neaime, Georges (Bochum), Palezzato, Elisa (Sapporo), Pfeiffer, Götz (Galway), Pokora, Piotr (Kraków), Pol, Delphine (Kaiserslautern), Röhrle, Gerhard (Bochum), Saito, Kyoji (Kyoto), Saito, Morihiko (Kyoto), Salvetti, Mario (Pisa), Schenck, Henry K. (Auburn, Alabama), Schulze, Mathias (Kaiserslautern), Settepanella, Simona (Sapporo), Shepler, Anne V. (Denton), Stump, Christian (Bochum), Suci, Alexander I. (Boston), Szemberg, Tomasz (Kraków), Tohaneanu, Stefan (Moscow), Torielli, Michele (Sapporo), Tran, Tan Nhat (Sapporo), Tsujie, Shuhei (Higashi-Hiroshima), Vallès, Jean (Pau), Wakefield, Max D. (Annapolis), Walther, Uli (West Lafayette), Welker, Volkmar (Marburg), Yoshinaga, Masahiko (Sapporo)

Workshop 2105 (hybrid meeting)



31.01. - 06.02.2021

Organizers:

Moduli spaces and Modular forms

Jan Hendrik Bruinier, Darmstadt

Gerard van der Geer, Amsterdam

Valery Gritsenko, Villeneuve d'Ascq

Abstract

The relation between moduli spaces and modular forms goes back to the theory of elliptic curves. On the one hand both topics experience their own growth and development, but from time to time new unexpected links show up and usually these lead to progress on both sides. One subject where there has been a lot of progress concerns the moduli of abelian varieties and K3 surfaces and especially on the Kodaira dimension of these spaces. The idea of the workshop was to bring together the experts of the two areas in the hope that discussion, interaction and lectures would spur the development of new ideas. The lectures of the workshop gave ample evidence of the interaction and provided opportunities for further interaction. Besides the lectures participants interacted via zoom in smaller groups.

Participants

Alfes-Neumann, Claudia (Bielefeld), Bengoechea, Paloma (Zürich), Bergström, Jonas (Stockholm), Bringmann, Kathrin (Köln), Bruinier, Jan Hendrik (Darmstadt), Brumer, Armand (Bronx), Calegari, Frank (Chicago), Cao, Jin (Beijing), Che-
nevier, Gaëtan (Paris), Cheng, Miranda (Amsterdam), Codogni, Giulio (Roma), Duncan, John F. R. (Atlanta), Faber, Carel F. (Utrecht), Farkas, Gavril (Berlin), Funke, Jens (Durham), Golyshev, Vasily (Moscow), Gritsenko, Valery (Villeneuve d'Ascq), Grushevsky, Samuel (Stony Brook), Howard, Benjamin V. (Chestnut Hill), Hulek, Klaus (Hannover), Kiefer, Paul (Darmstadt), Klingler, Bruno (Berlin), Kondo, Shigeyuki (Nagoya), Kramer, Jürg (Berlin), Krämer, Thomas (Berlin), Kudla, Stephen S. (Toronto), Li, Yingkun (Darmstadt), Ma, Shouhei (Tokyo), Metzler, Ingmar (Darmstadt), Möller, Martin (Frankfurt am Main), Movasati, Hossein (Rio de Janeiro), Nikulin, Viacheslav V. (Moscow), Pacetti, Ariel Martin (Córdoba), Petersen, Dan (Stockholm), Poor, Cris (Bronx), Raum, Martin (Göteborg), Ritzenthaler, Christophe (Rennes), Rosu, Eugenia (Regensburg), Salvati Manni, Riccardo (Roma), Sankaran, Gregory (Bath), Sankaran, Siddarth (Winnipeg), Schütt, Matthias (Hannover), Schwagenscheidt, Markus (Zürich), Stuken, Ekaterina (Moscow), Taïbi, Olivier (Lyon), Tommasi, Orsola (Padova), Tornaría, Gonzalo (Montevideo), van der Geer, Gerard (Amsterdam), von Pippich, Anna-Maria (Darmstadt), Wang, Haowu (Bonn), Williams, Brandon (Darmstadt), Yang, Tonghai (Madison), Yoshikawa, Ken-Ichi (Kyoto), Yuen, David S. (Kapolei), Zagier, Don B. (Bonn), Zuffetti, Riccardo (Frankfurt am Main)



14.02. - 20.02.2021

Organizers:

Challenges in Optimization with Complex PDE-Systems

Michael Hintermüller, Berlin

Karl Kunisch, Graz

Günter Leugering, Erlangen

Elisabetta Rocca, Pavia

Abstract

The workshop concentrated on various aspects of optimization problems with systems of nonlinear PDEs or variational inequalities as constraints. In particular, discussions around several keynote presentations in the areas of optimal control of nonlinear or non-smooth systems, optimization problems with functional and discrete or switching variables leading to mixed integer nonlinear PDE constrained optimization, shape and topology optimization, feedback control and stabilization, multi-criteria problems and multiple optimization problems with equilibrium constraints as well as versions of these problems under uncertainty or stochastic influences, and the respectively associated numerical analysis as well as design and analysis of solution algorithms were promoted. Moreover, aspects of optimal control of data-driven PDE constraints were addressed.

Participants

Agosti, Abramo (Pavia), Alphonse, Amal C. (Berlin), Aspri, Andrea (Pavia), Azmi, Behzad (Linz), Breiten, Tobias (Berlin-Charlottenburg), Brokate, Martin (Garching bei München), Burns, John Allen (Blacksburg), Casas, Eduardo (Santander), Clason, Christian (Essen), Colli, Pierluigi (Pavia), Frankowska, H el ene (Paris), Gazca, Alexei (Erlangen), Geiersbach, Caroline (Berlin), Hante, Falk M. (Berlin), Heinkenschloss, Matthias (Houston), Hertlein, Lukas (Garching bei M unchen), Herty, Michael (Aachen), Herzog, Roland (Chemnitz), Hinterm uller, Michael (Berlin), Hinze, Michael (Koblenz), Holler, Gernot (Graz), H omberg, Dietmar (Berlin), Huber, Olivier (Berlin), Ito, Kazufumi (Raleigh), Jacob, Birgit (Wuppertal), Kouri, Drew Philip (Albuquerque), Kr oner, Axel (Berlin), Kunisch, Karl (Graz), Leugering, G unter (Erlangen), Meinschmidt, Hannes (Linz), Meyer, Christian (Dortmund), M unch, Arnaud Diego (Aubi ere), Neitzel, Ira (Bonn), Pfeiffer, Laurent (Palaiseau), Pieper, Konstantin (Oak Ridge), Raymond, Jean-Pierre (Toulouse), Rocca, Elisabetta (Pavia), Rodrigues, S ergio S. (Linz), Sachs, Ekkehard (Trier), Scarpa, Luca (Wien), Schulz, Volker (Trier), Signori, Andrea (Pavia), Sokolowski, Jan (Vandoeuvres-l es-Nancy), Sprekels, J urgen (Berlin), Stengl, Steven-Marian (Berlin), Surowiec, Thomas M. (Marburg), Tr oltzsch, Fredi (Berlin), Tucsna , Marius (Talence), Ulbrich, Michael (Garching bei M unchen), Ulbrich, Stefan (Darmstadt), Veldmann, David (Erlangen), Vexler, Boris (Garching bei M unchen), Wachsmuth, Daniel (W urzburg), Walter, Daniel (Linz), Wang, Gensheng (Tianjin), Yousept, Irwin (Essen), Zuazua, Enrique (Erlangen)

21.02. - 27.02.2021

Applications of Optimal Transportation in the Natural Sciences

Organizers:

Jean-David Benamou, Le Chesnay
Virginie Ehrlacher, Champs sur Marne
Daniel Matthes, Garching

Abstract

Concepts and methods from the mathematical theory of optimal transportation have reached significant importance in various fields of the natural sciences. The view on classical problems from a "transport perspective" has led to the development of powerful problem-adapted mathematical tools, and sometimes to a novel geometric understanding of the matter. The natural sciences, in turn, are the most important source of ideas for the further development of the optimal transport theory, and are a driving force for the design of efficient and reliable numerical methods to approximate Wasserstein distances and the like. The presentations and discussions in this workshop have been centered around recent analytical results and numerical methods in the field of optimal transportation that have been motivated by specific applications in statistical physics, quantum mechanics, and chemistry.

Participants

Baradat, Aymeric (Leipzig), Benamou, Jean-David (Paris), Bonafini, Mauro (Göttingen), Brenier, Yann (Paris), Brigati, Giovanni (Paris), Bruna, Maria (Cambridge), Burger, Martin (Erlangen), Buttazzo, Giuseppe (Pisa), Cancès, Clément (Ville-neuve d'Ascq), Cardaliaguet, Pierre (Paris), Carlier, Guillaume (Paris), Colombo, Maria (Lausanne), Cotar, Codina (London), Degond, Pierre (London), Di Marino, Simone (Genova), Dolbeault, Jean (Paris), Dusson, Geneviève (Besançon), Ehrlacher, Virginie (Marne-la-Vallée), Erbar, Matthias (Bonn), Figalli, Alessio (Zürich), Friesecke, Gero (Garching bei München), Gallouet, Thomas (Palaiseau), Gangbo, Wilfrid (Los Angeles), Georgiou, Tryphon T. (Irvine), Golse, Francois (Palaiseau), Hopf, Katharina (Berlin), Iacobelli, Mikaela (Zürich), Kim, Inwon C. (Los Angeles), Kopfer, Eva (Bonn), Laborde, Maxime (Montréal), Maas, Jan (Klosterneuburg), Matthes, Daniel (Garching bei München), Maury, Bertrand (Orsay), McCann, Robert J. (Toronto), Mérigot, Quentin (Orsay), Metivier, Ludovic (Saint-Martin-d'Hères), Mielke, Alexander (Berlin), Mirebeau, Jean-Marie (Orsay), Montufar, Guido F. (Leipzig), Natale, Andrea (Orsay), Ortiz, Michael (Pasadena), Pass, Brendan (Edmonton), Pazukhina, Vera (München), Peletier, Mark A. (Eindhoven), Peyré, Gabriel (Paris), Pietschmann, Jan-Frederik (Chemnitz), Poon, Clarice (Bath), Rott, Eva-Maria (Garching bei München), Rumpf, Martin (Bonn), Santambrogio, Filippo (Villeurbanne), Savaré, Giuseppe (Milano), Schlichting, André (Münster), Schmitzer, Bernhard (Garching bei München), Seis, Christian (Münster), Slepcev, Dejan (Pittsburgh), Sturm, Karl-Theodor (Bonn), Vialard, Francois-Xavier (Marne-la-Vallée), von Renesse, Max (Leipzig), Wirth, Benedikt (Münster), Yang, Yunan (New York)

Workshop 2109 (hybrid meeting)



28.02. - 06.03.2021

Hyperbolic Balance Laws: modeling, analysis, and numerics

Organizers:

Remi Abgrall, Zürich
Mauro Garavello, Milano
Mária Lukáčová-Medvid'ová, Mainz
Konstantina Trivisa, College Park

Abstract

This workshop brought together leading experts, as well as the most promising young researchers, working on nonlinear hyperbolic balance laws. The meeting focused on addressing new cutting-edge research in modeling, analysis, and numerics. Particular topics included ill-/well-posedness, randomness and multiscale modeling, flows in a moving domain, free boundary problems, games and control.

Participants

Abgrall, Remi (Zürich), Ancona, Fabio (Padova), Bianchini, Roberta (Roma), Bianchini, Stefano (Trieste), Chertock, Alina (Raleigh), Chiri, Maria Teresa (State College), Colombo, Rinaldo M. (Brescia), Daneri, Sara (L'Aquila), Degond, Pierre (London), Despres, Bruno (Paris), Dumbser, Michael (Trento), Feireisl, Eduard (Praha), Freistühler, Heinrich (Konstanz), Garavello, Mauro (Milano), Gassner, Gregor (Köln), Giesselmann, Jan (Darmstadt), Goatin, Paola (Sophia-Antipolis), Guerra, Graziano (Milano), Helzel, Christiane (Düsseldorf), Herty, Michael (Aachen), Holden, Helge (Trondheim), Klingenberg, Christian (Würzburg), Kröner, Dietmar (Freiburg i. Br.), Kurganov, Alexander (Shenzhen, Guangdong Province), Kuzmin, Dmitri (Dortmund), Le Meledo, Elise (Zürich), Li, Fengyan (Troy), Li, Jiequan (Beijing), Loubère, Raphael (Talence), Lukáčová-Medvid'ová, Mária (Mainz), Marconi, Elio (Basel), May, Sandra (Dortmund), Nguyen, Tien Khai (Raleigh), Noelle, Sebastian (Aachen), Öffner, Philipp (Mainz), Otto, Felix (Leipzig), Petrella, Marco (Zürich), Puppo, Gabriella A. (Roma), Ricchiuto, Mario (Talence), Risebro, Nils Henrik (Oslo), Rohde, Christian (Stuttgart), Rossi, Elena (Reggio Emilia), Schneider, Simon (Mainz), Székelyhidi Jr., László (Leipzig), Tadmor, Eitan (College Park), Thomann, Andrea (Mainz), Thorsen, Tessa (College Park), Torlo, Davide (Talence), Trivisa, Konstantina (College Park), Tzavaras, Athanasios E. (Thuwal), Warnecke, Gerald (Magdeburg), Weber, Franziska (Pittsburgh), Wiebe, Bettina (Mainz), Yuan, Yuhuan (Mainz)

07.03. - 13.03.2021

Organizers:

Homotopic and Geometric Galois Theory

Benjamin Collas, Bayreuth

Pierre Dèbes, Villeneuve d'Ascq

Hiroaki Nakamura, Osaka

Jakob Stix, Frankfurt

Abstract

In his "Letter to Faltings", Grothendieck lays the foundation of what will become part of his multi-faceted legacy to arithmetic geometry. This includes the following three branches discussed in the workshop: the arithmetic of Galois covers, the theory of motives and the theory of anabelian Galois representations. Their geometrical paradigms endow similar but complementary arithmetic insights for the study of the absolute Galois group $G_{\mathbb{Q}}$ of the field of rational numbers that initially crystallized into a functorially group-theoretic unifying approach. Recent years have seen some new enrichments based on modern geometrical constructions – e.g. simplicial homotopy, Tannaka perversity, automorphic forms – that endow some higher considerations and outline new geometric principles. This workshop brought together an international panel of young and senior experts of arithmetic geometry who sketched the future desire paths of homotopic and geometric Galois theory.

Participants

Balakrishnan, Jennifer S. (Boston), Bary-Soroker, Lior (Tel Aviv), Boughattas, Elyes (Paris), Cadoret, Anna (Paris), Collas, Benjamin (Kyoto), Dèbes, Pierre (Villeneuve d'Ascq), Fehm, Arno (Dresden), Fried, Michael David (Irvine), Harbater, David (Philadelphia), Harpaz, Jonathan (Villetaneuse), Heinloth, Jochen (Essen), Horel, Geoffroy (Villetaneuse), Hoshi, Akinari (Niigata), Hoshi, Yuichiro (Kyoto), Karemaker, Valentijn (Utrecht), Koenig, Joachim (Cheongju), Legrand, François (Caen), Litt, Daniel (Athens), Lütke, Martin (Frankfurt am Main), McKean, Stephen (Durham), Minamide, Arata (Kyoto), Nakamura, Hiroaki (Osaka), Neftin, Danny (Haifa), Østvær, Paul Arne (Oslo), Patrikis, Stefan (Columbus), Philip, Séverin (Saint-Martin-d'Hères), Pop, Florian (Philadelphia), Pries, Rachel (Fort Collins), Sawada, Koichiro (Osaka), Shiraishi, Densuke (Osaka), Stix, Jakob (Frankfurt am Main), Tang, Yunqing (Orsay), Topaz, Adam (Edmonton), Tsujimura, Shota (Kyoto), Wittenberg, Olivier (Villetaneuse), Yu, Hongjie (Klosterneuburg), Yuji, Tomoki (Kyoto)



07.03. - 13.03.2021

Organizers:

Deep Learning for Inverse Problems

Simon Arridge, London

Peter Maaß, Bremen

Carola-Bibiane Schönlieb, Cambridge UK

Abstract

Machine learning and in particular deep learning offer several data-driven methods to amend the typical shortcomings of purely analytical approaches. The mathematical research on these combined models is presently exploding on the experimental side but still lacking on the theoretical point of view. This workshop addresses the challenge of developing a solid mathematical theory for analyzing deep neural networks for inverse problems.

Participants

Adler, Jonas (Stockholm), Arridge, Simon R. (London), Beckmann, Matthias (Hamburg), Benning, Martin (London), Betcke, Marta M. (London), Boiger, Romana (Villigen), Bronstein, Michael (London), de Hoop, Maarten V. (Houston), De los Reyes, Juan Carlos (Quito), Dittmer, Sören (Bremen), Duff, Margaret (Bath), Eldar, Yonina C. (Haifa), Etmann, Christian (Cambridge), Girolami, Mark (Cambridge), Haltmeier, Markus (Innsbruck), Hauptmann, Andreas (Oulu), Kaltenbacher, Barbara (Klagenfurt), Kluth, Tobias (Bremen), Liu, Tianlin (Basel), Lucka, Felix (Amsterdam), Maaß, Peter (Bremen), Oktem, Ozan (Stockholm), Rosasco, Lorenzo (Genova), Schönlieb, Carola-Bibiane (Cambridge), Seo, Jin Keun (Seoul), Siltanen, Samuli (University of Helsinki), Stanzola, Antonio (London), Stuart, Andrew M. (Coventry)

14.03. - 20.03.2021

Organizers:

Homogenization Theory: Periodic and Beyond

Anne-Laure Dalibard, Paris

Claude Le Bris, Marne La Vallee

Panagiotis E. Souganidis, Chicago

Abstract

The objective of the workshop has been to review the latest developments in homogenization theory for a large category of equations and settings arising in the modeling of solid, fluids, wave propagation, heterogeneous media, etc. The topics approached have covered periodic and nonperiodic deterministic homogenization, stochastic homogenization, regularity theory, derivation of wall laws and detailed study of boundary layers,...

Participants

Bedrossian, Jacob (College Park), Bella, Peter (Dortmund), Berlyand, Leonid (University Park), Blanc, Xavier (Paris), Bonnivard, Matthieu (Paris), Borcea, Liliana (Ann Arbor), Bowman, David (Chicago), Braides, Andrea (Roma), Cardaliaguet, Pierre (Paris), Cicalese, Marco (Garching bei München), Dalibard, Anne-Laure (Paris), Dang, Spencer (University Park), Dirr, Nicolas (Cardiff), Dondl, Patrick (Freiburg i. Br.), Duerinckx, Mitia (Orsay), Fischer, Julian (Klosterneuburg), Fliss, Sonia (Palaiseau), Francfort, Gilles A. (Villetaneuse), Garnier, Josselin (Palaiseau), Garroni, Adriana (Roma), Gérard-Varet, David (Paris), Giunti, Arianna (Bonn), Gloria, Antoine (Paris), Goudey, Rémi (Marne-la-Vallée), Guo, Xiaoqin (Cincinnati), Le Bris, Claude (Marne-la-Vallée), Lin, Fang-Hua (New York), Lopez-Ruiz, Gabriela (Paris), Maekawa, Yasunori (Kyoto), Masmoudi, Nader (New York), Mazzucato, Anna (University Park), Morfe, Peter (Chicago), Nečasová, Šárka (Praha), Neukamm, Stefan (Dresden), Neuss-Radu, Maria (Erlangen), Nguyen, Toan T. (University Park), Novikov, Alexei (University Park), Nussenzveig-Lopes, Helena J. (Rio de Janeiro), Pertinand, Jules (Paris), Piatnitski, Andrey (Narvik), Planas, Gabriela (Campinas), Prange, Christophe (Talence), Ray, Nadja (Erlangen), Schweiger, Florian (Rehovot), Schweizer, Ben (Dortmund), Smart, Charles K. (Chicago), Souganidis, Panagiotis E. (Chicago), Wolf, Sylvain (Paris), Woukeng, Jean-Louis (Dschang), Zeitouni, Ofer (Rehovot)



21.03. - 27.03.2021

Organizers:

Mathematical Foundations of Machine Learning

Peter Bartlett, Berkeley

Cristina Butucea, Palaiseau

Johannes Schmidt-Hieber, Enschede

Abstract

Machine learning has achieved remarkable successes in various applications, but there is wide agreement that a mathematical theory for deep learning is missing. Recently, some first mathematical results have been derived in different areas such as mathematical statistics and statistical learning. Any mathematical theory of machine learning will have to combine tools from different fields such as nonparametric statistics, high-dimensional statistics, empirical process theory and approximation theory. A focus of the workshop was on theory for deep neural networks. Mathematically speaking, neural networks define function classes with a rich mathematical structure that are extremely difficult to analyze because of non-linearity in the parameters. Until very recently, most existing theoretical results could not cope with many of the distinctive characteristics of deep networks. Other topics were procedures for quantifying the uncertainty of machine learning methods and the mathematics of data privacy.

Participants

Bartlett, Peter (Berkeley), Betken, Annika (Enschede), Blanchard, Gilles (Orsay), Brunel, Victor-Emmanuel (Palaiseau), Bubeck, Sébastien (Redmond), Bühlmann, Peter (Zürich), Bunea, Florentina (Ithaca), Butucea, Cristina (Palaiseau), Carpentier, Alexandra (Magdeburg), Dalalyan, Arnak (Palaiseau), Dereich, Steffen (Münster), Donoho, David L. (Stanford), Duchi, John (Stanford), Fan, Jianqing (Princeton), Finocchio, Gianluca (Enschede), Foygel Barber, Rina (Chicago), Gao, Chao (Chicago), Gunasekar, Suriya (Redmond), Györfi, László (Budapest), Hein, Matthias (Tübingen), Hsu, Daniel J. (New York), Issartel, Yann (Malakoff), Kassing, Sebastian (Münster), Ke, Zheng T. (Cambridge), Kim, Yongdai (Seoul), Klopp, Olga (Cergy-Pontoise), Kohler, Michael (Darmstadt), Kovács, Solt (Zürich), Kutyniok, Gitta (München), Langer, Sophie (Darmstadt), Lugosi, Gabor (Barcelona, Catalonia), Mammen, Enno (Heidelberg), Meyer, Joseph Theo (Heidelberg), Montanari, Andrea (Stanford), Mücke, Nicole (Berlin), Munk, Axel (Göttingen), Nickl, Richard (Cambridge), Perchet, Vianney (Palaiseau), Pontil, Massimiliano (Genova), Reiß, Markus (Berlin), Richter, Stefan (Heidelberg), Rockova, Veronika (Chicago), Rohde, Angelika (Freiburg i. Br.), Samworth, Richard (Cambridge), Schmidt-Hieber, Johannes (Enschede), Shamir, Ohad (Rehovot), Staudt, Thomas (Göttingen), Steinberger, Lukas (Wien), Sun, Nike (Cambridge), Suvorikova, Alexandra (Berlin), Suzuki, Taiji (Tokyo), Tibshirani, Ryan (Pittsburgh), Tsigler, Alexander (Berkeley), Tsybakov, Alexandre B. (Palaiseau), van de Geer, Sara (Zürich), Verzelen, Nicolas (Montpellier), Vogt, Michael (Ulm), Yuan, Ming (New York), Zamolodtchikov, Petr (Enschede), Zhou, Huibin (New Haven)



28.03. - 03.04.2021

Organizers:

Geometric Numerical Integration

Marlis Hochbruck, Karlsruhe

Christian Lubich, Tübingen

Robert McLachlan, Palmerston North

Jesús María Sanz-Serna, Madrid

Abstract

The topics of the workshop included interactions between geometric numerical integration and numerical partial differential equations; geometric aspects of stochastic differential equations; interaction with optimisation and machine learning; new applications of geometric integration in physics; problems of discrete geometry, integrability, and algebraic aspects.

Participants

Abdulle, Assyr (Lausanne), Bao, Weizhu (Singapore), Bernier, Joackim (Toulouse), Blanes, Sergio (Valencia), Bogfjellmo, Geir (Trondheim), Bou-Rabee, Nawaf (Camden), Budd, Chris J. (Bath), Casas, Fernando (Castellon), Celledoni, Elena (Trondheim), Ceruti, Gianluca (Tübingen), Chartier, Philippe (Rennes), Cohen, David (Göteborg), Crouseilles, Nicolas (Rennes), Curry, Charles (Trondheim), Dörich, Benjamin (Karlsruhe), Ebrahimi-Fard, Kurusch (Trondheim), Einkemmer, Lukas (Innsbruck), Escorihuela-Tomás, Alejandro (Castellon), Faou, Erwan (Bruz), Frank, Jason E. (Utrecht), Gay-Balmaz, Francois (Paris), Hairer, Ernst (Genève), Hochbruck, Marlis (Karlsruhe), Iserles, Arieh (Cambridge), Jahnke, Tobias (Karlsruhe), Kovács, Balázs (Tübingen), Kraus, Michael (Garching bei München), Leimkuhler, Benedict (Edinburgh), Leok, Melvin (La Jolla), Lubich, Christian (Tübingen), McLachlan, Robert (Palmerston North), Miyatake, Yuto (Osaka), Modin, Klas (Göteborg), Munthe-Kaas, Hans Z. (Bergen), Murua, Ander (Donostia/San Sebastian), Ober-Blöbaum, Sina (Paderborn), Offen, Christian (Paderborn), Olver, Peter J. (Minneapolis), Ostermann, Alexander (Innsbruck), Owren, Brynjulf (Trondheim), Quispel, Reinout (Bundoora), Sander, Oliver (Dresden), Sanz-Serna, Jesús María (Leganes), Schönlieb, Carola-Bibiane (Cambridge), Schrammer, Stefan (Karlsruhe), Schratz, Katharina (Paris), Sherry, Ferdia (Cambridge), Sonnendrücker, Eric (Garching bei München), Stern, Ari (St. Louis), Suris, Yuri B. (Berlin), Vandereycken, Bart (Genève), Vermeeren, Mats (Leeds), Vilmart, Gilles (Genève), Viviani, Milo (Pisa), Wiese, Anke (Edinburgh), Zanna, Antonella (Bergen), Zygalakis, Konstantinos (Edinburgh)



18.04. - 24.04.2021

Organizers:

Algebraic Groups

Corrado De Concini, Rome

Philippe Gille, Villeurbanne

Peter Littelmann, Köln

Abstract

Linear algebraic groups is an active research area in contemporary mathematics. It has rich connections to algebraic geometry, representation theory, algebraic combinatorics, number theory, algebraic topology, and differential equations. The foundations of this theory were laid by A. Borel, C. Chevalley, J.-P. Serre, T. A. Springer and J. Tits in the second half of the 20th century. The Oberwolfach workshops on algebraic groups, led by Springer and Tits, played an important role in this effort as a forum for researchers, meeting at approximately 3 year intervals since the 1960s. The present workshop continued this tradition, covering a range of topics, with an emphasis on recent developments in the subject.

Participants

Achar, Pramod N. (Baton Rouge), Anderson, Dave (Columbus), Balaji, Vikraman (Tamil Nadu, Chennai), Baumann, Pierre (Strasbourg), Brion, Michel (Gières), Brosnan, Patrick (College Park), Cupit-Foutou, Stéphanie (Bochum), De Concini, Corrado (Roma), Elias, Benjamin (Eugene), Fang, Xin (Köln), Feigin, Evgeny (Moscow), Fourier, Ghislain (Aachen), Gille, Philippe (Villeurbanne), Halpern-Leistner, Daniel (Ithaca), Hernandez, David (Paris), Hoskins, Victoria (Nijmegen), Kiritchenko, Valentina (Moscow), Knop, Friedrich (Erlangen), Kraft, Hanspeter (Basel), Kumar, Shrawan (Chapel Hill), Lachowska, Anna (Lausanne), Littelmann, Peter (Köln), Maffei, Andrea (Pisa), Malle, Gunter (Kaiserslautern), McNinch, George (Medford), Mehmeti, Vlere (Caen), Mirkovic, Ivan (Amherst), Moreau, Anne (Orsay), Müller, Henrik (Köln), Pezzini, Guido (Roma), Procesi, Claudio (Roma), Reichstein, Zinovy (Vancouver), Ressayre, Nicolas (Villeurbanne), Richarz, Timo (Darmstadt), Riche, Simon (Aubière), Röhrle, Gerhard (Bochum), Rosengarten, Zev (Jerusalem), Schaefer, Daniel (Köln), Schumann, Beatrix (Köln), Shan, Peng (Beijing), Soergel, Wolfgang (Freiburg i. Br.), Stavrova, Anastasia (St. Petersburg), Stewart, David (Newcastle upon Tyne), Stroppel, Catharina (Bonn), Testerman, Donna M. (Lausanne), Varagnolo, Michela (Cergy-Pontoise), Vasserot, Eric (Paris), Vilonen, Kari (Melbourne), Williamson, Geordie (Sydney), Xue, Ting (Parkville)



25.04. - 01.05.2021

Organizers:

Computability Theory

Vasco Brattka, Neubiberg
Noam Greenberg, Wellington
Iskander Kalimullin, Kazan
Mariya Soskova, Madison

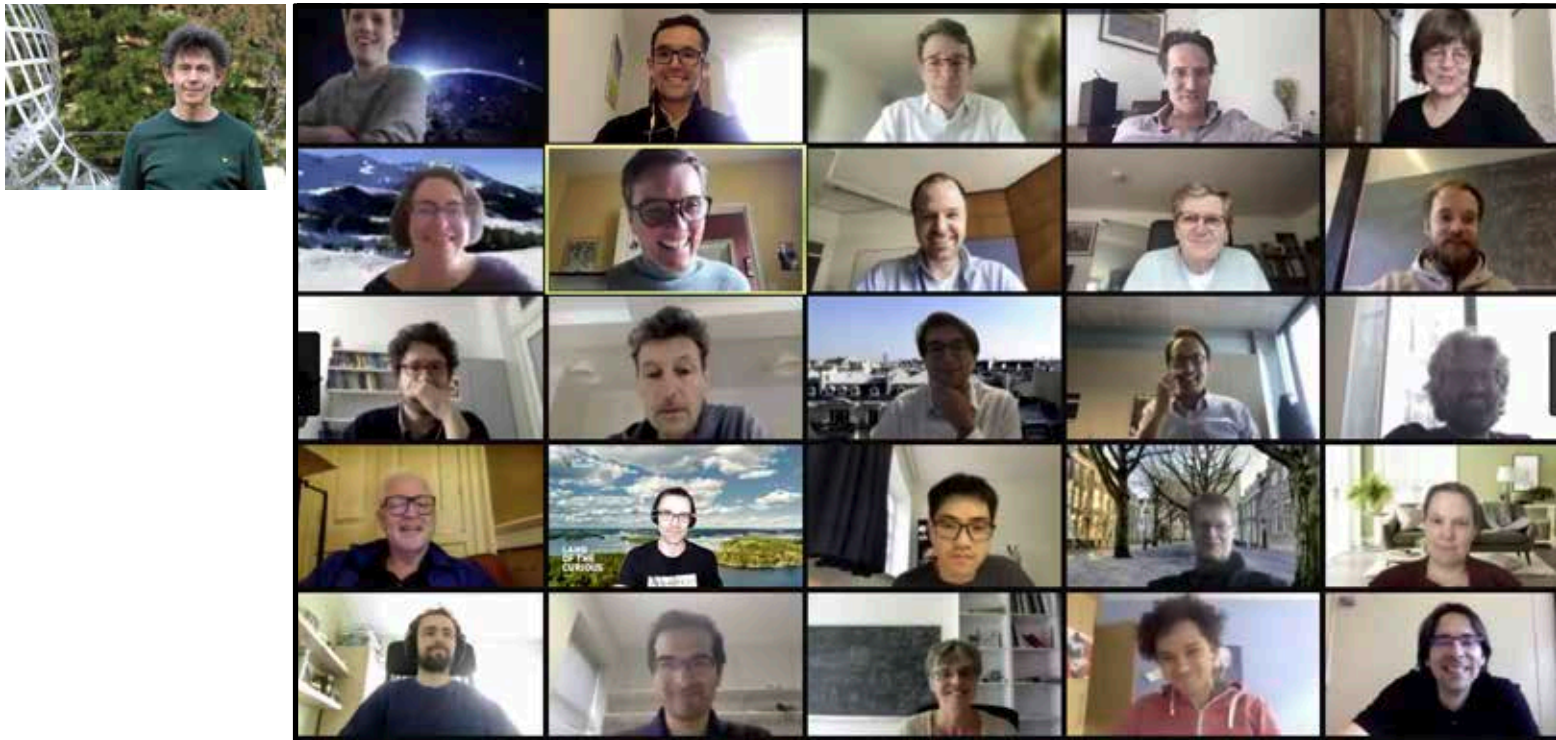
Abstract

Over the last decade computability theory has seen many fascinating developments that have linked the subject closer to other mathematical disciplines inside and outside of logic. This includes work on enumeration degrees that has revealed deep and surprising relations to general topology, the work on algorithmic randomness that is closely tied to symbolic dynamics and geometric measure theory. Inside logic there are connections to model theory, set theory, effective descriptive set theory, computable analysis and reverse mathematics. In some of these cases the bridges to seemingly distant mathematical fields have yielded completely new proofs or even solutions of open problems in the respective fields. Thus, computability theory has formed vibrant and beneficial interactions with other mathematical fields.

Participants

Andrews, Uri (Madison), Anglès d'Auriac, Paul-Elliot (Grenoble), Bazhenov, Nikolay (Novosibirsk), Becher, Verónica (Buenos Aires), Bienvenu, Laurent (Talence), Brattka, Vasco (Neubiberg), Cholak, Peter (Notre Dame), Chong, Chi Tat (Singapore), Delle Rose, Valentino (Siena), Dzhamalov, Damir D. (Storrs), Faizrahmanov, Marat (Kazan), Fiori Carones, Marta (Warszawa), Fokina, Ekaterina (Wien), Franklin, Johanna (Hempstead), Frittaion, Emanuele (Darmstadt), Goh, Jun Le (Madison), Goncharov, Sergey S. (Novosibirsk), Harizanov, Valentina S. (Washington), Harrison-Trainor, Matthew (Auckland), Hertling, Peter (Neubiberg), Hirschfeldt, Denis Roman (Chicago), Hölzl, Rupert (Neubiberg), Hoyrup, Mathieu (Villers-lès-Nancy), Janicki, Philip (Neubiberg), Jockusch, Carl (Urbana), Kalimullin, Iskander (Kazan), Khoussainov, Bakhadyr (Auckland), Kihara, Takayuki (Nagoya), Knight, Julia F. (Notre Dame), Kohlenbach, Ulrich W. (Darmstadt), Lempp, Steffen (Madison), Liu, Lu (Changsha), Lutz, Neil (Ames), Marccone, Alberto (Udine), Marks, Andrew (Los Angeles), Mayordomo, Elvira (Zaragoza), Melnikov, Alexander G. (Auckland), Merkle, Wolfgang (Heidelberg), Miller, Joseph S. (Madison), Miller, Russell (Flushing), Monin, Benoit (Créteil), Morozov, Andrey S. (Novosibirsk), Ng, Keng Meng (Singapore), Nies, Andre O. (Auckland), Patey, Ludovic (Villeurbanne), Pauly, Arno (Swansea), Puzarenko, Vadim (Novosibirsk), Schröder, Matthias (Darmstadt), Selivanov, Victor (Novosibirsk), Shafer, Paul (Leeds), Shen, Alexander (Montpellier), Shlapentokh, Alexandra (Greenville), Shore, Richard A. (Ithaca), Slaman, Theodore A. (Berkeley), Solomon, Reed (Storrs), Soskova, Mariya (Madison), Steifer, Tomasz (Warszawa), Stephan, Frank (Singapore), Terwijn, Sebastiaan A. (Nijmegen), Towsner, Henry (Philadelphia), Turetsky, Dan (Wellington), Valenti, Manlio (Udine), Westrick, Linda (University Park), Yamaleev, Mars (Kazan), Yu, Liang (Nanjing)

Workshop 2118 (hybrid meeting)



02.05. - 08.05.2021

Foundations of Bayesian Inference for Complex Statistical Models

Organizers:

Richard Nickl, Cambridge UK
Judith Rousseau, Oxford
Aad van der Vaart, Leiden

Abstract

In this virtual workshop a variety of recent developments in Bayesian high-dimensional and non-parametric statistics were discussed in depth. There were 12 in depth talks delivered via zoom in the afternoons (to allow for US attendance), and several informal evening time meetings on wonder.me, where follow up discussions of the most important mathematical developments took place. Loosely speaking there were 3 main clusters of topics, on i) Asymptotic behaviour of Bayes methods, ii) Bayesian inverse problems, and iii) Sampling methods for complex posterior distributions.

Participants

Abraham, Kweku (Orsay), Agapiou, Sergios (Nicosia), Altmeyer, Randolph (Cambridge), Bacallado, Sergio (Cambridge), Bochkina, Natalia (Edinburgh), Bohr, Jan (Cambridge), Burger, Martin (Erlangen), Castillo, Ismael (Paris), Dalalyan, Arnak (Palaiseau), Dashti, Masoumeh (Brighton), Deo, Neil (Cambridge), Dion, Charlotte (Paris), Dunson, David (Durham), Eggen, Bart (Leiden), Favaro, Stefano (Torino), Franssen, Stefan (Leiden), Gao, Chao (Chicago), Gassiat, Elisabeth (Orsay), George, Edward I. (Philadelphia), Ghoshal, Subhashis (Raleigh), Giordano, Matteo (Cambridge), Hadji, Amine (Leiden), Hairault, Adrien (Oxford), Helin, Tapio (Lappeenranta), Hoffmann, Marc (Paris), Holmes, Chris (Oxford), Kekkonen, Hanne (Delft), Kirichenko, Alisa (Oxford), Koers, Geerten (Leiden), Kovachki, Nikola B. (Pasadena), Lijoi, Antonio (Milano), Mammen, Enno (Heidelberg), Monard, Francois (Santa Cruz), Moss, Daniel (Oxford), Moulines, Eric (Palaiseau), Munk, Axel (Göttingen), Nault, Zacharie (Orsay), Nguyen, Jeanne (Leiden), Nickl, Richard (Cambridge), Ning, Bo (Paris), Paternain, Gabriel (Cambridge), Petrone, Sonia (Milano), Pruenster, Igor (Milano), Ray, Kolyan M. (London), Reiß, Markus (Berlin), Rockova, Veronika (Chicago), Rousseau, Judith (Oxford), Schillings, Claudia (Mannheim), Schmidt-Hieber, Johannes (Enschede), Scricciolo, Catia (Verona), Spokoiny, Vladimir G. (Berlin), Sulem, Deborah (Oxford), Szabo, Botond (Leiden), Teckentrup, Aretha (Edinburgh), van der Pas, Stephanie (Amsterdam), van der Vaart, Aad W. (Leiden), van Zanten, Harry (Amsterdam), Vuursteen, Lasse (Leiden), Wade, Sara (Edinburgh), Wang, Sven (Cambridge)



16.05. - 22.05.2021

Organizers:

Geometric Methods of Complex Analysis

Bo Berndtsson, Göteborg

John Erik Fornaess, Trondheim

Nikolay Shcherbina, Wuppertal

Abstract

The purpose of this workshop was to discuss recent results in Several Complex Variables, Complex Geometry and Complex Dynamical Systems with a special focus on the exchange of ideas and methods among these areas. The main topics of the workshop included Holomorphic Dynamics and Nevanlinna's Theory; L^2 -methods and Cohomologies; Plurisubharmonic Functions and Pluripotential Theory; Geometric Questions of Complex Analysis.

Participants

Abate, Marco (Pisa), Andersson, Mats (Göteborg), Bedford, Eric D. (Stony Brook), Berman, Robert (Göteborg), Berndtsson, Bo (Göteborg), Blocki, Zbigniew (Kraków), Bracci, Filippo (Roma), Chen, Bo-Yong (Shanghai Shi), Demailly, Jean-Pierre (Gières), Deng, Fusheng (Beijing), Di Nezza, Eleonora (Palaiseau), Dinh, Tien-Cuong (Singapore), Drinovec Drnovšek, Barbara (Ljubljana), Fornaess, John Erik (Trondheim), Fornaess Wold, Erlend (Oslo), Forstneric, Franc (Ljubljana), Globevnik, Josip (Ljubljana), Guedj, Vincent (Toulouse), Harz, Tobias (Wuppertal), Hu, Mi (Parma), Ivashkovich, Sergej M. (Villeneuve d'Ascq), Joericke, Burglind (Bures-sur-Yvette), Kolodziej, Slawomir (Kraków), Kutzschebauch, Frank (Bern), Lempert, Laszlo (West Lafayette), Levenberg, Norman (Bloomington), Merker, Joël (Orsay), Nemirovski, Stefan (Moscow), Ohsawa, Takeo (Nagoya), Peters, Han (Amsterdam), Poletsky, Evgeny A. (Syracuse), Rong, Feng (Shanghai Shi), Ruppenthal, Jean (Wuppertal), Samuelson Kalm, Hakan (Göteborg), Shaw, Mei-Chi (Notre Dame), Shcherbina, Nikolay (Wuppertal), Sibony, Nessim (Orsay), Siu, Yum-Tong (Cambridge), Stenson, Berit (Trondheim), Sukhov, Alexander (Villeneuve d'Ascq), Tardini, Nicoletta (Parma), Tumanov, Alexander (Urbana), Vivas, Liz (Columbus), Wang, Xu (Trondheim), Winkelmann, Jörg (Bochum), Witt Nyström, David (Göteborg), Wu, Jujie (Zhuhai), Wulcan, Elizabeth (Göteborg), Zeriahi, Ahmed (Toulouse), Zhang, Liyou (Beijing), Zhou, Xiangyu (Beijing), Zimmer, Andrew M. (Madison)



30.05. - 05.06.2021

**Mathematics and its Ancient Classics Worldwide:
Translations, Appropriations, Reconstructions, Roles**

Organizers:

Karine Chemla, Paris
Vincenzo De Risi, Berlin/Paris
Antoni Malet, Barcelona

Abstract

The workshop analyzed with a multidisciplinary perspective the constitution, recovery, and role of the classical texts in mathematical practice throughout history. It aims at problematizing the notion of “classic”, to make it a historical category and to study the rhetorical, pedagogical, and institutional mechanisms that contribute to secure the status of classic to specific texts. So far, the focus of the historiography has dealt mostly with Greek classics and their impact on Western European societies, but we aimed to expand the focus of our enquiry culturally as well as chronologically.

Participants

Aradi, Naomi (Zürich), Axworthy, Angela (Berlin), Beeley, Philip (Oxford), Bella, Sandra (Paris), Bellé, Riccardo (Massa (MS)), Brentjes, Sonja (Berlin), Chemla, Karine (Paris), Chikurel, Idit (Hamburg), Confalonieri, Sara (Paris), Crozet, Pascal (Paris), Cuomo, Serafina (Durham), De Risi, Vincenzo (Paris), De Young, Gregg (New Cairo), Feingold, Mordechai (Pasadena), Fried, Michael N. (Beer-Sheva), Friedman, Michael (Berlin), Gavagna, Veronica (Firenze), Goldstein, Catherine (Paris), Guicciardini, Niccolò (Milano), Han, Qi (Beijing), Harari, Orna (Ramat Aviv, Tel Aviv), Høyrup, Jens E. (Roskilde), Husson, Matthieu (Paris), Kaplan, Abram (Cambridge), Karimian, Zeinab (Paris), Keller, Agathe (Paris), Lee, Eunsoo (Stanford), Longa, Gianluca (Aubière), Malet, Antoni (Barcelona, Catalonia), Michel, Nicolas (Utrecht), Morel, Thomas (Lens), Napolitani, Pier Daniele (Pisa), Nasifoglu, Yelda (Oxford), Netz, Reviel (Stanford), Oaks, Jeffrey A. (Indianapolis), PAN, Shuyuan (Beijing), Remaki, Ariles (Paris), Remmert, Volker (Wuppertal), Roby, Courtney Ann (Ithaca), Sammarchi, Eleonora (Zürich), Smadja, Ivahn (Nantes), Tatarchenko, Ksenia (Singapore), Trouillot, Alexis (Paris), Volkov, Alexei (Hsinchu City), Wagner, Roy (Zürich), Wang, Xiaofei (Beijing), Wilck, Benjamin (Berlin), Zheng, Felix Fanglei (Beijing), Zhou, Xiahoan (Beijing), Zhu, Yiwen (Guangzhou)



06.06. - 12.06.2021

Organizers:

Analysis, Geometry and Topology of Singular PDE

Claire Debord, Paris
Rafe Mazzeo, Stanford
Paolo Piazza, Roma
Boris Vertman, Oldenburg

Abstract

This workshop, held in an hybrid format, focused on the topology, geometry and geometric analysis of certain spaces with singularities: stratified spaces, compactifications of moduli spaces, spaces carrying a (singular) foliation, etc., and on the microlocal techniques, either in their classical forms or in more recent versions developed to handle singular PDE, or via the groupoid approach. Overall, this workshop provided an excellent setting for specialists from different parts of this general field of research to understand the range of problems and applications being studied and to learn the variety of techniques which are being brought to bear.

Participants

Adrourlidakis, Iakovos (Athens), Albin, Pierre (Urbana), Aldana, Clara Lucia (Barranquilla), Ammann, Bernd (Regensburg), Antonini, Paolo (Lecce), Bahuaud, Eric (Seattle), Bär, Christian (Potsdam), Bei, Francesco (Roma), Braverman, Maxim (Boston), Canzani, Yaiza (Chapel Hill), Carrillo-Rouse, Paulo (Toulouse), Carron, Gilles (Nantes), Cherkis, Sergey (Tucson), Cren, Clément (Créteil), Dai, Xianzhe (Santa Barbara), Debord, Claire (Paris), Degeratu, Anda (Stuttgart), Dimakis, Panagiotis (Stanford), Fredrickson, Laura (Eugene), Gell-Redman, Jesse (Melbourne), Goette, Sebastian (Freiburg i. Br.), Grieser, Daniel (Oldenburg), Güneysu, Batu (Potsdam), Hartmann, Luiz (Sao Carlos), Kottke, Chris (Sarasota), Kröncke, Klaus (Hamburg), Lesch, Matthias (Bonn), Lescure, Jean-Marie (Créteil), Ludwig, Ursula (Essen), Ma, Xiaonan (Paris), Massard, Kévin (Paris), Mazzeo, Rafe (Stanford), Melrose, Richard B. (Cambridge), Mendoza, Gerardo A. (Philadelphia), Mohsen, Omar (Münster), Olsen Lye, Jørgen (Oldenburg), Piazza, Paolo (Roma), Puglisi, Massimiliano (Roma), Rochon, Frederic (Montréal), Rowlett, Julie (Göteborg), Schick, Thomas (Göttingen), Schrohe, Elmar (Hannover), Sher, David (Chicago), Singer, Michael A. (London), Skandalis, Georges (Paris), Strohmaier, Alexander (Leeds), Varghese, Mathai (Adelaide), Vasy, Andras (Stanford), Velásquez, Mario (Göttingen), Vertman, Boris (Oldenburg), Weiss, Hartmut (Kiel), Wunsch, Jared (Evanston), Zenobi, Vito Felice (Roma), Zhang, Wei-Ping (Tianjin), Zhu, Xuwen (Boston)



13.06. - 19.06.2021

Organizers:

Enumerative Geometry of Surfaces

Gaëtan Borot, Bonn

Samuel Grushevsky, Stony Brook

Martin Möller, Frankfurt

Abstract

The recent developments in hyperbolic geometry and flat geometry in real dimension 2 formed the core of the workshop, with an emphasis on enumerative aspects. A particularly important role in this regard was played by intersection-theoretic techniques on $\overline{M}_{g,n}$, the geometry of the strata of differentials, the geometry of Hurwitz spaces, topological recursion techniques, and large genus asymptotics. The workshop included an exploration of relations with similar problems in complex dimension 2, tropical techniques for enumerative problems, and relations to mathematical physics.

Participants

Andersen, Jørgen E. (Odense), Arana-Herrera, Francisco (Stanford), Athreya, Jayadev S. (Seattle), Aulicino, David (Brooklyn), Bainbridge, Matthew (Bloomington), Benirschke, Frederik (Stony Brook), Borot, Gaëtan (Berlin), Cavaliere, Renzo (Fort Collins), Chen, Dawei (Chestnut Hill), Costantini, Matteo (Bonn), Delecroix, Vincent (Talence), Do, Norman (Monash University), Dozier, Benjamin (Stony Brook), Engel, Philip M. (Athens), Erlandsson, Viveka (Bristol), Fanoni, Federica (Créteil), Farkas, Gavril (Berlin), Filip, Simion (Chicago), Gendron, Quentin (Guanajuato), Giacchetto, Alessandro (Bonn), Goujard, Elise (Talence), Grushevsky, Samuel (Stony Brook), Hamenstädt, Ursula (Bonn), Janda, Felix (Notre Dame), Klingler, Bruno (Berlin), Korotkin, Dmitry (Montréal), Kramer, Reinier (Bonn), Lanneau, Erwan (Saint-Martin-d'Hères), Lewanski, Danilo (Gif-sur-Yvette), Markwig, Hannah (Tübingen), Masur, Howard (Chicago), McMullen, Curtis T. (Cambridge), Möller, Martin (Frankfurt am Main), Mondello, Gabriele (Roma), Mullane, Scott (Frankfurt am Main), Nguyen, Duc-Manh (Talence), Norbury, Paul (Melbourne), Norton, Chaya (Ann Arbor), Oberdieck, Georg (Bonn), Parlier, Hugo (Esch-sur-Alzette), Petri, Bram (Paris), Pixton, Aaron (Ann Arbor), Rafi, Kasra (Toronto), Randecker, Anja (Heidelberg), Sapir, Jenya (Binghamton), Sauvaget, Adrien (Cergy-Pontoise), Schmitt, Johannes (Bonn), Schwab, Johannes (Frankfurt am Main), Vakil, Ravi (Stanford), Wheeler, Campbell (Bonn), Wolpert, Scott A. (College Park), Wright, Alex M. (Ann Arbor), Zagier, Don B. (Bonn), Zograf, Peter (St. Petersburg), Zorich, Anton (Paris), Zvonkine, Dimitri (Versailles)



20.06. - 26.06.2021

Organizers:

Classical Algebraic Geometry

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

Abstract

Progress in algebraic geometry often comes through the introduction of new tools and ideas to tackle the classical problems in the development of the field. 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, with a view toward their application to the classical problems.

Participants

Agostini, Daniele (Leipzig), Aprodu, Marian (Bucharest), Barros Reyes, Ignacio (Orsay), Beauville, Arnaud (Nice), Benoist, Olivier (Paris), Bud, Andrei (Berlin), Castravet, Ana-Maria (Versailles), Colombo, Elisabetta (Milano), Debarre, Olivier (Paris), Di Lorenzo, Andrea (Berlin), Dolgachev, Igor (Ann Arbor), Ein, Lawrence (Chicago), Eisenbud, David (Berkeley), Engel, Philip M. (Cambridge), Eur, Christopher (Stanford), Farkas, Gavril (Berlin), Flapan, Laure (East Lansing), Floris, Enrica (Poitiers), Fu, Lie (Nijmegen), Gibney, Angela (Piscataway), Grushevsky, Samuel (Stony Brook), Hassett, Brendan (Providence), He, Zhuang (Berlin), Heinloth, Jochen (Essen), Höring, Andreas (Nice), Hulek, Klaus (Hannover), Huybrechts, Daniel (Bonn), Kemeny, Michael (Madison), Kollár, János (Princeton), Kuznetsov, Alexander (Moscow), Landesman, Aaron (Stanford), Larson, Hannah (Stanford), Lazarsfeld, Robert (Stony Brook), Lelli-Chiesa, Margherita (Roma), Lian, Carl (Berlin), Litt, Daniel (Athens), Macri, Emanuele (Orsay), Manivel, Laurent (Toulouse), Möller, Martin (Frankfurt am Main), Mongardi, Giovanni (Bologna), Oberdieck, Georg (Bonn), O'Grady, Kieran Gregory (Roma), Ortega, Angela (Berlin), Ottem, John Christian (Oslo), Pacienza, Gianluca (Vandoeuvre-lès-Nancy), Payne, Sam (Austin), Perry, Alexander (Ann Arbor), Pertusi, Laura (Milano), Popa, Mihnea (Cambridge), Raicu, Claudiu (Notre Dame), Ramkumar, Ritvik (Berkeley), Riedl, Eric (Notre Dame), Saccà, Giulia (New York), Sarti, Alessandra (Poitiers), Schreieder, Stefan (Hannover), Schreyer, Frank-Olaf (Saarbrücken), Sertöz, Emre Can (Bonn), Song, Jieao (Paris), Stellari, Paolo (Milano), Totaro, Burt (Los Angeles), Tschinkel, Yuri (New York), Vakil, Ravi (Stanford), Verra, Alessandro (Roma), Voisin, Claire (Paris)



27.06. - 03.07.2021

Analysis, Geometry and Topology of Positive Scalar Curvature Metrics

Organizers:

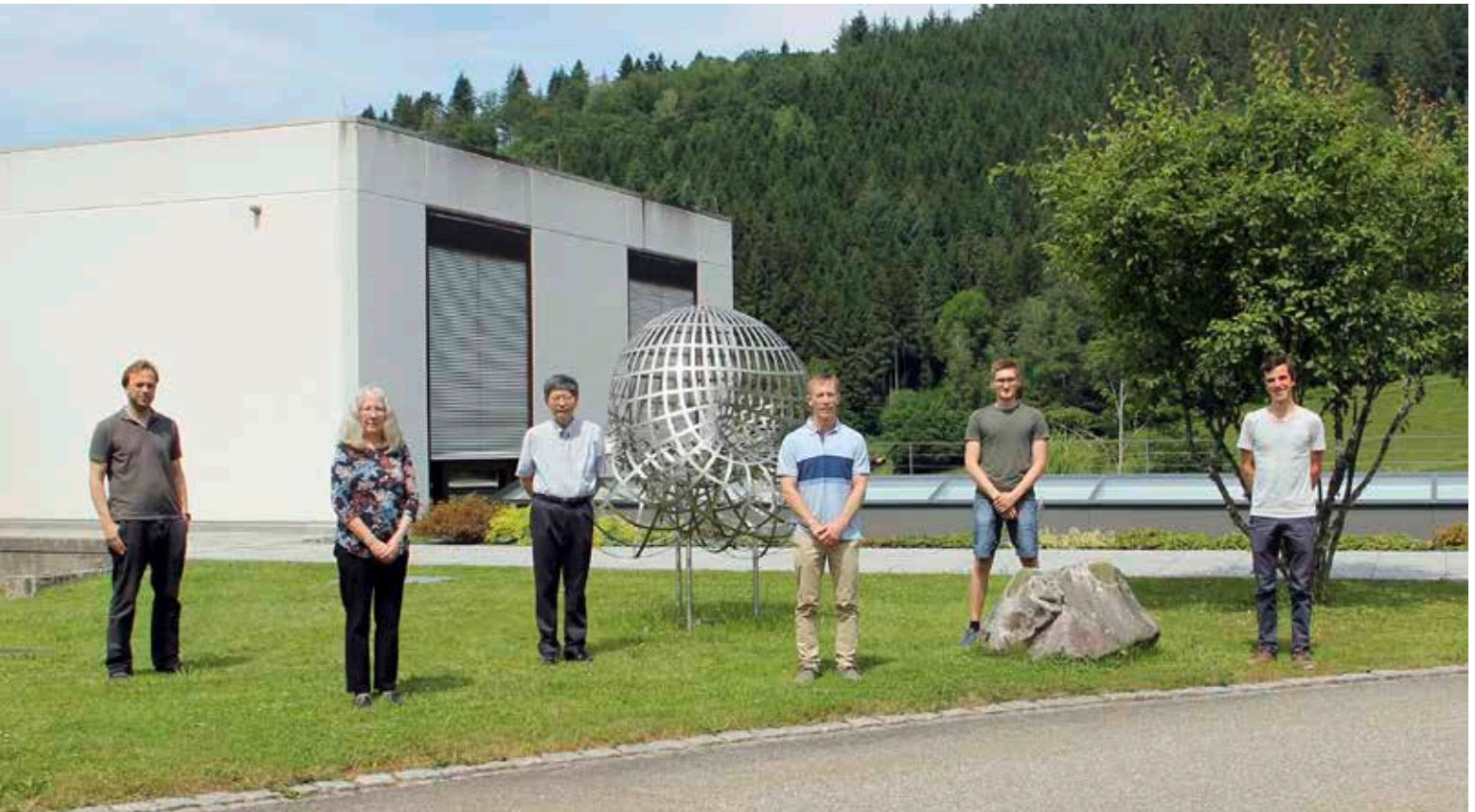
Bernd Ammann, Regensburg
Bernhard Hanke, Augsburg
Anna Sakovich, Uppsala

Abstract

The investigation of Riemannian metrics with lower scalar curvature bounds has been a central topic in differential geometry for decades. It addresses foundational problems, combining ideas and methods from global analysis, geometric topology, metric geometry and general relativity. Seminal contributions by Gromov during the last years have led to a significant increase of activities in the area which have produced a number of impressive results. Our workshop reflected the state of the art of this thriving field of research.

Participants

Ammann, Bernd (Regensburg), Bamler, Richard (Berkeley), Bär, Christian (Potsdam), Botvinnik, Boris (Eugene), Bray, Hubert (Durham), Burkhardt-Guim, Paula (Berkeley), Carlotto, Alessandro (Zürich), Cecchini, Simone (Göttingen), Cederbaum, Carla (Tübingen), Chruściel, Piotr T. (Wien), Dahl, Mattias (Stockholm), Ebert, Johannes (Münster), Eichmair, Michael (Wien), Frenck, Georg (Karlsruhe), Galloway, Gregory (Coral Gables), Gicquaud, Romain (Tours), Glöckle, Jonathan (Regensburg), Große, Nadine (Freiburg i. Br.), Hanke, Bernhard (Augsburg), Hirsch, Sven (Durham), Huang, Lan-Hsuan (Storrs), Kleiner, Bruce (New York), Kröncke, Klaus (Hamburg), LeBrun, Claude (Stony Brook), Mantoulidis, Christos (Houston), Piazza, Paolo (Roma), Råde, Daniel (Augsburg), Reiser, Philipp (Karlsruhe), Sakovich, Anna (Uppsala), Schick, Thomas (Göttingen), Shi, Yuguang (Beijing), Sormani, Christina (New York), Wang, Jian (Augsburg), Wiemeler, Michael (Münster), Xie, Zhizhang (College Station), Zeidler, Rudolf (Münster)



27.06. - 03.07.2021

Organizers:

Numerical Methods for Fully Nonlinear and Related PDEs

Sören Bartels, Freiburg
Susanne C. Brenner, Baton Rouge
Xiaobing Feng, Knoxville
Michael Neilan, Pittsburgh

Abstract

The aim of this workshop was to discuss the challenges, latest trends and advancements on numerical methods for fully nonlinear PDEs. The construction of numerical schemes and their convergence analysis is still an emerging field in computational mathematics with several fundamental open problems. Nonetheless, significant breakthroughs have recently appeared, including the design of accurate finite element schemes for non-variational problems, a priori error estimates for monotone schemes, and the construction of high-order and adaptive methods.

Participants

Awanou, Gerard (Chicago), Bartels, Sören (Freiburg i. Br.), Bonnet, Guillaume (Orsay), Brenner, Susanne C. (Baton Rouge), Budd, Chris J. (Bath), Feng, Xiaobing H. (Knoxville), Gallistl, Dietmar (Jena), Jakobsen, Espen (Trondheim), Jensen, Max (Brighton), Lewis, Tom (Greensboro), Li, Wenbo (Knoxville), Mirebeau, Jean-Marie (Orsay), Neilan, Michael J. (Pittsburgh), Nochetto, Ricardo H. (College Park), Pollock, Sara (Gainesville), Qiu, Weifeng (Hong Kong), Salgado, Abner J. (Knoxville), Schmitzer, Bernhard (Göttingen), Schnake, Stefan (Oak Ridge), Smears, Iain (London), Süli, Endre (Oxford), Sung, Li-yeng (Baton Rouge), Tan, Zhiyu (Baton Rouge), Tscherner, Philipp (Freiburg i. Br.), Wu, Shuonan (Beijing), Yang, Yunan (New York), Zhang, Wujun (New Brunswick)



04.07. - 10.07.2021

Organizers:

Differentialgeometrie im Grossen

Richard Bamler, Berkeley
Ursula Hamenstädt, Bonn
Urs Lang, Zürich
Ben Weinkove, Evanston

Abstract

The field of classical differential geometry has expanded enormously over the last several decades, helped by the development of tools from neighboring fields such as partial differential equations, complex analysis and geometric topology. In the spirit of the previous meetings in the series, this meeting will bring together researchers from apparently separate subfields of differential geometry, but whose work is linked by common themes. In particular, this meeting will emphasize intrinsic geometric questions motivated by the classification and rigidity of global geometric structures and the interaction of curvature with the underlying geometry and topology.

Participants

Bamler, Richard (Berkeley), Basso, Giuliano (Fribourg), Besson, Gérard (Grenoble), Carron, Gilles (Nantes), Chau, Albert (Vancouver), Conlon, Ronan (Richardson), Creutz, Paul (Köln), Dai, Xianzhe (Santa Barbara), Deruelle, Alix (Paris), Di Nezza, Eleonora (Palaiseau), Fine, Joel (Bruxelles), Fujiwara, Koji (Kyoto), Gianniotis, Panagiotis (Athens), Hamenstädt, Ursula (Bonn), Hein, Hans-Joachim (Münster), Jäckel, Frieder (Bonn), Kapovich, Misha (Davis), Kleiner, Bruce (New York), Kotschwar, Brett (Tempe), Lang, Urs (Zürich), Lee, Man-Chun (Evanston), Li, Qiongling (Tianjin), Li, Yang (Princeton), Liu, Gang (Shanghai), Lott, John (Berkeley), Lytchak, Alexander (Köln), Macbeth, Heather (Bronx), Markovic, Vladimir (Oxford), Nienhaus, Jan (Münster), Pozzetti, Maria Beatrice (Heidelberg), Rupflin, Melanie (Oxford), Sambarino, Andrés (Paris), Santoro, Bianca (Münster), Schulz, Mario B. (London), Sesum, Natasa (Piscataway), Simon, Miles (Magdeburg), Song, Antoine Y. (Berkeley), Stadler, Stephan (Bonn), Sun, Song (Berkeley), Tian, Gang (Beijing), Wei, Guofang (Santa Barbara), Weinkove, Ben (Evanston), Wiemeler, Michael (Münster), Wienhard, Anna Katharina (Heidelberg), Wilking, Burkhard (Münster), Wolf, Michael (Houston), Yao, Qi (Münster), Zarei, Masoumeh (Augsburg)



11.07. - 17.07.2021

Organizers:

Dynamische Systeme

Marie-Claude Arnaud, Paris

Helmut Hofer, Princeton

Michael Hutchings, Berkeley

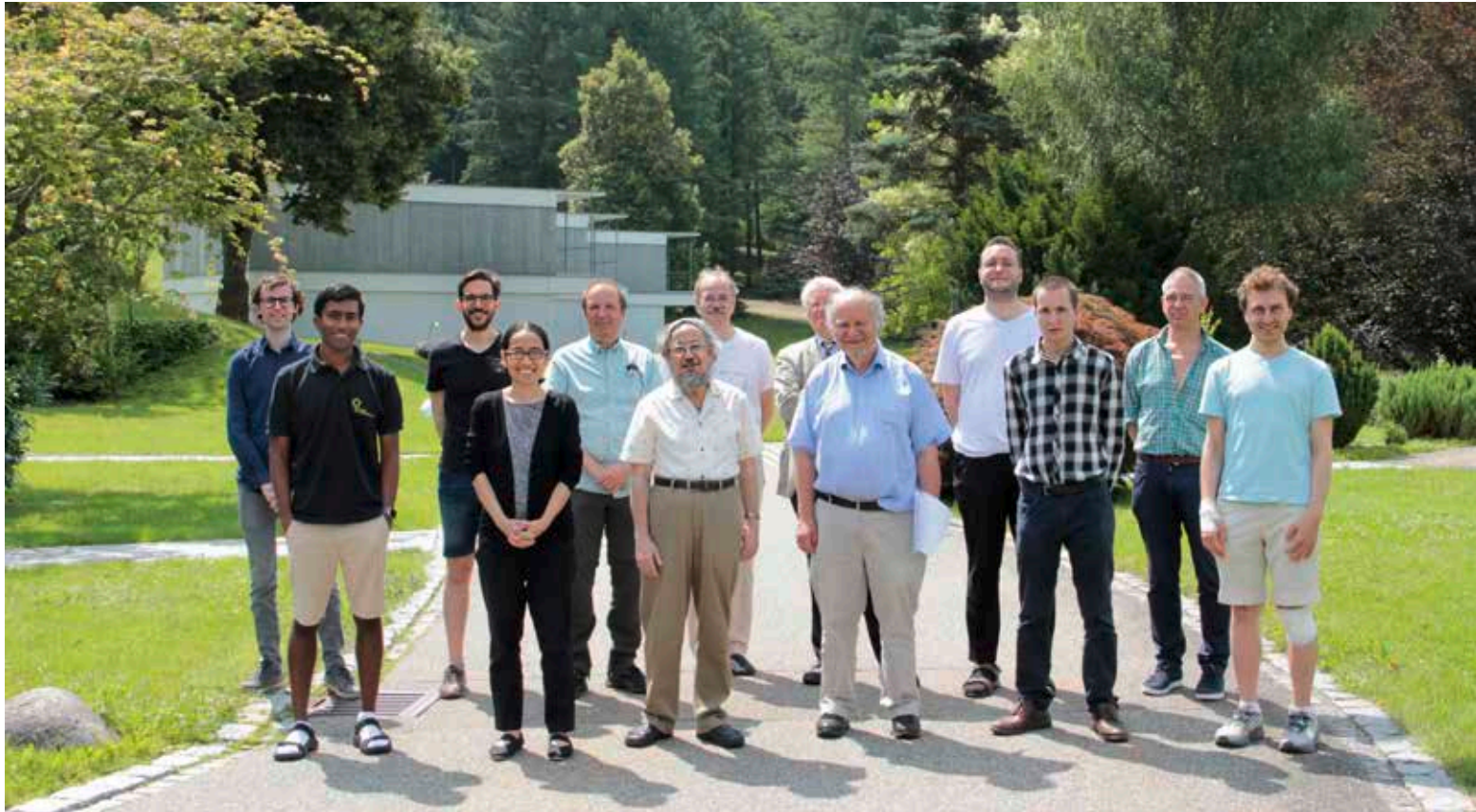
Vadim Kaloshin, Klosterneuburg

Abstract

This workshop continued a biannual series of workshops at Oberwolfach on dynamical systems that started with a meeting organized by Moser and Zehnder in 1981. Workshops in this series focus on new results and developments in dynamical systems and related areas of mathematics, with symplectic geometry playing an important role in recent years in connection with Hamiltonian dynamics. In this year special emphasis was placed on various kinds of spectra (in contact geometry, in Riemannian geometry, in dynamical systems and in symplectic topology) and their applications to dynamics.

Participants

Abbondandolo, Alberto (Bochum), Allais, Simon (Lyon), Alves, Marcelo (Antwerp), Arnaud, Marie-Claude (Paris), Baladi, Viviane (Paris), Baldomà Barraca, Immaculada (Barcelona, Catalonia), Balint, Peter (Budapest), Berger, Pierre (Paris), Berk, Przemyslaw (Zürich), Biebler, Sébastien (Paris), Bjerklov, Kristian (Stockholm), Bramham, Barney (Bochum), Callis, Keagan (College Park), Carrand, Jerome (Paris), Colin, Vincent (Nantes), Cristofaro-Gardiner, Daniel (Santa Cruz), Crovisier, Sylvain (Orsay), De Simoi, Jacopo (Toronto), Dyatlov, Semyon (Cambridge), Eliasson, Hakan (Paris), Fathi, Albert (Atlanta), Fayad, Bassam (Paris), Féjoz, Jacques (Paris), Fish, Joel W. (Boston), Florio, Anna (Paris), Forni, Giovanni (College Park), Ginzburg, Viktor L. (Santa Cruz), Gouëzel, Sébastien (Rennes), Guardia Munarriz, Marcel (Barcelona, Catalonia), Gurel, Basak (Orlando), Hezari, Hamid (Irvine), Hofer, Helmut W. (Princeton), Hryniewicz, Umberto L. (Aachen), Hutchings, Michael (Berkeley), Irie, Kei (Kyoto), Kaloshin, Vadim Y. (Klosterneuburg), Kanigowski, Adam (College Park), Koudjina, Comlan Edmond (Klosterneuburg), Krikorian, Raphaël (Cergy-Pontoise), Le Calvez, Patrice (Paris), Leguil, Martin (Amiens), Nelson, Jo (Houston), Ostrover, Yaron (Tel Aviv), Pan, Yi (Paris), Pirnapasov, Abror (Bochum), Polterovich, Leonid V. (Ramat Aviv, Tel Aviv), Prasad, Rohil (Princeton), Ramos, Vinicius G.B. (Rio de Janeiro), Rezchikov, Semon (Cambridge), Seara, Tere (Barcelona, Catalonia), Seyfaddini, Sobhan (Paris), Shelukhin, Egor (Montréal), Sorrentino, Alfonso (Roma), Tanny, Shira (Ramat Aviv, Tel Aviv), Trujillo, Frank (Zürich), Ulcigrai, Corinna (Zürich), van Koert, Otto (Seoul), Viterbo, Claude M. (Paris), Wei, Qiaoling (Beijing), Weiler, Morgan (Houston), Zelditch, Steve (Evanston), Zhang, Ke (Toronto)



18.07. - 24.07.2021

Organizers:

Explicit Methods in Number Theory

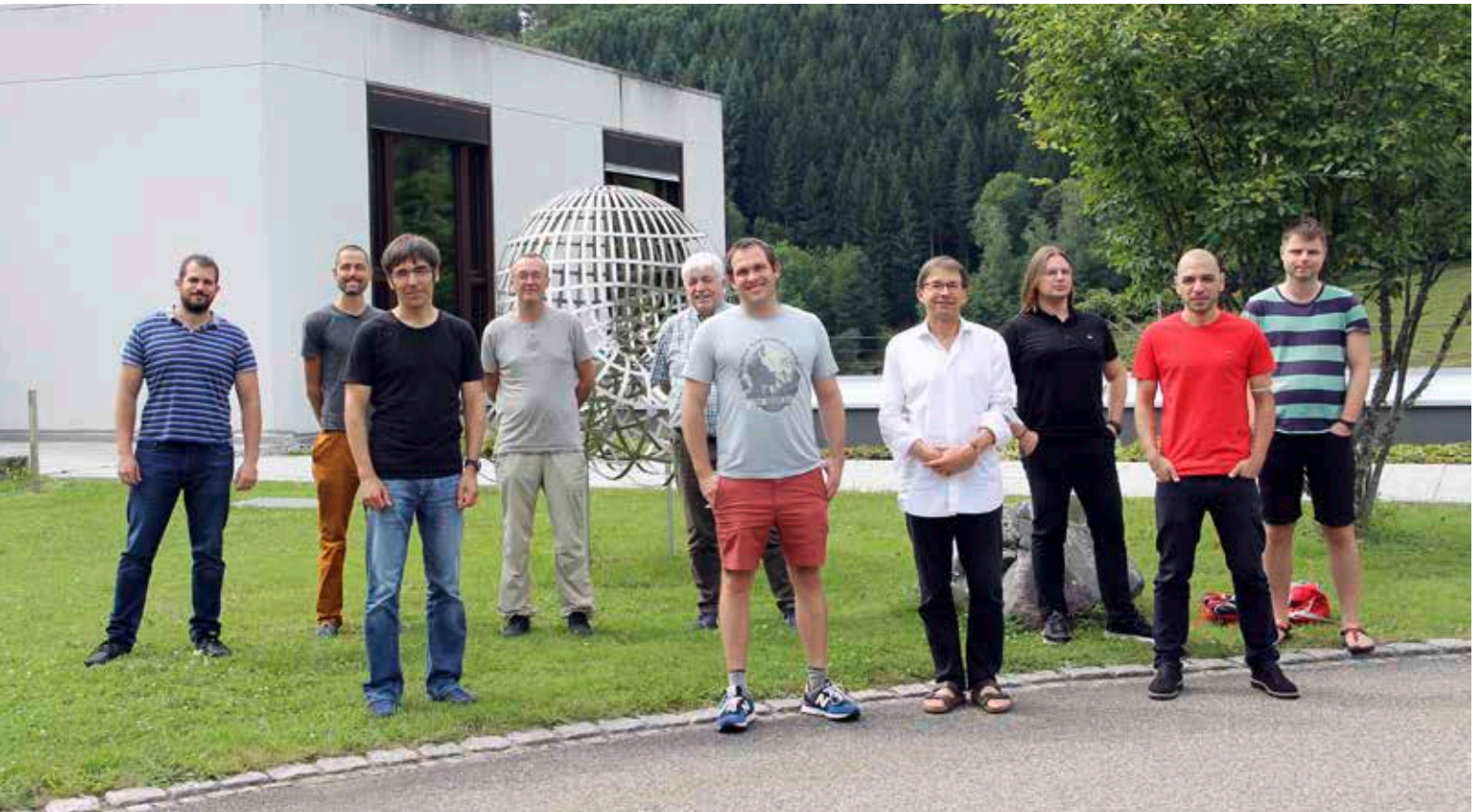
Karim Belabas, Talence
Bjorn Poonen, Cambridge MA
Fernando Rodriguez-Villegas, Trieste

Abstract

The series of Oberwolfach meetings on 'Explicit methods in number theory' brings together people attacking key problems in number theory via techniques involving concrete or computable descriptions. Here, number theory is interpreted broadly, including algebraic and analytic number theory, Galois theory and inverse Galois problems, arithmetic of curves and higher-dimensional varieties, zeta and L-functions and their special values, modular forms and functions. The 2021 meeting featured a seven-lecture minicourse on the distribution of class groups and Selmer groups. The other talks covered a broad range of topics in number theory ranging, for instance, from deterministic integer factorisation to the inverse Galois problem, rational points, and integrality of instanton numbers.

Participants

Alpoge, Levent (Cambridge), Balakrishnan, Jennifer S. (Boston), Bartel, Alex (Glasgow), Belabas, Karim (Talence), Beukers, Frits (Utrecht), Bhargava, Manjul (Princeton), Calegari, Frank (Chicago), Chidambaram, Shiva (Cambridge), Cohen, Henri (Talence), Costa, Edgar (Cambridge), Couveignes, Jean-Marc (Talence), Cremona, John E. (Coventry), Dogra, Netan (London), Dokchitser, Tim (Bristol), Elkies, Noam D. (Cambridge), Ellenberg, Jordan S. (Madison), Fisher, Tom (Cambridge), Granville, Andrew J. (Montréal), Gross, Benedict H. (Cambridge), Hajir, Farshid (Amherst), Harvey, David (Sydney), Ho, Wei (Ann Arbor), Kadets, Borys (Athens), Kedlaya, Kiran S. (La Jolla), Klüners, Jürgen (Paderborn), Koymans, Peter (Bonn), Landesman, Aaron (Stanford), Lenstra, Hendrik W. (Leiden), Li, Wanlin (Montréal), Liu, Yuan (Ann Arbor), Matchett Wood, Melanie (Cambridge), Paganò, Carlo (Glasgow), Paterson, Ross (Glasgow), Poonen, Bjorn (Cambridge), Pries, Rachel (Fort Collins), Rodriguez-Villegas, Fernando (Trieste), Sawin, Will (New York), Schoof, René (Roma), Sertöz, Emre Can (Bonn), Siksek, Samir (Warwick), Silverberg, Alice (Irvine), Smith, Alexander (Cambridge), Stoll, Michael (Bayreuth), Sutherland, Andrew (Cambridge), Swaminathan, Ashvin A. (Princeton), Thorne, Jack (Cambridge), Tran, Ha (Edmonton), Triantafyllou, Nicholas (Athens), Venkatesh, Akshay (Princeton), Viray, Bianca (Seattle), Vogt, Isabel (Providence), Voight, John (Hanover), Voloch, Jose Felipe (Christchurch), Wilke, Anne-Edgar P. R. (Talence), Zagier, Don B. (Bonn), Edixhoven, Bas (Leiden)



25.07. - 31.07.2021

Organizers:

Partial Differential Equations

Guido De Philippis, Trieste

Richard Schoen, Irvine

Felix Schulze, Coventry

Abstract

The workshop covered topics in nonlinear elliptic and parabolic Partial Differential Equations as well as topics in Geometric Measure Theory, touching topics such as geometric variational problems and minimal surfaces, geometric flows, free boundaries and the structure of nodal sets of eigenfunctions as well as real and complex Monge-Ampère equations. The program consisted of 21 talks, with an evening talk adjusting to the majority of the time zones of the virtual participants and gave sufficient time for discussion

Participants

Bellettini, Costante (London), Carlotto, Alessandro (Zürich), Choi, Kyeongsu (Seoul), Colombo, Maria (Lausanne), Daniels-Holgate, Joshua (Coventry), Daskalopoulos, Panagiotis (New York), De Philippis, Guido (Trieste), De Rosa, Antonio (College Park), Deruelle, Alix (Paris), Edelen, Nick (Notre Dame), Feehan, Paul M. N. (Piscataway), Fraser, Ailana M. (Vancouver), Hershkovits, Or (Jerusalem), Hirsch, Jonas (Leipzig), Huisken, Gerhard (Tübingen), Kleiner, Bruce (New York), Li, Chao (Princeton), Logunov, Alexander (Princeton), Maggi, Francesco (Austin), Mantoulidis, Christos (Providence), Mooney, Connor (Irvine), Mramor, Alexander (Baltimore), Pigati, Alessandro (New York), Riviere, Tristan (Zürich), Saez, Mariel (Estación Central Santiago), Schoen, Richard (Irvine), Schulze, Felix (Coventry), Sesum, Natasa (Piscataway), Simon, Miles (Magdeburg), Struwe, Michael (Zürich), Topping, Peter M. (Coventry), Tosatti, Valentino (Montréal), Velichkov, Bozhidar (Pisa), Weinkove, Ben (Evanston), Zhou, Xin (Ithaca)



01.08. - 07.08.2021

Organizers:

Computation and Learning in High Dimensions

Albert Cohen, Paris

Wolfgang Dahmen, Columbia

Ronald A. DeVore, College Station

Angela Kunoth, Köln

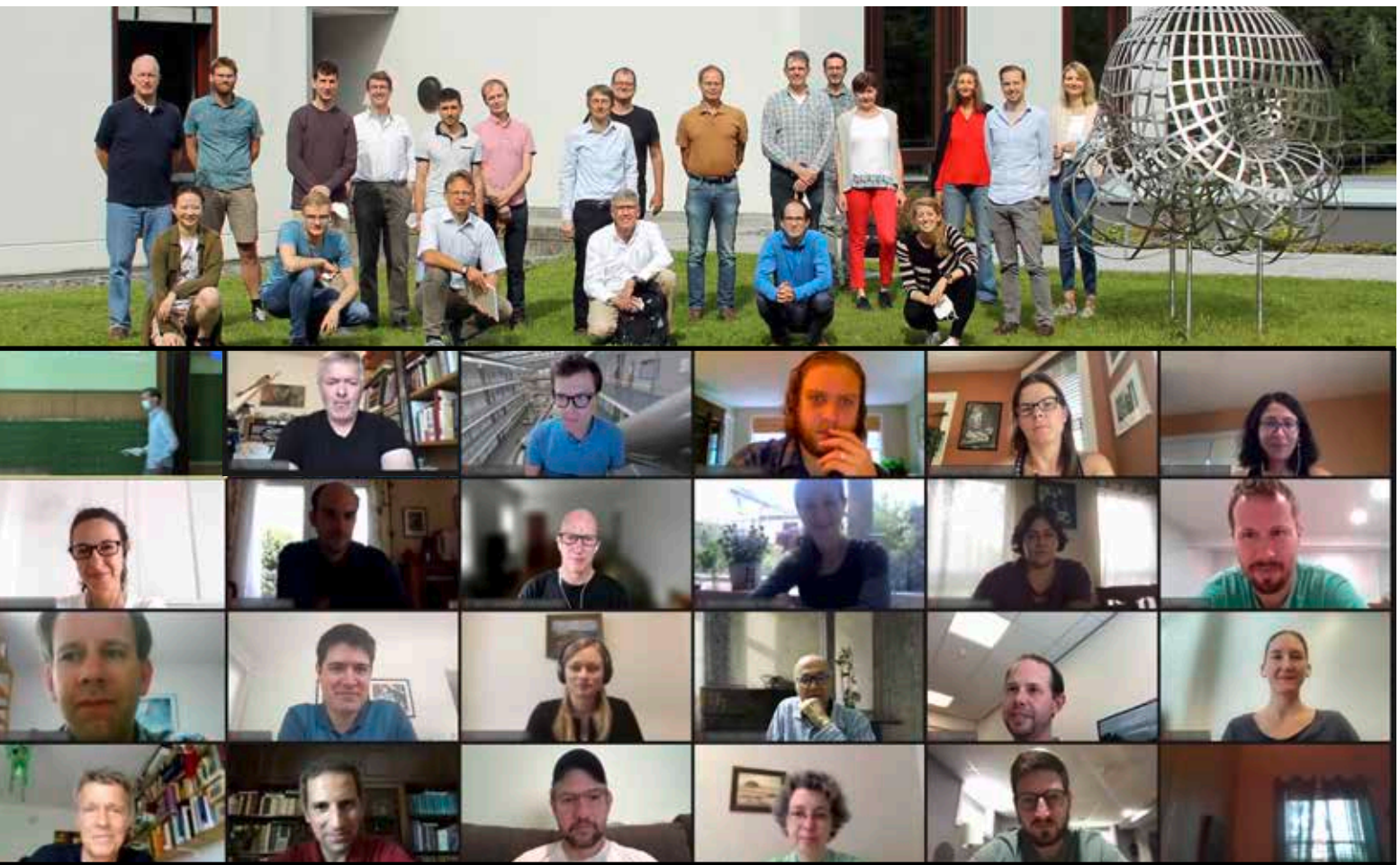
Abstract

The most challenging problems in science often involve the learning and accurate computation of high dimensional functions. Extracting essential information from complex problem-inherent structures and developing rigorous models to quantify the quality of information in a high-dimensional setting pose challenging tasks from both theoretical and numerical perspective. This has led to the emergence of several new computational methodologies, accounting for the fact that by now well understood methods are in their original form no longer viable. Common to these approaches is the nonlinearity of the solution method. For certain problem classes, these methods have drastically advanced the frontiers of computability. The most visible is deep learning. Although the use of deep neural networks has been extremely successful in certain application areas, their mathematical understanding is far from complete. This workshop proposed to deepen the understanding of the mathematical concepts that drive this new evolution and to promote the exchange of ideas emerging in various disciplines.

Participants

Adcock, Ben (Burnaby), Bachmayr, Markus (Mainz), Baraniuk, Richard (Houston), Binev, Peter (Columbia), Bonito, Andrea (College Station), Boyer, Claire (Paris), Canuto, Claudio (Torino), Cohen, Albert (Paris), Dahmen, Wolfgang (Columbia), DeVore, Ronald A. (College Station), Dolbeault, Matthieu (Paris), Foucart, Simon (College Station), Grasedyck, Lars (Aachen), Grohs, Philipp (Wien), Györfi, László (Budapest), Harbrecht, Helmut (Basel), Hunhold, Laslo (Köln), Kazashi, Yoshihito (Lausanne), Kerkycharian, Gerard (Paris), Kovachki, Nikola B. (Pasadena), Kunoth, Angela (Köln), Kutyniok, Gitta (München), Lelievre, Tony (Marne-la-Vallée), Li, Wuchen (Columbia), Lombardi, Damiano (Paris), Mishra, Siddhartha (Zürich), Nochetto, Ricardo H. (College Park), Nouy, Anthony (Nantes), Oswald, Peter (Bonn), Park, Josiah (College Station), Petersen, Philipp Christian (Wien), Petrova, Guergana (College Station), Petrushev, Pencho (Columbia), Picard, Dominique (Paris), Rauhut, Holger (Aachen), Ruthotto, Lars (Atlanta), Scheichl, Robert (Heidelberg), Schmidt-Hieber, Johannes (Enschede), Schneider, Reinhold (Berlin), Somacal, Agustin (Paris), Stevenson, Rob P. (Amsterdam), Süli, Endre (Oxford), Urban, Karsten (Ulm), Voigtlaender, Felix (Garching bei München), Weller, Anna (Köln), Welper, Gerrit (Orlando), Wojtaszczyk, Przemek (Warszawa), Xu, Jinchao (University Park), Yilmaz, Tolunay (Köln)

Workshop 2132 (hybrid meeting)



08.08. - 14.08.2021

Organizers:

Dynamics of Waves and Patterns

Margaret Beck, Boston
Martina Chirilus-Bruckner, Leiden
Christian Kühn, Garching
Jens Rademacher, Bremen

Abstract

The dynamics of waves and patterns play a significant role in the sciences, especially in fluid mechanics, material science, neuroscience and ecology. The mathematical treatment interconnects several areas, ranging from evolution equations and functional analysis to dynamical systems, geometry, topology, and stochastic as well as numerical analysis. This workshop has specifically focussed on dynamic stability on extended domains, bifurcations of waves and patterns, effects of stochastic driving, and spatio-temporal inhomogenities. During the workshop, multiple new directions, collaborations, and very interesting scientific conversations arose across the entire field.

Participants

Avitabile, Daniele (Amsterdam), Bakker, Bente (Leiden), Beck, Margaret (Boston), Blömker, Dirk (Augsburg), Bramburger, Jason (Seattle), Breden, Maxime (Palaiseau), Carter, Paul (Minneapolis), Chirilus-Bruckner, Martina (Leiden), Dawes, Jonathan (Bath), de Rijk, Björn (Stuttgart), Dodson, Stephanie (Davis), Doelman, Arjen (Leiden), Fiedler, Bernold (Berlin), Gallay, Thierry (Gières), Geyer, Anna (Delft), Ghazaryan, Anna R. (Oxford), Gnann, Manuel (Delft), Goh, Ryan (Boston), Haragus, Mariana (Besançon), Holst, Paul (Bremen), Holzer, Matt (Fairfax), Hupkes, Hermen Jan (Leiden), Iuorio, Annalisa (Wien), Jaquette, Jonathan (Boston), Jaramillo, Gabriela (Houston), Jones, Christopher (Chapel Hill), Kaper, Tasso J. (Boston), Kevrekidis, Panos (Amherst), Kliem, Sandra (Frankfurt am Main), Knobloch, Edgar (Berkeley), Kolokolnikov, Theo (Halifax), Kühn, Christian (Garching bei München), Latushkin, Yuri (Columbia), Lessard, Jean-Philippe (Montréal), Lloyd, David J. B. (Guildford), Lu, Bing-Ying (Bremen), Mueller, Carl (Rochester), Munoz, Claudio (Estación Central Santiago), Nishiura, Yasumasa (Sapporo), Pauthier, Antoine (Bremen), Rademacher, Jens (Bremen), Reichel, Wolfgang (Karlsruhe), Rottschäfer, Vivi (Leiden), Sandstede, Björn (Providence), Scheel, Arnd (Minneapolis), Schratz, Katharina (Paris), Soresina, Cinzia (Graz), Teramoto, Takashi (Asahikawa), Uecker, Hannes (Oldenburg), van den Berg, Jan Bouwe (Amsterdam), van Heijster, Peter J.A. (Wageningen), Veerman, Frits W. J. (Leiden), Wayne, Clarence Eugene (Boston), Wechselberger, Martin (Sydney), Wright, J. Douglas (Philadelphia)



15.08. - 21.08.2021

Organizers:

Computational Group Theory

Bettina Eick, Braunschweig

Derek Holt, Warwick

Gabriele Nebe, Aachen

Eamonn O'Brien, Auckland

Abstract

This was the eighth Oberwolfach Workshop on Computational Group Theory. It demonstrated how an increasing number and variety of deep theoretical results are being used to devise powerful and practical algorithms in Computational Group Theory. The talks also presented connections with and applications to Number Theory, Combinatorics, Geometry, and Geometric Group Theory. The schedule left plenty of time for discussions. This was used by many participants to initiate new projects, develop new research ideas and discuss new collaborations.

Participants

Babai, Laszlo (Chicago), Bartholdi, Laurent (Göttingen), Bernhardt, Dominik (Aachen), Breuillard, Emmanuel (Cambridge), Bridson, Martin R. (Oxford), Brooksbank, Peter A. (Lewisburg), Cannon, John J. (Sydney), Chang, Mun See (St. Andrews), Ciobanu-Radomirovic, Laura (Edinburgh), Conder, Matthew (Auckland), Craven, David A. (Birmingham), de Graaf, Willem A. (Povo), Detinko, Alla (Hull), Dietrich, Heiko (Clayton), Eick, Bettina (Braunschweig), Elder, Murray (Broadway), Fieker, Claus (Kaiserslautern), Flannery, Dane (Galway), Geck, Meinolf (Stuttgart), Hiß, Gerhard (Aachen), Hofmann, Tommy (Kaiserslautern), Holt, Derek F. (Coventry), Horn, Max (Kaiserslautern), Hulpke, Alexander (Fort Collins), Jefferson, Chris (St. Andrews), Kirschmer, Markus (Paderborn), Kontorovich, Alex (Piscataway), Lee, Melissa (Auckland), Leedham-Green, Charles R. (London), Liebeck, Martin W. (London), Lohrey, Markus (Siegen), Lübeck, Frank (Aachen), Lux, Klaus (Tucson), Maglione, Joshua (Bielefeld), Malle, Gunter (Kaiserslautern), Moede, Tobias (Braunschweig), Müller, Jürgen (Aachen), Nebe, Gabriele (Aachen), Niemeyer, Alice (Aachen), O'Brien, Eamonn A. (Auckland), Pan, Eileen Xueyu (Clayton), Parker, Richard A. (Cambridge), Praeger, Cheryl E. (Crawley), Reid, Alan W. (Houston), Roney-Dougal, Colva M. (St. Andrews), Rossmann, Tobias (Galway), Schneider, Csaba (Belo Horizonte), Schweitzer, Pascal (Kaiserslautern), Soicher, Leonard H. (London), Tent, Katrin (Münster), Thiel, Ulrich (Kaiserslautern), Vaughan-Lee, Michael R. (Kirkcudbright), Voll, Christopher (Bielefeld), Waldecker, Rebecca (Halle / Saale), Wilson, James B. (Fort Collins)

Workshop 2134 (hybrid meeting)



22.08. - 28.08.2021

Organizers:

Automorphic Forms, Geometry and Arithmetic

Gaetan Chenevier, Orsay
Tasho Kaletha, Ann Arbor
Stephen Kudla, Toronto
Sophie Morel, Princeton

Abstract

The workshop on automorphic forms, geometry and arithmetic focused on important recent developments within the research area, in particular, on the different recent approaches towards the Langlands functoriality principle and the Langlands correspondence, on their relative analogues, and on the relations between those advances and more arithmetic questions.

Participants

A'Campo, Lambert (London), Arasteh Rad, Esmail (Tehran), Atobe, Hiraku (Sapporo), Aubert, Anne-Marie (Paris), Beuzart-Plessis, Raphaël (Marseille), Bouthier, Alexis (Paris), Chen, Rui (Singapore), Chenevier, Gaëtan (Paris), Dillery, Peter (Ann Arbor), Fintzen, Jessica (Cambridge), Gan, Wee Teck (Singapore), Gerbelli-Gauthier, Mathilde (Princeton), Gurevich, Nadya (Beer-Sheva), Haines, Thomas (College Park), Hanzer, Marcela (Zagreb), Harris, Michael (New York), Hilado, Anton (Burlington), Ichino, Atsushi (Kyoto), Jiang, Dihua (Minneapolis), Kaletha, Tasho (Ann Arbor), Kim, Ju-Lee (Cambridge), Kudla, Stephen S. (Toronto), Lafforgue, Vincent (Gières), Laumon, Gérard (Orsay), Letellier, Emmanuel (Paris), Li, Wen-Wei (Beijing), Luo, Caihua (Göteborg), Morel, Sophie (Lyon), Murnaghan, Fiona (Toronto), Ngô, Bao Chau (Chicago), Niziol, Wiesława (Paris), Prasad, Dipendra (Mumbai), Rapoport, Michael (Bonn), Raskin, Sam (Austin), Renard, David (Palaiseau), Richarz, Timo (Darmstadt), Sakellaridis, Yiannis (Baltimore), Sawin, Will (New York), Scholze, Peter (Bonn), Schwein, David (Cambridge), Schwermer, Joachim (Wien), Speh, Birgit (Ithaca), Taïbi, Olivier (Lyon), Thorne, Jack (Cambridge), Tsai, Pei-Yu (Zhuhai), Wong, Tian An (Dearborn), Xue, Cong (Cambridge), Zhu, Yihang (College Park), Zou, Jialiang (Singapore)



29.08. - 04.09.2021

Organizers:

Mathematical Aspects of General Relativity

Carla Cederbaum, Tübingen

Mihalis Dafermos, Princeton

Jim Isenberg, Eugene

Hans Ringström, Stockholm

Abstract

General relativity is an area that naturally combines differential geometry, partial differential equations, global analysis and dynamical systems with astrophysics, cosmology, high energy physics, and numerical analysis. It is rapidly expanding and has witnessed remarkable developments in recent years. There were 24 on-site and 30 online participants. The schedule consisted of three overview talks of 80 minutes, four evening talks of 60 minutes, 19 talks of 45 minutes and seven talks of 20 minutes.

Participants

Allen, Paul Tyler (Portland), Aretakis, Stefanos (Toronto), Beyer, Florian (Dunedin), Bieri, Lydia (Ann Arbor), Blue, Pieter (Edinburgh), Burtscher, Annegret (Nijmegen), Cederbaum, Carla (Tübingen), Chatzikaleas, Athanasios (Paris), Chruściel, Piotr T. (Wien), Czimek, Stefan (Providence), Dafermos, Mihalis (Princeton), Fournodavlos, Grigorios (Paris), Friedrich, Helmut (Göln), Gajic, Dejan (Nijmegen), Galloway, Gregory (Coral Gables), Garfinkle, David (Rochester), Giorgi, Elena (Princeton), Graf, Melanie (Tübingen), Hilditch, David (Lisboa), Holzegel, Gustav (London), Huang, Lan-Hsuan (Storrs), Huisken, Gerhard (Tübingen), Isenberg, James A. (Eugene), Jauregui, Jeffrey (Schenectady), Kehle, Christoph (Zürich), Kehrberger, Leonhard (Cambridge), Lee, Dan A. (New York), Lindblad Petersen, Oliver (Stanford), Lott, John (Berkeley), Luk, Jonathan (Stanford), Mars, Marc (Salamanca), Mazzieri, Lorenzo (Trento), Metzger, Jan (Potsdam), Moschidis, Georgios (Berkeley), Oliynyk, Todd (Parkville), Reiris-Ithurralde, Martin (Montevideo), Ringström, Hans (Stockholm), Sakovich, Anna (Uppsala), Sancassani, Anna (Tübingen), Sbierski, Jan J. (Oxford), Shlapentokh-Rothman, Yakov (Princeton), Smulevici, Jacques (Paris), Speck, Jared (Nashville), Stavrov, Iva (Portland), Stern, Daniel L. (Chicago), Taylor, Martin (London), Teixeira da Costa, Rita (Cambridge), Unger, Ryan (Princeton), Vålcu, Caterina (Palaiseau), Van de Moortel, Maxime C. (Princeton), Wald, Robert (Chicago), Wang, Mu-Tao (New York), Wolff, Markus (Tübingen), Wyatt, Zoe (Cambridge)



12.09. - 18.09.2021

Quantum Groups – Algebra, Analysis and Category Theory

Organizers:

Masaki Izumi, Kyoto
Sergey Neshveyev, Oslo
Dmitri Nikshych, Durham
Adam Skalski, Warsaw

Abstract

The meeting was devoted to discussing the state of the art of different branches of tensor categories and quantum groups, with emphasis on the exchange of ideas between the purely algebraic and operator algebraic sides of these theories. There were 54 participants, 32 of which were present at the institute and 22 participated online. The program consisted of 28 talks (19 delivered by speakers present in Oberwolfach, 9 by online participants) on a variety of topics, from modular categories to Nichols algebras, quantum probability and quantization of Lie groups. One of the goals of the workshop was to give a new impulse to interactions between purely algebraic and analytic (operator algebraic) sides of the theory.

Participants

Algethami, Dakeal (Leicester), Andruskiewitsch, Nicolás (Córdoba), Arano, Yuki (Kyoto), Bichon, Julien (Aubière), Bieliavsky, Pierre (Louvain-la-Neuve), Brannan, Michael (Waterloo), Brochier, Adrien (Paris), Carnovale, Giovanna (Padova), Chari, Vyjayanthi (Riverside), Davydov, Alexei (Athens), de Clercq, Hadewijch (Gent), De Commer, Kenny (Bruxelles), Delaney, Colleen (Bloomington), Dzokou Talla, Joel Right (Bruxelles), Edie-Michell, Cain (Nashville), Elzinga, Floris Eelke (Oslo), Ettingof, Pavel (Cambridge), Femic, Bojana (Belgrade), Franz, Uwe (Besançon), Freslon, Amaury (Orsay), Gayral, Victor (Reims), Grossman, Pinhas (Sydney), Habbestad, Erik (Oslo), Hataishi, Lucas Y. (Oslo), Heckenberger, Istvan (Marburg), Izumi, Masaki (Kyoto), Jordan, David (Edinburgh), Kolb, Stefan (Newcastle upon Tyne), Krähmer, Ulrich (Dresden), Letzter, Gail R. (Rockville), Mudrov, Andrey (Leicester), Neshveyev, Sergey (Oslo), Nikshych, Dmitri (Durham), Ostrik, Viktor (Eugene), Pinzari, Claudia (Roma), Plavnik, Julia (Bloomington), Raum, Sven (Stockholm), Razavinia, Farrokh (Porto), Rotheray, Lucia (Fribourg), Rowell, Eric (College Station), Schopieray, Andrew (Kensington), Skalski, Adam (Warszawa), Snyder, Noah (Bloomington), Stokman, Jasper V. (Amsterdam), Tuset, Lars (Oslo), Vaes, Stefaan (Leuven), Vergnioux, Roland (Caen), Viselter, Ami (Haifa), Voigt, Christian (Glasgow), Walton, Chelsea (Houston), Wang, Simeng (Orsay), Wysoczańska-Kula, Anna (Wrocław), Yakimov, Milen (Boston), Yamashita, Makoto (Oslo)



19.09. - 25.09.2021

Organizers:

Homotopical Algebra and Higher Structures

Michael Batanin, Prague
Andrey Lazarev, Lancaster
Muriel Livernet, Paris
Martin Markl, Prague

Abstract

Homotopical algebra and higher category theory play an increasingly important role in pure mathematics, and higher methods have seen tremendous development in the last couple of decades. The talks delivered at the workshop described some of the latest progress in this area and applications to various problems of algebra, geometry, and combinatorics. One novel feature of the workshop was having a survey talk at the end of each afternoon session.

Participants

Ara, Dimitri (Marseille), Batanin, Michael (Praha), Berger, Clemens (Nice), Bergner, Julie (Charlottesville), Campbell, Alexander (North Ryde), Chuang, Joseph (London), Cirici, Joana (Barcelona, Catalonia), Cisinski, Denis-Charles (Regensburg), Davydov, Alexei (Athens), Dolgushev, Vasily (Philadelphia), Eurenus, Bjorn (Lancaster), Fresse, Benoit (Villeneuve d'Ascq), Gagna, Andrea (Praha), Guetta, Léonard (Bonn), Gutierrez, Javier J. (Barcelona), Gwilliam, Owen (Amherst), Hackney, Philip (Lafayette), Henry, Simon (Ottawa), Hinich, Vladimir (Haifa), Holstein, Julian (Hamburg), Joyal, André (Montréal), Kaufmann, Ralph (West Lafayette), Keller, Bernhard (Paris), Kock, Joachim (Cerdanyola (Barcelona)), Kosanovic, Danica (Villetaneuse), Lazarev, Andrey (Lancaster), Livernet, Muriel (Paris), Markl, Martin (Praha), Mathew, Akhil (Chicago), Mazuir, Thibaut (Paris), Merkulov, Sergei (Belvaux), Obradovic, Jovana (Belgrade), Ozornova, Viktoriya (Bonn), Paoli, Simona (Aberdeen), Poirier, Kate (Brooklyn), Pridham, Jonathan (Edinburgh), Richter, Birgit (Hamburg), Robertson, Marcy (Melbourne), Rogers, Chris (Reno), Ronco, Maria (Talca), Sheng, Yunhe (Changchun), Street, Ross (Macquarie Park, NSW), Tabuada, Goncalo (Cambridge), Tillmann, Ulrike (Oxford), Trnka, Dominik (Praha), Vallette, Bruno (Villetaneuse), Voronov, Alexander A. (Minneapolis), Wahl, Nathalie (København), White, David (Granville), Whitehouse, Sarah (Sheffield)



26.09. - 02.10.2021

Organizers:

Singularities

Javier Fernandez de Bobadilla, Bilbao

Francois Loeser, Paris

András Némethi, Budapest

Duco van Straten, Mainz

Abstract

Singularity theory concerns local and global structure of singularities of (algebraic) varieties and maps. As such, it combines tools from algebraic geometry, complex analysis, topology, algebra and combinatorics. The meeting followed a standard schedule of three talks in the morning and two in the afternoon, with a longer break in between to give an opportunity for longer discussion and collaboration in smaller groups.

Participants

A'Campo, Norbert (Basel), Belotto da Silva, André (Paris), Borodzik, Maciej (Warszawa), Burban, Igor (Paderborn), Cluckers, Raf (Villeneuve d'Ascq), Cogolludo-Agustin, Jose Ignacio (Zaragoza), de Bobadilla de Olazabal, Javier F. (Bilbao, Bizkaia), Dimca, Alexandru (Nice), Faber, Eleonore (Leeds), Fernandes, Alexandre (Fortaleza), Garay, Mauricio D. (Bures-sur-Yvette), Gorskiy, Evgeny (Davis), Goryunov, Victor (Liverpool), Greuel, Gert-Martin (Kaiserslautern), Gusein-Zade, Sabir M. (Moscow), Halupczok, Immanuel (Düsseldorf), Ishii, Shihoko (Tokyo), Keating, Ailsa (Cambridge), Libgober, Anatoly (Chicago), Loeser, Francois (Paris), Lönne, Michael (Bayreuth), Luengo, Ignacio (Madrid), McLean, Mark (Stony Brook), Mond, David (Coventry), Nagy, Janos (Budapest), Némethi, András (Budapest), Nguyen, Hong Duc (Kaiserslautern), Nguyen, Kien Huu (Leuven), Okuma, Tomohiro (Yamagata), Palka, Karol (Warszawa), Pallarés Torres, Irma (Leuven), Peřka, Tomasz (Bilbao, Bizkaia), Pe Pereira, Maria (Madrid), Pichon, Anne (Marseille), Popescu-Pampu, Patrick (Villeneuve d'Ascq), Rimanyi, Richard (Chapel Hill), Romano Velázquez, Agustín (Mumbai), Ros Camacho, Ana (Cardiff), Saito, Kyoji (Kyoto), Saito, Morihiko (Kyoto), Sampaio, Jose Edson (Fortaleza), Schürmann, Jörg (Münster), Sigurdsson, Baldur (Hanoi), Stevens, Jan (Göteborg), Tamas, Laszlo (Cluj-Napoca), van Straten, Duco (Mainz), Veys, Wim (Leuven), Wahl, Jonathan M. (Chapel Hill), Wang, Botong (Beijing), Weber, Andrzej (Warszawa), Xu, Chenyang (Princeton), Zach, Matthias (Hannover), Zaidenberg, Mikhail (Saint-Martin-d'Hères)



03.10. - 09.10.2021

Statistics of Stochastic Differential Equations on Manifolds and Stratified Spaces

Organizers:

Stephan Huckemann, Göttingen
Xue-Mei Li, London
Yvo Pokern, London
Anja Sturm, Göttingen

Abstract

Statistics for stochastic differential equations (SDEs) attempts to use SDEs as statistical models for real-world phenomena. This involves an understanding of qualitative properties of this class of stochastic processes which includes Brownian motion as well as estimation of parameters in the SDE or a nonparametric estimation of drift and diffusivity fields from observations. Observations can be in continuous time, in high frequency discrete time considering the limit of small inter-observation times or in discrete time with constant inter-observation times. Application areas of SDEs where state spaces are naturally viewed as manifolds or stratified spaces include multivariate stochastic volatility models, stochastic evolution of shapes (e.g. of biological cells), time-varying image deformations for video analysis and phylogenetic trees.

Participants

Bui, Mai Ngoc (London), Ditlevsen, Susanne (København), García-Portugués, Eduardo (Leganes), Habermann, Karen (Coventry), Huckemann, Stephan (Göttingen), Kendall, Wilfrid S. (Coventry), Li, Xue-Mei (London), Mamajiwala, Mariya (London), Mohammadi Jouzdani, Neda (Lausanne), Nye, Tom (Newcastle upon Tyne), Panaretos, Victor M. (Lausanne), Petko, Benedikt (London), Pokern, Yvo (London), Reiß, Markus (Berlin), Santoro, Leonardo (Lausanne), Schauer, Moritz (Göteborg), Schmitter, Émeline (Villeneuve d'Ascq), Schwarz, Simon (Göttingen), Soerensen, Michael (København), Sommer, Stefan (København), Sturm, Anja (Göttingen), Tran Van, Do (Göttingen), van der Meulen, Frank (Delft)



03.10. - 09.10.2021

Organizers:

Geometry and Optimization in Quantum Information

Hamza Fawzi, Cambridge UK

Omar Fawzi, Lyon

Aram Harrow, Cambridge MA

Monique Laurent, Amsterdam

Abstract

Quantum information theory seeks to understand the fundamental limits set by quantum mechanics for information processing tasks. The mathematical aspects of quantum information rely on tools from various fields including mathematical optimization, high-dimensional convex geometry, operator algebras and representation theory. The goal of this meeting is to focus on the mathematical aspects connecting geometry, optimization and quantum information theory and develop new tools to solve some of the open problems at the intersection of these fields.

Participants

Aubrun, Guillaume (Villeurbanne), Berta, Mario (London), Blekherman, Greg (Atlanta), Datta, Nilanjana (Cambridge), De las Cuevas, Gemma (Innsbruck), Fawzi, Hamza (Cambridge), Fawzi, Omar (Lyon), Gribling, Sander (Paris), Harrow, Aram (Cambridge), Heimendahl, Arne (Köln), Huber, Felix (Kraków), Klingler, Andreas (Innsbruck), König, Robert (Garching bei München), Lancien, Cécilia A. (Toulouse), Laurent, Monique (Amsterdam), Leung, Debbie (Waterloo), Netzer, Tim (Innsbruck), Nieuwboer, Harold (Amsterdam), O'Donnell, Ryan (Pittsburgh), Parrilo, Pablo A. (Cambridge), Paulsen, Vern I. (Waterloo), Pérez-García, David (Madrid), Pironio, Stefano (Bruxelles), Polloreno, Anthony (Boulder), Scalet, Samuel (Cambridge), Shayeghi, Ala (Lyon), Slofstra, William (Waterloo), Ta, Hoang (Lyon), van der Eyden, Mirte (Innsbruck), Vidick, Thomas (Pasadena), Walter, Michael (Amsterdam), Winter, Andreas (Bellaterra, Barcelona)



31.10. - 06.11.2021

Enveloping Algebras and Geometric Representation Theory

Organizers:

Iain Gordon, Edinburgh
Bernard Leclerc, Caen
Michaela Varagnolo, Cergy-Pontoise

Abstract

This workshop continued a series of conferences on enveloping algebras, as the first part of the title suggests, but the focus of these meetings and also the organizers have changed over the years to reflect the newest developments in the field of algebraic Lie theory. This year the main focus was on geometric and categorical methods, with an eye to explicit and combinatorial formulas. All participants in Oberwolfach were happy to be able to interact again during breaks and evenings, after many months of online communication only.

Participants

Achar, Pramod N. (Baton Rouge), Balagovic, Martina (Newcastle upon Tyne), Baumann, Pierre (Strasbourg), Bellamy, Gwyn (Glasgow), Bittmann, Lea (Edinburgh), Bozec, Tristan (Montpellier), Braverman, Alexander (Toronto), Chari, Vyjayanthi (Riverside), Davison, Ben D. J. (Edinburgh), Finkelberg, Mikhail (Moscow), Fittouhi, Yasmine (Rehovot), Fourier, Ghislain (Aachen), Fujita, Ryo (Paris), Gajda, Vincent (Freiburg i. Br.), Geiss, Christof (Odense), Goodwin, Simon (Birmingham), Gordon, Iain (Edinburgh), Halacheva, Iva (Boston), Hernandez, David (Paris), Kamnitzer, Joel (Toronto), Kim, Myungho (Seoul), Kodera, Ryosuke (Chiba), Kumar, Shrawan (Chapel Hill), Lanini, Martina (Roma), Leclerc, Bernard (Caen), Littelmann, Peter (Köln), Liu, Wille (Bonn), Losev, Ivan (New Haven), Maksimau, Ruslan (Cergy-Pontoise), Mellit, Anton (Wien), Minets, Alexandre (Edinburgh), Nakajima, Hiraku (Chiba), Negut, Andrei (Cambridge), Oya, Hironori (Saitama), Panyushev, Dmitri I. (Moscow), Patimo, Leonardo (Freiburg i. Br.), Reineke, Markus (Bochum), Riche, Simon (Aubière), Rybnikov, Leonid G. (Moscow), Schiffmann, Olivier (Orsay), Schröer, Jan (Bonn), Schumann, Beatrix (Köln), Serganova, Vera V. (Berkeley), Shan, Peng (Beijing), Shapiro, Alexander M. (Edinburgh), Soergel, Wolfgang (Freiburg i. Br.), Stroppel, Catharina (Bonn), Tolmachov, Kostiantyn (Edinburgh), Varagnolo, Michela (Cergy-Pontoise), Vasserot, Eric (Paris), Vazirani, Monica (Davis), Vogelmann, Vivien (Freiburg i. Br.), Webster, Ben (Waterloo), Williams, Harold (Los Angeles), Williamson, Geordie (Sydney), Yakimova, Oksana (Jena)



07.11. - 13.11.2021

Organizers:

Combinatorial Optimization

Karen Aardal, Delft
Satoru Iwata, Tokyo
Volker Kaibel, Magdeburg
Ola Svensson, Lausanne

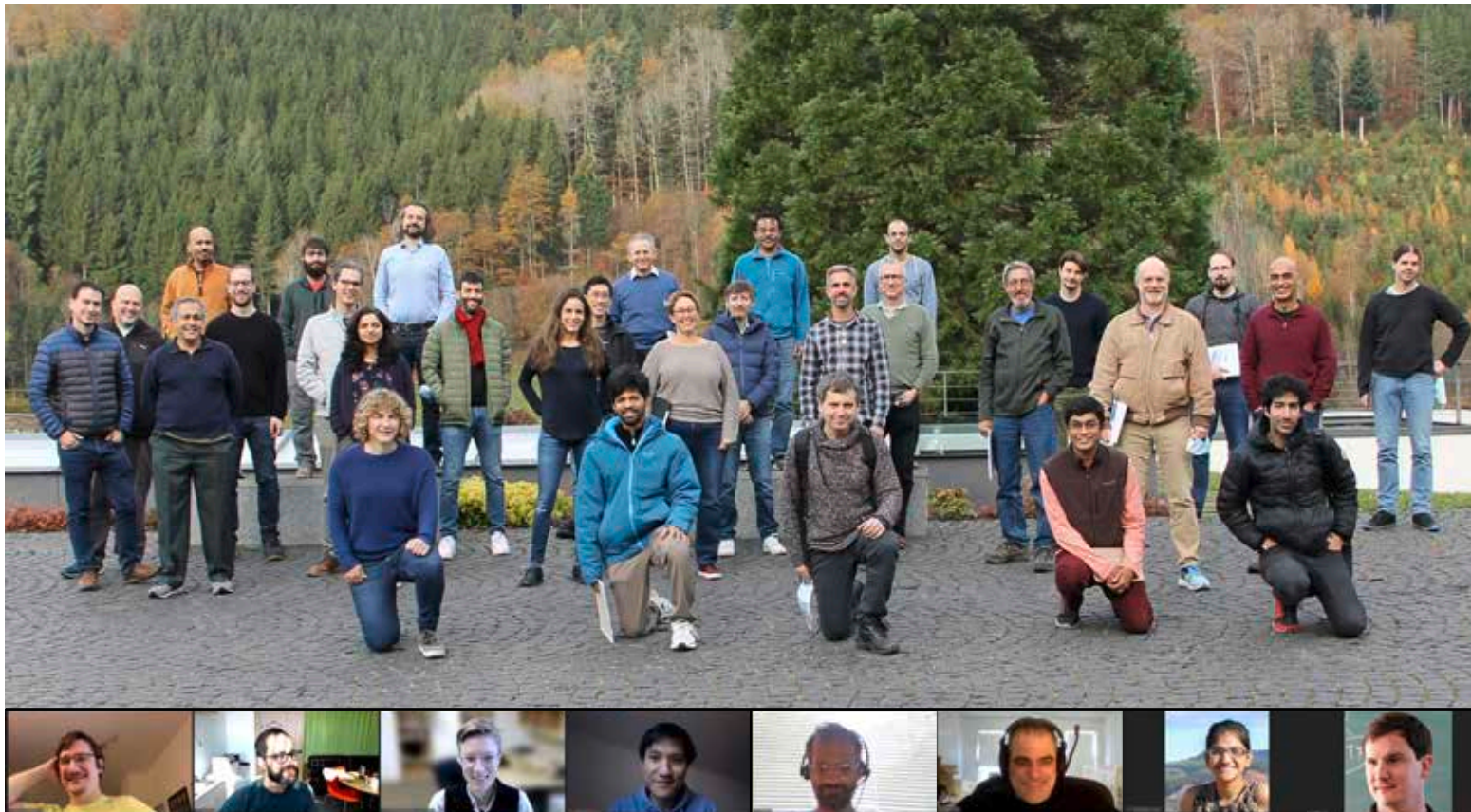
Abstract

Combinatorial Optimization deals with optimization problems defined on combinatorial structures such as graphs and networks. Motivated by diverse practical problem setups, the topic has developed into a rich mathematical discipline with many connections to other fields of Mathematics. It also has strong ties to Theoretical Computer Science and Operations Research. A series of Oberwolfach Workshops have been crucial for establishing and developing the field. The workshop we report about was a particularly exciting event - due to the depth of results that were presented, the spectrum of developments that became apparent from the talks, the breadth of the connections to other mathematical fields that were explored, and last but not least because for many of the participants it was the first opportunity to exchange ideas and to collaborate during an on-site workshop since almost two years.

Participants

Aardal, Karen I. (Delft), Anari, Nima (Palo Alto), Balkanski, Eric (New York), Bansal, Nikhil (Amsterdam), Basu, Amitabh (Baltimore), Chekuri, Chandra (Urbana), Conforti, Michele (Padova), Cook, William J. (Waterloo), Cornuéjols, Gérard P. (Pittsburgh), Dadush, Daniel (Amsterdam), De Loera, Jesús A. (Davis), Dey, Santanu S. (Atlanta), Di Summa, Marco (Padova), Eisenbrand, Friedrich (Lausanne), Faenza, Yuri (New York), Fiorini, Samuel (Bruxelles), Goemans, Michel X. (Cambridge), Gupta, Anupam (Pittsburgh), Iwata, Satoru (Tokyo), Jordan, Tibor (Budapest), Kaibel, Volker (Magdeburg), Klein, Nathan (Seattle), Laurent, Monique (Amsterdam), Megow, Nicole (Bremen), Morell, Sarah Maria (Berlin), Olver, Neil (London), Peis, Britta (Aachen), Pokutta, Sebastian (Berlin), Quanrud, Kent (West Lafayette), Rothvoss, Thomas (Seattle), Sanità, Laura (Eindhoven), Saueremann, Lisa (Cambridge), Sebö, András (Grenoble), Shmoys, David B. (Ithaca), Singh, Mohit (Atlanta), Skutella, Martin (Berlin), Svensson, Ola Nils A. (Lausanne), Tarnawski, Jakub (Küsnacht), Thomas, Rekha R. (Seattle), Traub, Vera (Zürich), Végh, László (London), Vondrak, Jan (Stanford), Vygen, Jens P. (Bonn), Weismantel, Robert (Zürich), Weltge, Stefan (Garching bei München), Williamson, David P. (Ithaca), Zambelli, Giacomo (London), Zenklusen, Rico (Zürich)

Workshop 2146 (hybrid meeting)



14.11. - 20.11.2021

Organizers:

Complexity Theory

Peter Bürgisser, Berlin

Irit Dinur, Rehovot

Salil Vadhan, Cambridge MA

Abstract

Computational Complexity Theory is the mathematical study of the intrinsic power and limitations of computational resources like time, space, or randomness. The current workshop focused on recent developments in various sub-areas including interactive proof systems, quantum information and computation, algorithmic coding theory, arithmetic complexity, expansion of hypergraphs and simplicial complexes, Markov chain Monte Carlo, and pseudorandomness. Many of the developments are related to diverse mathematical fields such as algebraic geometry, extremal combinatorics, combinatorial number theory, probability theory, representation theory, and operator algebras.

Participants

Barak, Boaz (Cambridge), Bläser, Markus (Saarbrücken), Brakerski, Zvika (Rehovot), Bringmann, Karl (Saarbrücken), Bürgisser, Peter (Berlin), Chen, Lijie (Cambridge), Christandl, Matthias (København), Dikstein, Yotam (Rehovot), Dinur, Irit (Rehovot), Dvir, Zeev (Princeton), Garg, Ankit (Bangalore, Bengaluru), Garg, Sumegha (Cambridge), Goldwasser, Shafi (Berkeley), Göös, Mika (Lausanne), Guruswami, Venkatesan (Pittsburgh), Harsha, Prahladh (Mumbai), Håstad, Johan (Stockholm), Hoza, William (Berkeley), Ikenmeyer, Christian (Liverpool), Kalai, Yael (Cambridge), Kaufman-Halman, Tali (Ramat-Gan), Koiran, Pascal (Lyon), Kopparty, Swastik (Toronto), Lau, Lap-Chi (Waterloo), Limaye, Nutan (København), Lin, Huijia (Rachel) (Seattle), Lovett, Shachar (La Jolla), Mahadev, Urmila (Pasadena), Makam, Visu (Princeton), Meka, Raghu R. (Los Angeles), Minzer, Dor Y. (Cambridge), O'Donnell, Ryan (Pittsburgh), Oveis Gharan, Shayan (Seattle), Pitassi, Toniann (Toronto), Raz, Ran (Princeton), Reingold, Omer (Stanford), Santhanam, Rahul (Oxford), Saraf, Shubhangi (Toronto), Schramm, Tselil (Stanford), Shpilka, Amir (Tel Aviv), Srivastava, Nikhil (Berkeley), Steurer, David (Zürich), Sudan, Madhu (Cambridge), Tal, Avishay (Berkeley), Ta-Shma, Amnon (Tel Aviv), Trevisan, Luca (Milano), Tulsiani, Madhur (Chicago), Umans, Chris (Pasadena), Vadhan, Salil (Boston), Vassilevska Williams, Virginia (Cambridge), Vidick, Thomas (Pasadena), Wigderson, Avi (Princeton), Williams, Ryan (Cambridge), Wootters, Mary (Palo Alto), Yuen, Henry (New York), Zuckerman, David (Austin), Zuiddam, Jeroen (Amsterdam)



28.11. - 04.12.2021

Organizers:

Applied Harmonic Analysis and Data Science

Ingrid Daubechies, Durham

Gitta Kutyniok, München

Holger Rauhut, Aachen

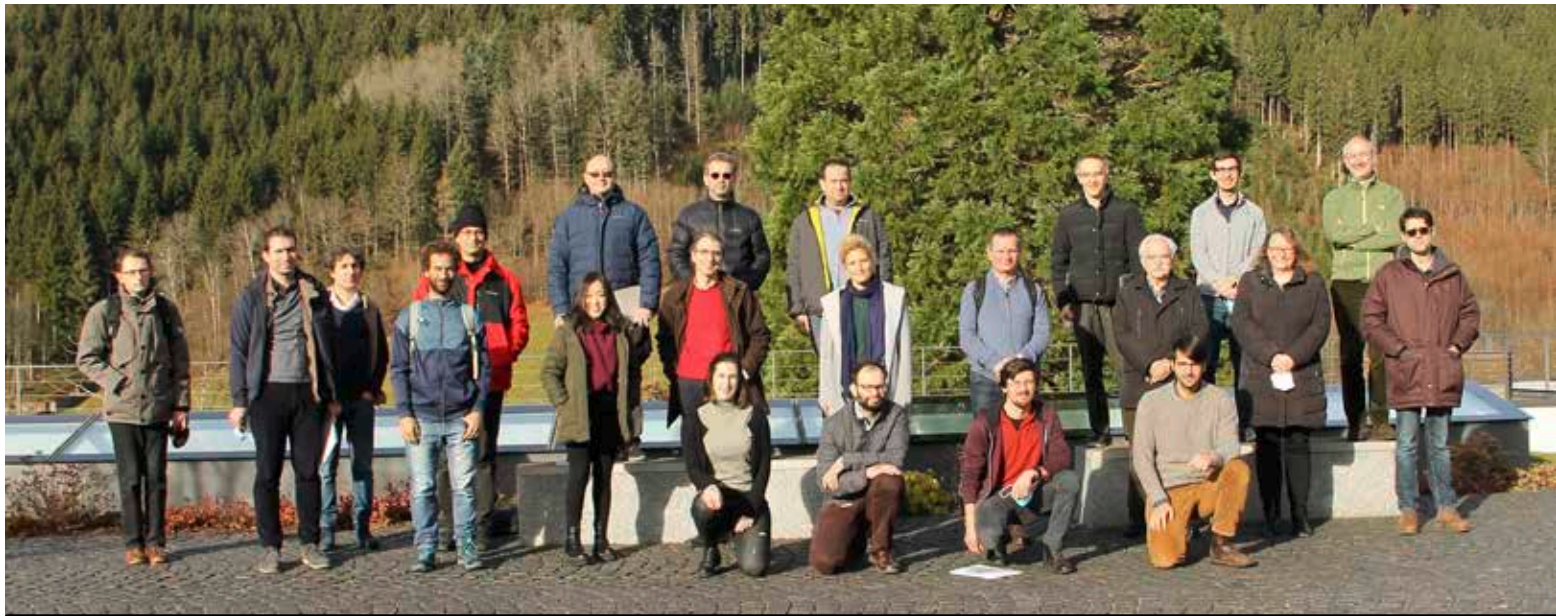
Thomas Strohmer, Davis

Abstract

Data science has become a field of major importance for science and technology nowadays and poses a large variety of challenging mathematical questions. The area of applied harmonic analysis has a significant impact on such problems by providing methodologies both for theoretical questions and for a wide range of applications in signal and image processing and machine learning. Building on the success of three previous workshops on applied harmonic analysis in 2012, 2015 and 2018, this workshop focused on several exciting novel directions such as mathematical theory of deep learning, but also reported progress on long-standing open problems in the field.

Participants

Alaifari, Rima (Zürich), Bah, Bubacarr (Muizenberg), Bandeira, Afonso S. (Zürich), Boche, Holger (München), Bodmann, Bernhard G. (Houston), Boedihardjo, March (Irvine), Bölcskei, Helmut (Zürich), Boutaib, Youness (Aachen), Bruna, Joan (New York), Calderbank, A. Robert (Durham), Cheng, Xiuyuan (Durham), Cloninger, Alexander (New Haven), Cohen, Albert (Paris), Cohen, Nadav (Ramat Aviv, Tel Aviv), Dahmen, Wolfgang (Columbia), Daubechies, Ingrid (Durham), De Mol, Christine (Bruxelles), Dirksen, Sjoerd (Utrecht), Faulhuber, Markus (Wien), Feichtinger, Hans Georg (Wien), Galli, Leonardo (Aachen), Genzel, Martin (Utrecht), Gribonval, Remi (Lyon), Grohs, Philipp (Wien), Groß, David (Köln), Hirn, Matthew (East Lansing), Hoppe, Frederik (Aachen), Hunhold, Laslo (Köln), Kovalsky, Shahar (Chapel Hill), Krahmer, Felix (Garching bei München), Küng, Richard (Linz), Kutyniok, Gitta (München), Maggioni, Mauro (Baltimore), Mendelson, Shahar (Canberra), Mhaskar, Hrushikesh N. (Claremont), Mixon, Dustin G. (Columbus), Montufar, Guido F. (Leipzig), Needell, Deanna (Los Angeles), Nguenngang, Gabin Maxime (Aachen), Paul, Laura (Aachen), Pfander, Götz (Eichstätt), Plonka-Hoch, Gerlind (Göttingen), Rauhut, Holger (Aachen), Razin, Noam (Ramat Aviv, Tel Aviv), Schnass, Karin (Innsbruck), Schnoor, Ekkehard (Aachen), Shan, Shan (South Hadley), Sober, Barak (Durham), Soltanolkotabi, Mahdi (Los Angeles), Steinerberger, Stefan (Seattle), Stöger, Dominik (Eichstätt), Strohmer, Thomas (Davis), Thesing, Laura (München), Villar, Soledad (Baltimore), Voigtlaender, Felix (Garching bei München), Ward, Rachel (Austin), Wu, Hau-Tieng (Durham)



12.12. - 18.12.2021

Organizers:

Convex Geometry and its Applications

Shiri Artstein-Avidan, Tel Aviv

Franck Barthe, Toulouse

Monika Ludwig, Vienna

Abstract

The geometry of convex domains in Euclidean space plays a central role in several branches of mathematics: functional and harmonic analysis, the theory of PDE, linear programming and, increasingly, in the study of algorithms in computer science. The purpose of this meeting was to bring together researchers from the analytic, geometric and probabilistic groups who have contributed to these developments.

Participants

Alesker, Semyon (Ramat Aviv, Tel Aviv), Alonso-Gutiérrez, David (Zaragoza), Artstein-Avidan, Shiri (Ramat Aviv, Tel Aviv), Barthe, Franck (Toulouse), Bernig, Andreas (Frankfurt am Main), Besau, Florian (Wien), Bianchi, Gabriele (Firenze), Böröczky, Karoly (Budapest), Brazitikos, Silouanos (Athens), Calka, Pierre (Saint-Étienne-du-Rouvray), Chen, Yuansi (Durham), Colesanti, Andrea (Firenze), Cordero-Erausquin, Dario (Paris), Eldan, Ronen (Rehovot), Eskenazis, Alexandros (Cambridge), Faifman, Dmitry (Tel Aviv), Florentin, Dan (Ramat-Gan), Fradelizi, Matthieu (Marne-la-Vallée), Guédon, Olivier (Marne-la-Vallée), Haddad, Julian (Belo Horizonte), Henk, Martin (Berlin), Hernandez Cifre, Maria A. (Espinardo, Murcia), Hug, Daniel (Karlsruhe), Huijberts, Sophie (Amsterdam), Iriyeh, Hiroshi (Mito), Kabluchko, Zakhar (Münster), Klartag, Bo'az (Rehovot), Koldobsky, Alexander (Columbia), Lehec, Joseph (Paris), Li, Jin (Shanghai Shi), Litvak, Alexander (Edmonton), Livshyts, Galyna (Atlanta), Ludwig, Monika (Wien), Meroni, Chiara (Leipzig), Milman, Emanuel (Haifa), Milman, Vitali D. (Ramat Aviv, Tel Aviv), Mui, Stephanie (New York), Mußnig, Fabian (Wien), Paouris, Grigoris (College Station), Pivovarov, Peter (Columbia), Reitzner, Matthias (Osnabrück), Rotem, Liran (Haifa), Roysdon, Michael (Ramat Aviv, Tel Aviv), Rudelson, Mark (Ann Arbor), Ryabogin, Dmitry (Kent), Saorín Gómez, Eugenia (Bremen), Saroglou, Christos (Ioannina), Schneider, Rolf (Freiburg i. Br.), Schuster, Franz (Wien), Shenfeld, Yair (Cambridge), Slomka, Boaz (Raanana), Stancu, Alina (Montréal), Tatarko, Kateryna (Waterloo), Thäle, Christoph (Bochum), Tkocz, Tomasz (Pittsburgh), van Handel, Ramon (Princeton), Wannerer, Thomas (Jena), Werner, Elisabeth M. (Cleveland), Wyczesany, Katarzyna (Ramat Aviv, Tel Aviv), Xi, Dongmeng (Shanghai Shi), Xiong, Ge (Shanghai), Zhang, Gaoyong (New York), Zvavitch, Artem (Kent)

2.4. Miniworkshops

Miniworkshop 2106a (online meeting)

07.02. - 13.02.2021

Non-semisimple Tensor Categories and Their Semisimplification

Organizers:

Nicolás Andruskiewitsch, Córdoba
Pavel Etingof, Cambridge MA
Christoph Schweigert, Hamburg

Abstract

Finite tensor categories are, despite their many applications and great interest, notoriously hard to classify. Among them, the semisimple ones (called fusion categories) have been intensively studied. Those with non-integral dimensions form a remarkable class. Already more than 20 years ago, tilting modules have been proposed as a source of such fusion categories. In this way, the Verlinde categories associated to the pair of a simple complex Lie algebra \mathfrak{g} and an integer level k have been recovered in a purely algebraic framework - called semisimplification of tensor categories. Recently efforts to understand how to go beyond these examples emerged. This mini-workshop aims at bringing together experts from various branches of representation theory and topological field theory to deepen our understanding of finite tensor categories and to compare new ways to understand semisimplification.

Participants

Andruskiewitsch, Nicolás (Córdoba), Angiono, Iván E. (Córdoba), Benson, David J. (Aberdeen), Brundan, Jonathan (Eugene), Costantino, Francesco (Toulouse), Entova-Aizenbud, Inna (Beer-Sheva), Etingof, Pavel (Cambridge), Harman, Nathan (Princeton), Heckenberger, Istvan (Marburg), Heidersdorf, Thorsten (Bonn), Negron, Cris (Chapel Hill), Nikshych, Dmitri (Durham), Ostrik, Viktor (Eugene), Pevtsova, Julia (Seattle), Plavnik, Julia (Bloomington), Schweigert, Christoph (Hamburg), Serganova, Vera V. (Berkeley), Sherman, Alexander (Beer-Sheva), Snyder, Noah (Bloomington), Stroppel, Catharina (Bonn), Vay, Cristian (Córdoba), Woike, Lukas (København)

Miniworkshop 2106c (online meeting)

07.02. - 13.02.2021

Nonpositively Curved Complexes

Organizers:

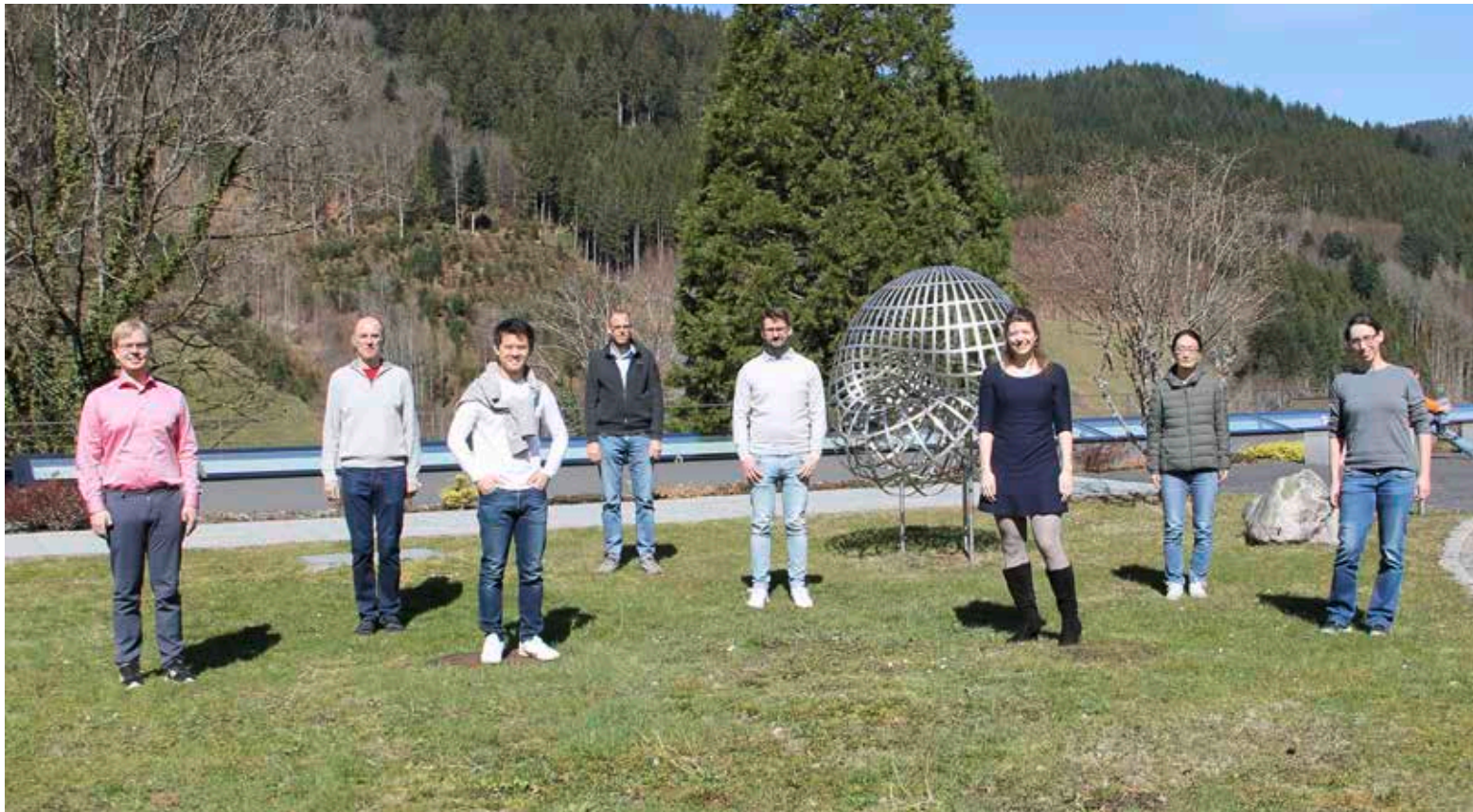
Damian Osajda, Wrocław
Piotr Przytycki, Montreal
Petra Schwer, Magdeburg

Abstract

The leading theme of the meeting was to understand nonpositively curved complexes and groups acting on them. Motivations, questions, results, and techniques being presented and discussed come from various areas of mathematics, including algebraic geometry, Lie groups, metric graph theory, geometric topology, algebraic topology, coarse geometry, K-theory, and, in general, geometric and analytic group theory. The subject discussed focused around participant's latest achievements, and important open questions in the area.

Participants

Chalopin, Jérémie (Marseille), Chepoi, Victor (Marseille), Dani, Pallavi (Baton Rouge), Engel, Alexander (Münster), Fioravanti, Elia (Bonn), Haettel, Thomas (Montpellier), Hoda, Nima (Paris), Jankiewicz, Kasia (Chicago), Lang, Urs (Zürich), Lonjou, Anne (Orsay), Martin, Alexandre (Edinburgh), Osajda, Damian L. (Wrocław), Przytycki, Piotr (Montréal), Schwer, Petra (Magdeburg), Thomas, Anne (Sydney), Valiunas, Motiejus (Wrocław), Varghese, Olga (Münster)



21.03. - 27.03.2021

Small Collaboration: Numerical Analysis of Electromagnetic Problems

Organizers:

Fleurianne Bertrand, Twente
Matthias Schlottbom, Twente
Gerhard Starke, Essen

Abstract

The classical theory of electromagnetism describes the interaction of electrically charged particles through electromagnetic forces, which are carried by the electric and magnetic fields. The propagation of the electromagnetic fields can be described by Maxwell's equations. Solving Maxwell's equations numerically is a challenging problem which appears in many different technical applications. Difficulties arise for instance from material interfaces or if the geometrical features are much larger than or much smaller than a typical wavelength. The spatial discretization needs to combine good geometrical flexibility with a relatively high order of accuracy. The aim of this small-scale, week-long interactive mini-workshop jointly organized by the University of Duisburg-Essen and the University of Twente, and kindly hosted at the MFO, is to bring together experts in non-standard and mixed finite elements methods with experts in the field of electromagnetism.

Participants

Bertrand, Fleurianne (Enschede), Corbijn van Willenswaard, Lars (Enschede), Giammatteo, Elena (Enschede), Hensel, Maurice (Essen), Hutzenthaler, Martin (Essen), Kozon, Marek (Enschede), Lamacz-Keymling, Agnes (Essen), Liu, Kaifung (Enschede), Ma, Rui (Essen), Pérez Arancibia, Carlos (Santiago), Pirch, Emilie (Berlin), Schlottbom, Matthias (Enschede), Schneider, Henrik (Berlin), Schwenninger, Felix (Enschede), Starke, Gerhard (Essen), van der Vegt, Jaap J.W. (Enschede), Yousept, Irwin (Essen), Zwart, Hans J. (Enschede)



11.04. - 17.04.2021

**Small Collaboration: Modeling Phenomena from Nature
by Hyperbolic Partial Differential Equations**

Organizers:

Christian Klingenberg, Würzburg
Qin Li, Madison
Marlies Pirner, Würzburg

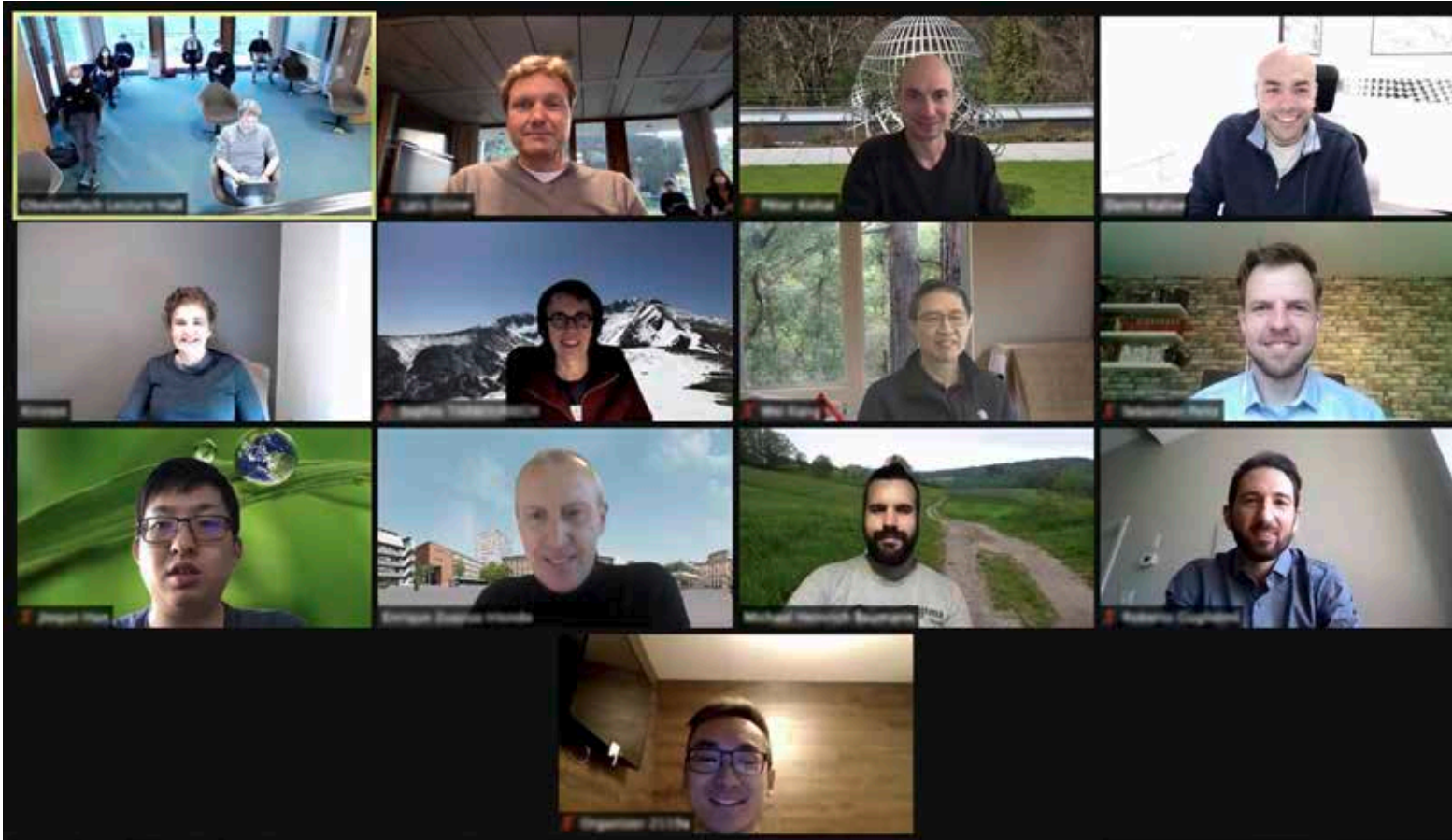
Abstract

Nonlinear hyperbolic partial differential equations constitute a plethora of models from physics, biology, engineering, etc. In this workshop we cover the range from modeling, mathematical questions of well-posedness, numerical discretization and numerical simulations to compare with the phenomenon from nature that was modeled in the first place. Both kinetic and fluid models were discussed.

Participants

Bae, Gi-Chan (Seoul), Barsukow, Wasilij (Garching bei München), Baumann, Lena (Würzburg), Birke, Claudius (Würzburg), Edelmann, Philipp (Los Alamos), Feireisl, Eduard (Praha), Hauck, Cory (Oak Ridge), Hellmuth, Kathrin (Würzburg), Horlebein, Eva (Würzburg), Kanbar, Farah (Würzburg), Klingenberg, Christian (Würzburg), Lai, Ru-Yu (Minneapolis), Li, Qin (Madison), Markfelder, Simon (Cambridge), Pirner, Marlies (Würzburg), Tang, Min (Shanghai Shi), Warnecke, Sandra (Würzburg), Yun, Seok-Bae (Suwon)

Miniworkshop 2119a (hybrid meeting)



09.05. - 15.05.2021

Organizers:

Analysis of Data-driven Optimal Control

Lars Grüne, Bayreuth

Kirsten Morris, Waterloo

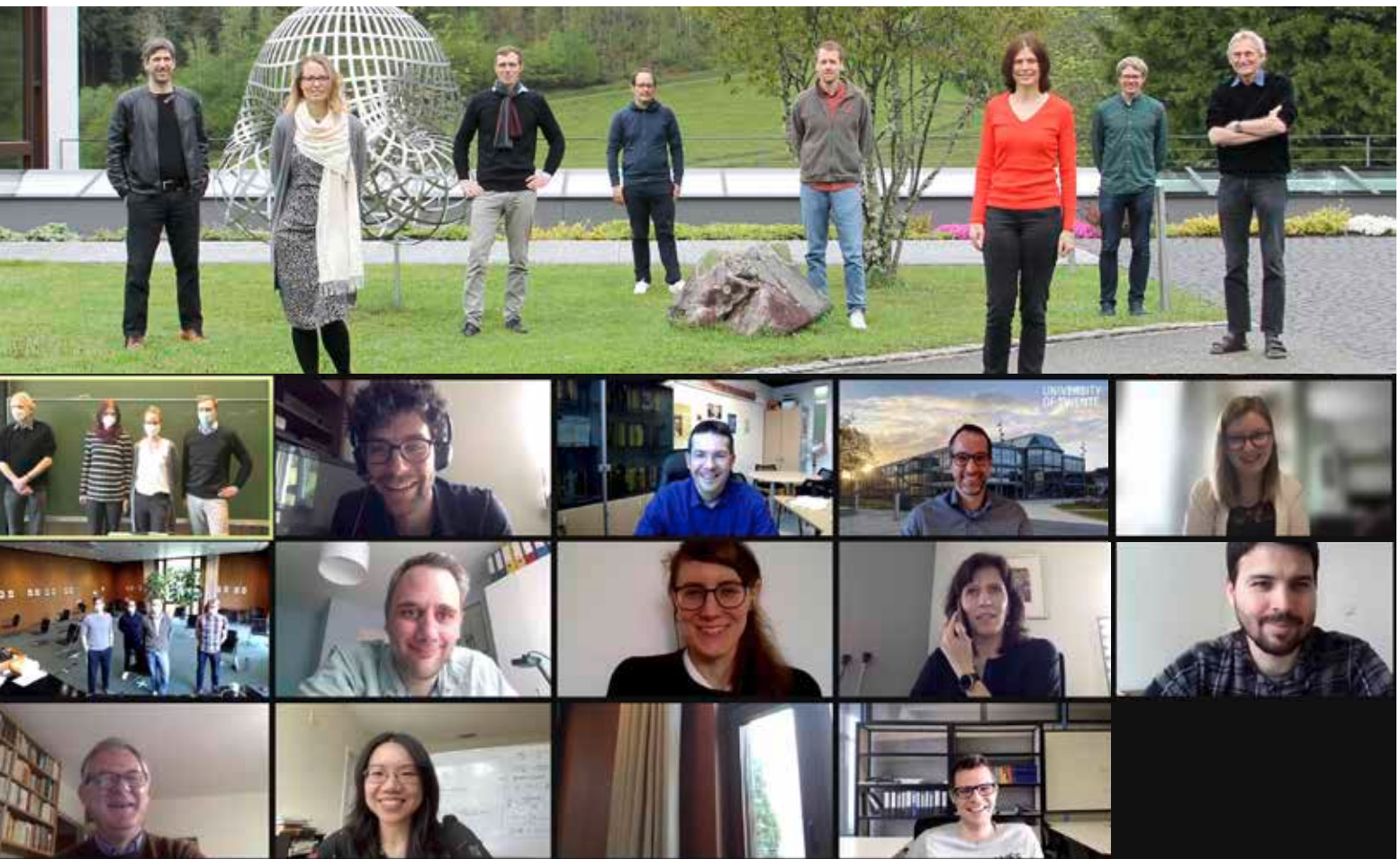
Abstract

This hybrid mini-workshop discussed recent mathematical methods for analyzing the opportunities and limitations of data-driven and machine-learning approaches to optimal feedback control. The analysis concerned all aspects of such approaches, ranging from approximation theory particularly for high-dimensional problems via complexity analysis of algorithms to robustness issues.

Participants

Baumann, Michael Heinrich (Bayreuth), Dörfler, Florian (Zürich), E, Weinan (Princeton), Grüne, Lars (Bayreuth), Guglielmi, Roberto (Waterloo), Han, Jiequn (Princeton), Kalise, Dante (Nottingham), Kang, Wei (Monterey), Kaur, Avneet (Waterloo), Koltai, Péter (Berlin), Korda, Milan (Toulouse), Krügel, Lisa (Bayreuth), Kutz, Nathan (Seattle), Mao, Brian (Waterloo), Morris, Kirsten Anna (Waterloo), Peitz, Sebastian (Paderborn), Tarbouriech, Sophie (Toulouse), Zuazua, Enrique (Erlangen)

Miniworkshop 2119b (hybrid meeting)



09.05. - 15.05.2021

Organizers:

Mathematics of Dissipation – Dynamics, Data and Control

Sara Grundel, Magdeburg

Volker Mehrmann, Berlin

Jacquelin M.A. Scherpen, Groningen

Felix L. Schwenninger, Enschede/Hamburg

Abstract

Dissipation of energy – as well as its sibling the increase of entropy – are fundamental facts inherent to any physical system. The concept of dissipativity has been extended to a more general system theoretic setting via port-Hamiltonian systems and this framework is a driver of innovations in many of areas of science and technology. The particular strength of the approach lies in the modularity of modeling, the strong geometric, analytic and algebraic properties and the very good approximation properties.

Participants

Breiten, Tobias (Berlin-Charlottenburg), Brune, Christoph (Enschede), Faulwasser, Timm (Dortmund), Gräble, Carmen (Magdeburg), Grundel, Sara (Magdeburg), Hu, Weiwei (Athens), Jacob, Birgit (Wuppertal), Maschke, Bernhard (Villurbanne), Mehrmann, Volker (Berlin), Philipp, Friedrich (Ilmenau), Reis, Timo (Hamburg), Schaller, Manuel (Ilmenau), Scherpen, Jacquelin (Groningen), Schwenninger, Felix (Enschede), Trelat, Emmanuel (Paris), Unger, Benjamin (Stuttgart), Worthmann, Karl (Ilmenau)



05.07. - 07.07.2021

Symposium on Mathematical Epidemiology: Coronavirus and Communication

Organizers:

Gerhard Huisken, Oberwolfach
Stefan Müller, HCM Bonn
Felix Otto, MPI Leipzig
László Székelyhidi, Leipzig

Abstract

The equations underlying mathematical models in epidemiology are analytically several notches simpler than equations used in for instance weather modelling. Nevertheless, the hard lessons learnt from over a year with COVID-19 indicate that in certain key aspects related to the data-driven nature of these problems, predicting the evolution of the coronavirus pandemic is much more difficult than predicting the weather. The Symposium aimed to establish a scientific forum, primarily within the mathematical community, to exchange experiences from the past year, identify possible directions in which outward looking mathematics in particular can contribute to more reliable epidemic modelling in the future, and to discuss how to address the difficulties faced when the lines between mathematical theorem and policy advice start to blur.

Participants

an der Heiden, Matthias (Berlin), Azman, Andrew S. (Baltimore), Barbarossa, Maria V. (Frankfurt am Main), Bismut, Jean-Michel (Orsay), Böttcher, Lucas (Frankfurt am Main), Britton, Tom (Stockholm), Brockmann, Dirk (Berlin), De Lellis, Camillo (Princeton), Diekmann, Odo (Utrecht), Ferguson, Neil (London), Feßler, Robert (Kaiserslautern), Goldenfeld, Nigel (Urbana), Götze, Friedrich (Bielefeld), Hairer, Martin (London), Hieber, Matthias (Darmstadt), Huber-Klawitter, Annette (Freiburg i. Br.), Huisken, Gerhard (Oberwolfach), Jost, Jürgen (Leipzig), Jülicher, Frank (Dresden), Kreck, Matthias (Bonn), Lovász, László (Budapest), Luckhaus, Stephan (Leipzig), Maday, Yvon (Paris), Müller, Stefan (Bonn), Müller, Werner (Bonn), Otto, Felix (Leipzig), Pardoux, Etienne (Marseille), Priesemann, Viola (Göttingen), Rapoport, Michael (Bonn), Röst, Gergely (Szeged), Schöbel, Anita (Kaiserslautern), Stevens, Angela (Münster), Stoyan, Dietrich (Freiberg), Struwe, Michael (Zürich), Székelyhidi Jr., László (Leipzig)



29.08. - 04.09.2021

Small Collaboration: Advanced Numerical Methods for Nonlinear Hyperbolic Balance Laws and Their Applications

Organizers:

Song Jiang, Beijing
Jiequan Li, Beijing
Mária Lukáčová-Medvid'ová, Mainz
Gerald Warnecke, Magdeburg

Abstract

This small collaborative workshop brought together experts from the Sino-German project working in the field of advanced numerical methods for hyperbolic balance laws. These are particularly important for compressible fluid flows and related systems of equations. The investigated numerical methods were finite volume/finite difference, discontinuous Galerkin methods, and kinetic-type schemes. We have discussed challenging open mathematical research problems in this field, such as multidimensional shock waves, interfaces with different phases or efficient and problem suited adaptive algorithms. Consequently, our main objective was to discuss novel high-order accurate schemes that reliably approximate underlying physical models and preserve important physically relevant properties. Theoretical questions concerning the convergence of numerical methods and proper solution concepts were addressed as well.

Participants

Chen, Guoxian (Wuhan), Cheng, Juan (Beijing), Deng, Yinbin (Wuhan), Du, Zhifang (Beijing), Feng, Yiwei (Beijing), Hellmuth, Kathrin (Würzburg), Ji, Xia (Beijing), Jiang, Song (Beijing), Klingenberg, Christian (Würzburg), Kröner, Dietmar (Freiburg i. Br.), Li, Jiequan (Beijing), Liu, Tiegang (Beijing), Lukáčová-Medvidová, Mária (Mainz), Magiera, Jim (Stuttgart), Noelle, Sebastian (Aachen), Qi, Jin (Beijing), Qiu, Jianxian (Xiamen Fujian), Rohde, Christian (Stuttgart), Schömer, Andreas (Mainz), She, Bangwei (Praha), Sun, Wenjun (Beijing), Tang, Huazhong (Beijing), Tao, Zhanjing (Changchun), Thein, Ferdinand (Magdeburg), Wang, Yue (Beijing), Warnecke, Gerald (Magdeburg), Wu, Kailiang (Shenzhen, Guangdong Province), Xiong, Tao (Xiamen), Yong, Wen-an (Beijing), Yu, Changsheng (Beijing), Yuan, Gonglin (Nanning), Yuan, Yuhuan (Mainz), Zhang, Qiang (Nanjing), Zhang, Yongjin (Henan'an), Zhao, Weifeng (Beijing), Zhu, Jun (Nanjing)



05.09. - 11.09.2021

MATRIX-MFO Tandem Workshop: Invariants and Structures in Low-Dimensional Topology

Organizers:

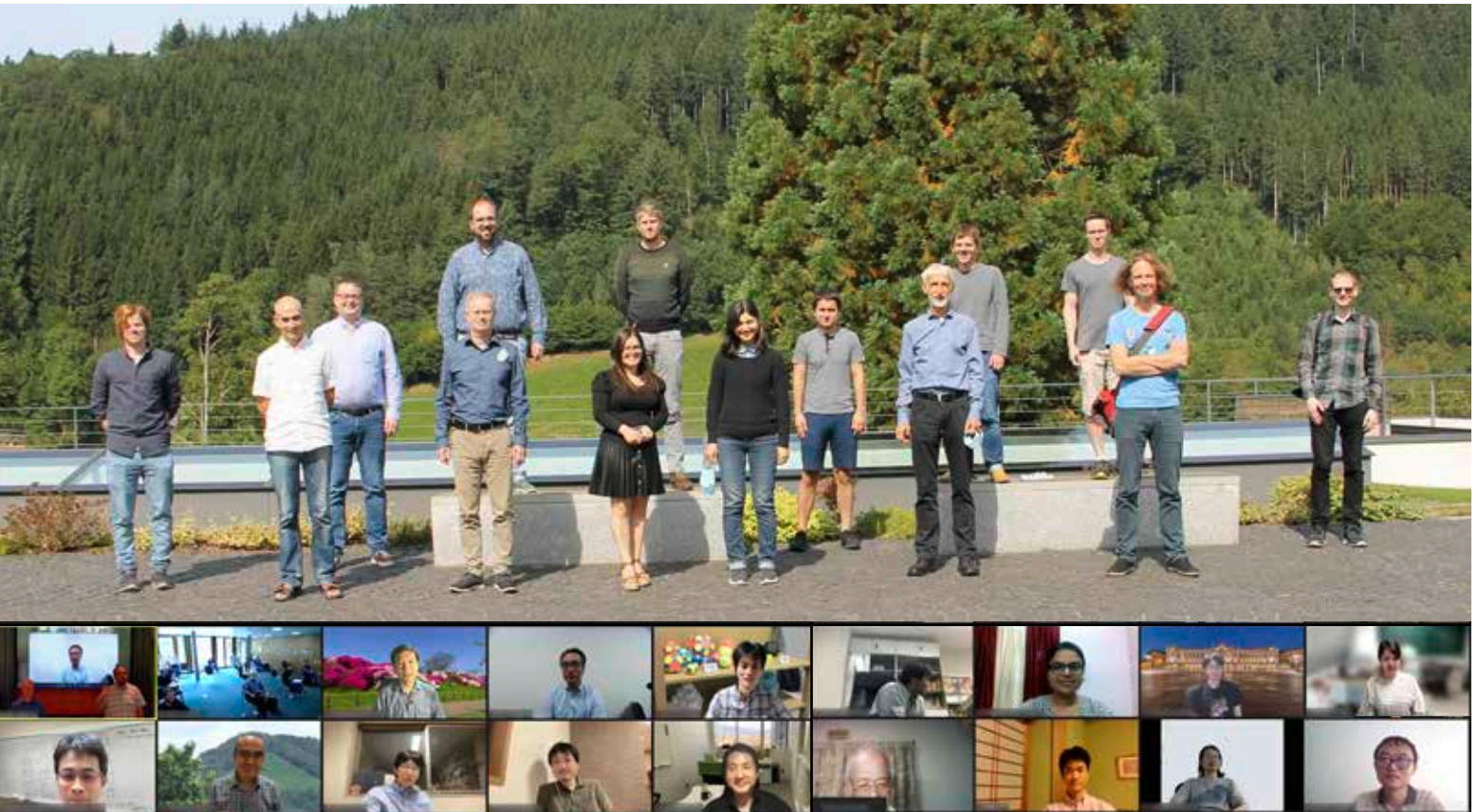
Stefan Friedl, Regensburg
Jessica Purcell, Monash
Arunima Ray, Bonn
Stephan Tillmann, Sydney

Abstract

The first ever MATRIX-MFO Tandem Workshop addressed several research questions in low-dimensional topology and related areas. To accommodate the hybrid setting and the time difference, the workshop had an unusual format, consisting primarily of discussion sessions and with very few formal talks. The problems treated in the discussion sessions were shortly introduced by the discussion leaders and concerned (1) twisted intersection forms of spin 4-manifolds, (2) knots in 3-manifolds, (3) profinite rigidity of 3-manifold groups, and (4) cobordisms up to stable diffeomorphism.

Participants

Bowden, Jonathan (Regensburg), Boyd, Rachael Jane (Bonn), Chatterjee, Rima (Köln), de Mesmay, Arnaud (Marne-la-Vallée), Feller, Peter (Zürich), Friedl, Stefan (Regensburg), Kammeyer, Holger (Düsseldorf), Kasprowski, Daniel (Bonn), Kegel, Marc (Berlin), Land, Markus (København), Lukman, Joy (Parkville), Moussard, Delphine (Marseille), Okun, Boris L. (Milwaukee), Powell, Mark A. (Durham), Purcell, Jessica S. (Clayton), Quintanilha, José Pedro (Regensburg), Raoux, Katherine (Bonn), Ray, Arunima (Bonn), Reutter, David (Bonn), Ruppik, Benjamin Matthias (Bonn), Schleimer, Saul (Coventry), Tillmann, Stephan (Sydney), Trüöl, Paula (Zürich), Zibrowius, Claudius (Regensburg)



05.09. - 11.09.2021

MFO-RIMS Tandem Workshop: Symmetries on Polynomial Ideals and Varieties

Organizers:

Gunnar Fløystad, Bergen
Satoshi Murai, Tokyo
Cordian Riener, Konstanz
Kohji Yanagawa, Osaka

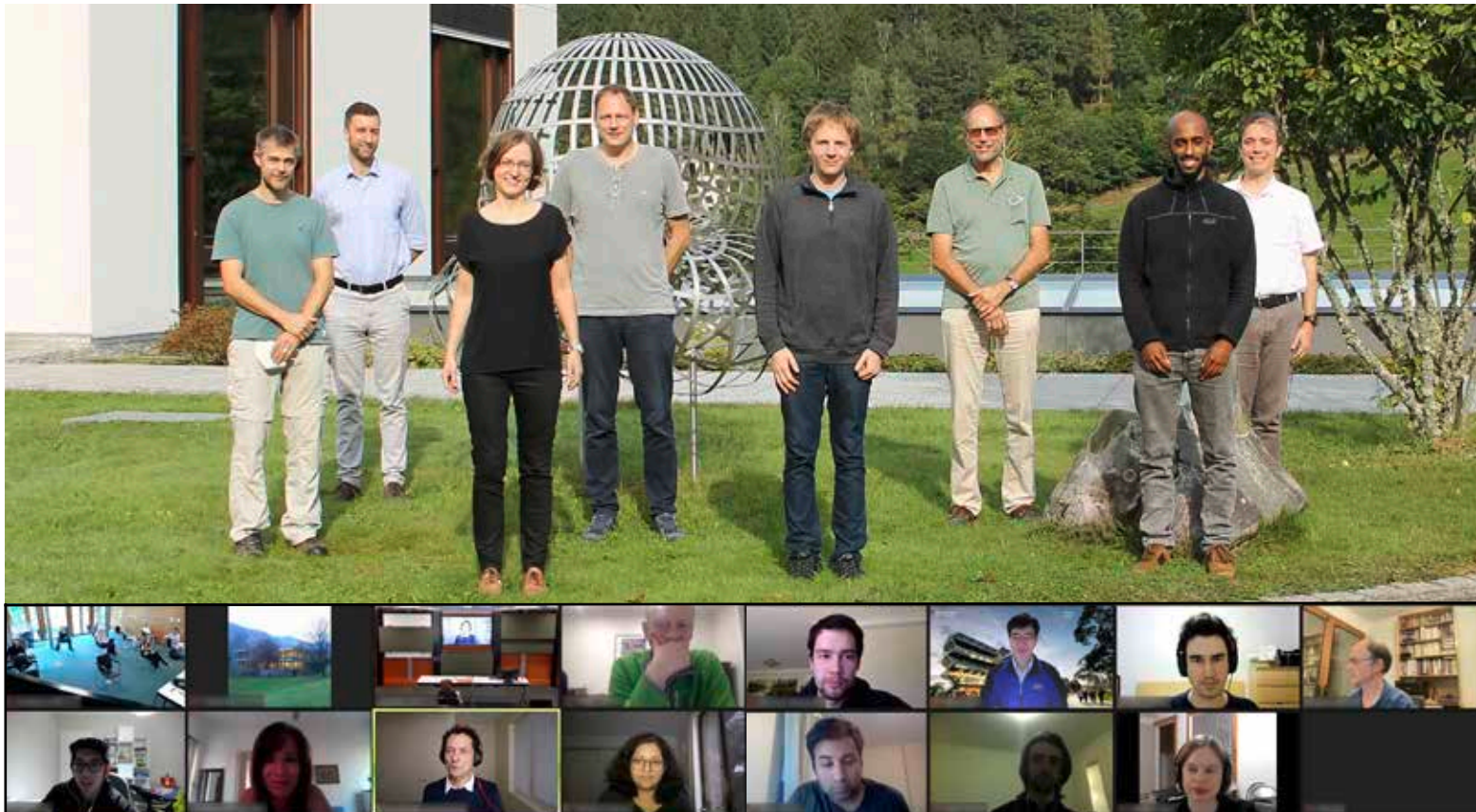
Abstract

The study of symmetry as a structural property of algebraic objects is one of the fundamental pillars of the developments of modern mathematics, most prominently beginning with the work of Abel and Galois. The focus of the workshop was on permutation actions of the symmetric group on polynomial rings and algebraic and semi-algebraic sets. More concretely, it was centered around recent developments in the asymptotic setup of symmetric ideals in the polynomial ring in infinitely many variables.

Participants

Basu, Saugata (West Lafayette), Bauer, Mario (Konstanz), Draisma, Jan (Bern), Eggermont, Rob H. (Eindhoven), Engström, Alexander (Aalto), Floystad, Gunnar (Bergen), Hashimoto, Mitsuyasu (Kyoto), Higashitani, Akihiro (Osaka), Kahle, Thomas (Magdeburg), Kohn, Kathlén (Stockholm), Kummer, Mario (Dresden), Kuroda, Shigeru (Tokyo), Lien, Arne (Konstanz), Maraj, Aida (Ann Arbor), Matsushita, Koji (Kyoto), Miyazaki, Mitsuhiro (Kyoto), Mohammadi, Fatemeh (Gent), Murai, Satoshi (Tokyo), Nagaoka, Takahiro (Kyoto), Nagel, Uwe (Lexington), Nakajima, Yusuke (Kyoto), Nasu, Hirokazu (Kyoto), Nguyen, Hop D. (Kyoto), Numata, Yasuhide (Kyoto), Ohsugi, Hidefumi (Kyoto), Okazaki, Ryota (Kyoto), Raicu, Claudiu (Notre Dame), Riener, Cordian (Tromsø), Römer, Tim (Osnabrück), Scheiderer, Claus (Konstanz), Shibata, Kosuke (Kyoto), Shibu, Nayana (Osaka), Terai, Naoki (Kyoto), Tsuchiya, Akiyoshi (Kyoto), Wachi, Akihito (Hokkaido), Watanabe, Junzo (Kawagawa), Yanagawa, Kohji (Osaka), Yazawa, Akiko (Kyoto)

Miniworkshop 2137a (hybrid meeting)



12.09. - 18.09.2021

MATRIX-MFO Tandem Workshop/Small Collaboration: Rough Wave Equations

Organizers:

Dorothee Frey, Karlsruhe
Zihua Guo, Clayton
Andrew Hassell, Canberra
Pierre Portal, Canberra
Jan Rozendaal, Warszawa
Po Lam Yung, Canberra

Abstract

The consideration of wave propagation in inhomogeneous media or the modelling of nonlinear waves often requires the study of wave equations with low regularity data and/or coefficients. Several Australian-European collaborations have recently led to deeper analytical understanding of rough wave equations. This tandem workshop provided a platform for such collaborations and brought together early career researchers and leading experts in harmonic analysis, microlocal analysis and spectral theory. The workshop focused on collaboration and technical knowledge exchange on topics such as local smoothing, spectral multipliers, restriction estimates, Hardy spaces for Fourier integral operators, and nonlinear partial differential equations.

Participants

Candy, Timothy (Dunedin), Cowling, Michael G. (Sydney), Duong, Xuan (Sydney), Frey, Dorothee (Karlsruhe), Gansemer, Antoine (Canberra), Gomes, Sean (Canberra), Guo, Zihua (Clayton), Harris, Sean (Canberra), Hassell, Andrew (Canberra), Herr, Sebastian (Bielefeld), Iliopoulou, Marina (Canterbury), Martini, Alessio (Birmingham), Mesfun, Yonas (Karlsruhe), Müller, Detlef (Kiel), Portal, Pierre (Canberra), Rozendaal, Jan (Warszawa), Rule, David (Linköping), Schippa, Robert (Karlsruhe), Schlue, Volker (Parkville), Sharma, Himani (Canberra), Sikora, Adam B. (Macquarie Park, NSW), Tacy, Melissa (Auckland), Yung, Po-Lam (Canberra)



17.10. - 23.10.2021

Organizers:

Three Facets of R-Matrices

Sachin Gautam, Columbus
Andrey Smirnov, Chapel Hill
Curtis Wendlandt, Columbus
Masahito Yamazaki, Kashiwa

Abstract

By definition, an R-matrix with spectral parameter is a solution to the Yang-Baxter equation, introduced in the 1970's by C.N. Yang and R.J. Baxter. Such a matrix encodes the Boltzmann weights of a lattice model of statistical mechanics, and the Yang-Baxter equation appears naturally as a sufficient condition for its solvability. In the last decade, several mathematical and physical theories have led to seemingly different constructions of R-matrices. The theme of this workshop was the interaction of three such approaches, each of which has independently proven to be valuable: the geometric, analytic and gauge-theoretic constructions of R-matrices. Its aim was to bring together leading experts and researchers from each school of thought, whose recent works have given novel interpretations to this nearly classical topic.

Participants

Appel, Andrea (Parma), Arbesfeld, Noah (London), Ashwinkumar, Meer (Kashiwa), Balagovic, Martina (Newcastle upon Tyne), Chari, Vyjayanthi (Riverside), Fujita, Ryo (Paris), Gautam, Sachin (Columbus), Havn Aamand, Nanna (København), Hernandez, David (Paris), Ishtiaque, Nafiz (Princeton), Moosavian, Seyed Farooq (Montréal), Oh, Jihwan (Oxford), Regelskis, Vidas (Hatfield, Herts), Schiffmann, Olivier (Orsay), Toledano Laredo, Valerio (Boston), Vlaar, Bart (Bonn), Wendlandt, Curtis (Saskatoon), Williams, Brian (Edinburgh), Yamazaki, Masahito (Kashiwa), Zhang, Huafeng (Villeneuve d'Ascq), Zhou, Yehao (Waterloo)



05.12. - 11.12.2021

Organizers:

(Anosov)³

Colin Guillarmou, Orsay
Benjamin Küster, Paderborn
Beatrice Pozzetti, Heidelberg
Tobias Weich, Paderborn

Abstract

Three different active fields are subsumed under the keyword “Anosov theory”: Spectral theory of Anosov flows, dynamical rigidity of Anosov actions, and Anosov representations. In all three fields there have been dynamic developments and substantial breakthroughs in recent years. The mini-workshop brought together researchers from the three different communities and sparked a joint discussion of current ideas, common interests, and open problems.

Participants

Dai, Xian (Heidelberg), Dang, Nguyen Thi (Heidelberg), Delarue, Benjamin (Paderborn), Flaminio, Livio (Villeneuve d’Ascq), Guedes Bonthonneau, Yannick (Villetaneuse), Guillarmou, Colin (Orsay), Hilgert, Joachim (Paderborn), Islam, Mitul (Heidelberg), Kassel, Fanny (Bures-sur-Yvette), Knieper, Gerhard (Bochum), Ledrappier, Francois (Paris), Lefeuvre, Thibault (Paris), Li, Jialun (Zürich), Monclair, Daniel (Orsay), Pozzetti, Maria Beatrice (Heidelberg), Rodriguez Hertz, Federico (Montevideo), Sambarino, Andrés (Paris), Spatzier, Ralf J. (Ann Arbor), Weich, Tobias (Paderborn), Wienhard, Anna Katharina (Heidelberg), Wolf, Lasse Lennart (Paderborn)



05.12. - 11.12.2021

Scattering Amplitudes, Cluster Algebras, and Positive Geometries

Organizers:

Nima Arkani-Hamed, Princeton
Hugh Thomas, Montreal
Lauren Williams, Cambridge MA

Abstract

Cluster algebras were developed by Fomin and Zelevinsky about twenty years ago. While the initial motivation came from within algebra (total positivity, canonical bases), it quickly became clear that cluster algebras possess deep links to a host of other subjects in mathematics and physics. In a separate vein, starting about ten years ago, Arkani-Hamed and his collaborators began a program of reformulating the bases of quantum field theory, motivated by a desire to discover the basic rules of quantum mechanics and spacetime as arising from deeper mathematical principles. Their approach to the fundamental problem of particle scattering amplitudes entails encoding the solution in geometrical objects, “positive geometries” and “amplituhedra”. Surprisingly, cluster algebras have been found to be tightly woven into the mathematics needed to describe these geometries. The purpose of this workshop is to explore the various connections between cluster algebras, scattering amplitudes, and positive geometries.

Participants

Arkani-Hamed, Nima (Princeton), Drummond, James (Southampton), Early, Nick (München), Ferro, Livia (München), Fevola, Claudia (Leipzig), Frost, Hadleigh (Oxford), Galashin, Pavel (Los Angeles), He, Song (Beijing), Karp, Steven (Montréal), Kaufman, Dani (Heidelberg), Lam, Thomas (Ann Arbor), Lukowski, Tomasz (Hatfield, Herts), Marsh, Bethany (Leeds), Matijasic, Antonela (München), Parisi, Matteo (Oxford), Plamondon, Pierre-Guy (Versailles), Rietsch, Konstanze (London), Salvatori, Giulio (Waterloo), Sherman-Bennett, Melissa (Ann Arbor), Spradlin, Marcus (Providence), Thomas, Hugh R. (Montréal), Volovich, Anastasia (Providence), Williams, Lauren K. (Cambridge)



05.12. - 11.12.2021

Variable Curvature Bounds, Analysis and Topology on Dirichlet Spaces

Organizers:

Gilles Carron, Nantes
Batu Güneysu, Chemnitz
Matthias Keller, Potsdam
Kazuhiro Kuwae, Fukuoka

Abstract

The Mini-Workshop has presented some of the most important recent results concerning the theory of Dirichlet forms. The given talks can be roughly categorized into (1) generalizations of the concept of an RDC-space, with the aim of allowing variable distributional lower Ricci curvature bounds, with measures that are not necessarily bounded from below by a constant; (2) the study of topological data and concepts in terms of the geometry induced by the underlying Dirichlet form; (3) regularity results for Gromov-Hausdorff type limits of Riemannian manifolds with uniform lower Ricci bounds in the Kato class; (4) curvature concepts for weighted graphs and other discrete spaces; (5) functional inequalities for Dirichlet spaces; (6) regularity results for abstract Dirichlet forms, in particular, on infinite dimensional spaces.

Participants

Bartmann, Philipp (Potsdam), Ben Amor, Ali (Chemnitz), Boldt, Sebastian (Leipzig), Braun, Mathias (Bonn), Carron, Gilles (Nantes), Güneysu, Batu (Chemnitz), Honda, Shouhei (Sendai), Keller, Matthias (Potsdam), Kopfer, Eva (Bonn), Kuwae, Kazuhiro (Fukuoka), Li, Xiang-Dong (Beijing), Mondello, Iaria (Créteil), Muench, Florentin (Leipzig), Richter, Matti (Potsdam), Rigoni, Chiara (Wien), Schmidt, Marcel (Jena), Stollmann, Peter (Chemnitz), Sturm, Karl-Theodor (Bonn), Thalmaier, Anton (Esch-sur-Alzette), von Renesse, Max (Leipzig)

2.5. Simons Visiting Professors

Die folgenden Forscherinnen und Forscher kombinierten einen Aufenthalt in Oberwolfach mit einem Aufenthalt an einer europäischen Universität, unterstützt durch die Simons Foundation.



Radoslaw K. Wojciechowski, Jamaica NY
Workshop: 2101b Geometry, Dynamics and Spectrum of Operators on Discrete Spaces
Host: Matthias Keller, Potsdam

2.5. Simons Visiting Professors

The following researchers combined their stay in Oberwolfach with a research visit to a European University, supported by the Simons Foundation.



Jesús A. De Loera, Davis
Workshop: 2145 Combinatorial Organization
Hosts: Raman Sanyal, Frankfurt
Volker Kaibel, Magdeburg



James B. Wilson, Fort Collins
Workshop: 2133 Computational Group Theory
Hosts: Gabriele Nebe, Aachen
Bettina Eick, Braunschweig

2.6. Arbeitsgemeinschaften

Arbeitsgemeinschaft 2114 (hybrid meeting)



04.04. - 10.04.2021

Derived Galois Deformation Rings and Cohomology of Arithmetic Groups

Organizers:

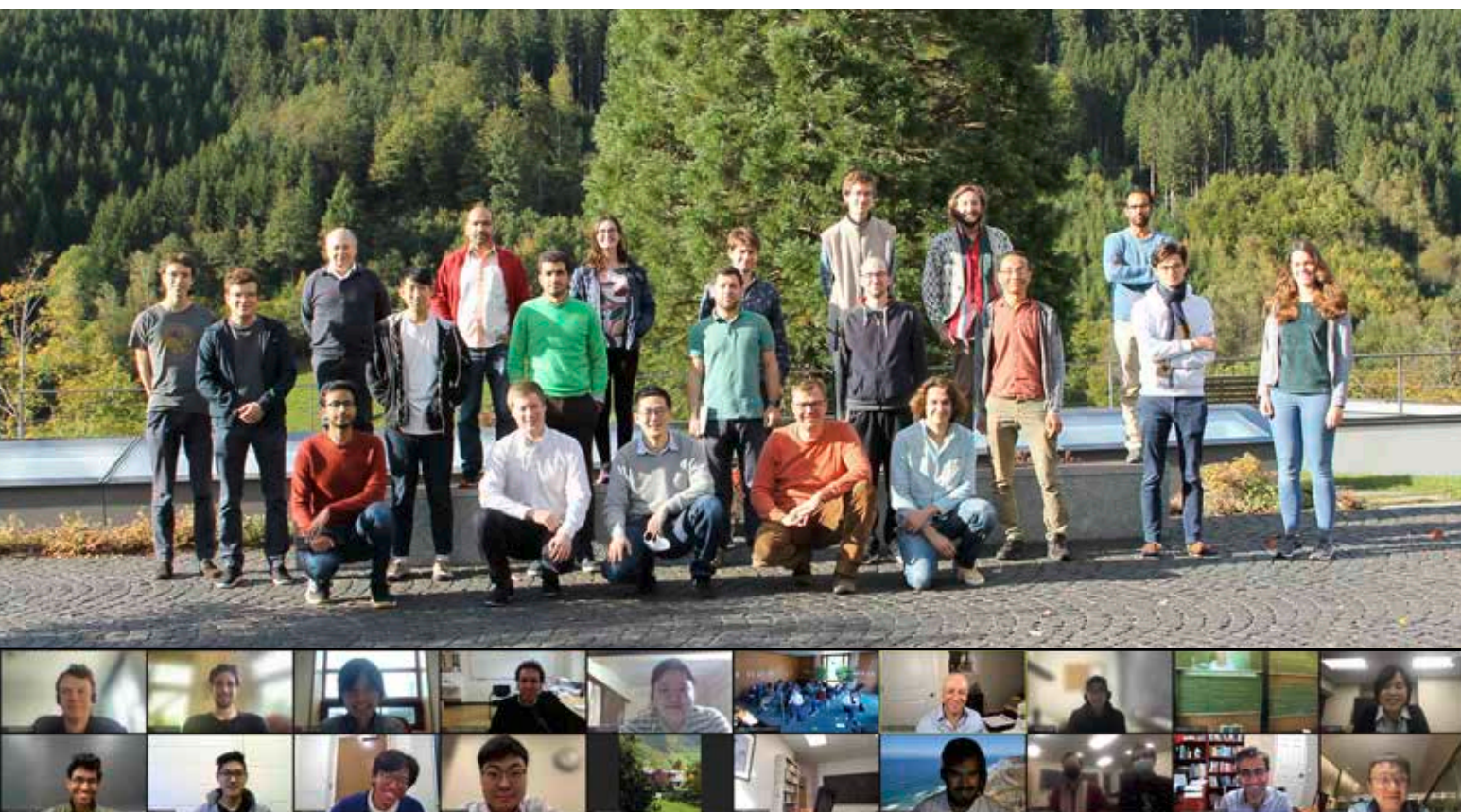
Frank Calegari, Chicago
Søren Galatius, Copenhagen
Akshay Venkatesh, Princeton

Abstract

The purpose of the meeting was to study derived generalizations of Mazur's deformation ring of Galois representations, and the relationship of such a derived deformation ring to the homology of arithmetic groups. The overall background assumed of participants was the theory of holomorphic forms and basic properties of their Galois representations. The workshop was split into four general series of lectures.

Participants

Allen, Patrick (Montréal), Andreychev, Grigory (Köln), Böckle, Gebhard (Heidelberg), Boxer, George (Lyon), Brantner, Lukas B. (Oxford), Buyukboduk, Kazim (Dublin), Cai, Yichang (Villetaneuse), Calegari, Frank (Chicago), Carlson, Magnus (Stockholm), Castella, Francesc (Santa Barbara), Colmez, Pierre (Paris), Conti, Andrea (Esch-sur-Alzette), Emerton, Matthew James (Chicago), Faltings, Gerd (Bonn), Feng, Tony (Cambridge), Fintzen, Jessica (Cambridge), Fust, Paulina (Essen), Galatius, Søren (København), Gee, Toby (London), Gehrmann, Lennart (Essen), Gerbelli-Gauthier, Mathilde (Princeton), Gulotta, Daniel (Bonn), Hansen, David (Bonn), Harris, Michael (New York), Hemo, Tamir (Pasadena), Heuer, Ben (Bonn), Hilado, Anton (Burlington), Hu, Yongquan (Beijing), Iakovenko, Sergei S. (Bonn), Iyengar, Ashwin (London), Koziol, Karol (Ann Arbor), Kubrak, Dmitry (Bonn), Le, Daniel (West Lafayette), Le Bras, Arthur-César (Villetaneuse), Mezard, Ariane (Paris), Min, Yu (Beijing), Niziol, Wieslawa (Paris), Oh, Gyu-jin (Princeton), Paškūnas, Vytautas (Essen), Patrikis, Stefan (Columbus), Raksit, Arpon (Stanford), Sala Fernandez, Guillem (Barcelona, Catalonia), Savitt, David (Baltimore), Shin, Sug Woo (Berkeley), Shotton, Jack George (Durham), Stier, Maximilian (Heidelberg), Strothmann, Benoit (Paris), Szymik, Markus (Trondheim), Tilouine, Jacques (Villetaneuse), Urban, Eric (New York), Venkatesh, Akshay (Princeton), Wake, Preston (East Lansing), Wang-Erickson, Carl (Pittsburgh), Xiao, Liang (Beijing), Yao, Zijian (Cambridge), Zhang, Mingjia (Bonn), Zhang, Zhiyu (Cambridge)



10.10. - 15.10.2021

Organizers:

Thin Groups and Super-approximation

Alireza Salehi Golsefidy, San Diego

Alex Kontorovich, Piscataway

Hee Oh, New Haven

Abstract

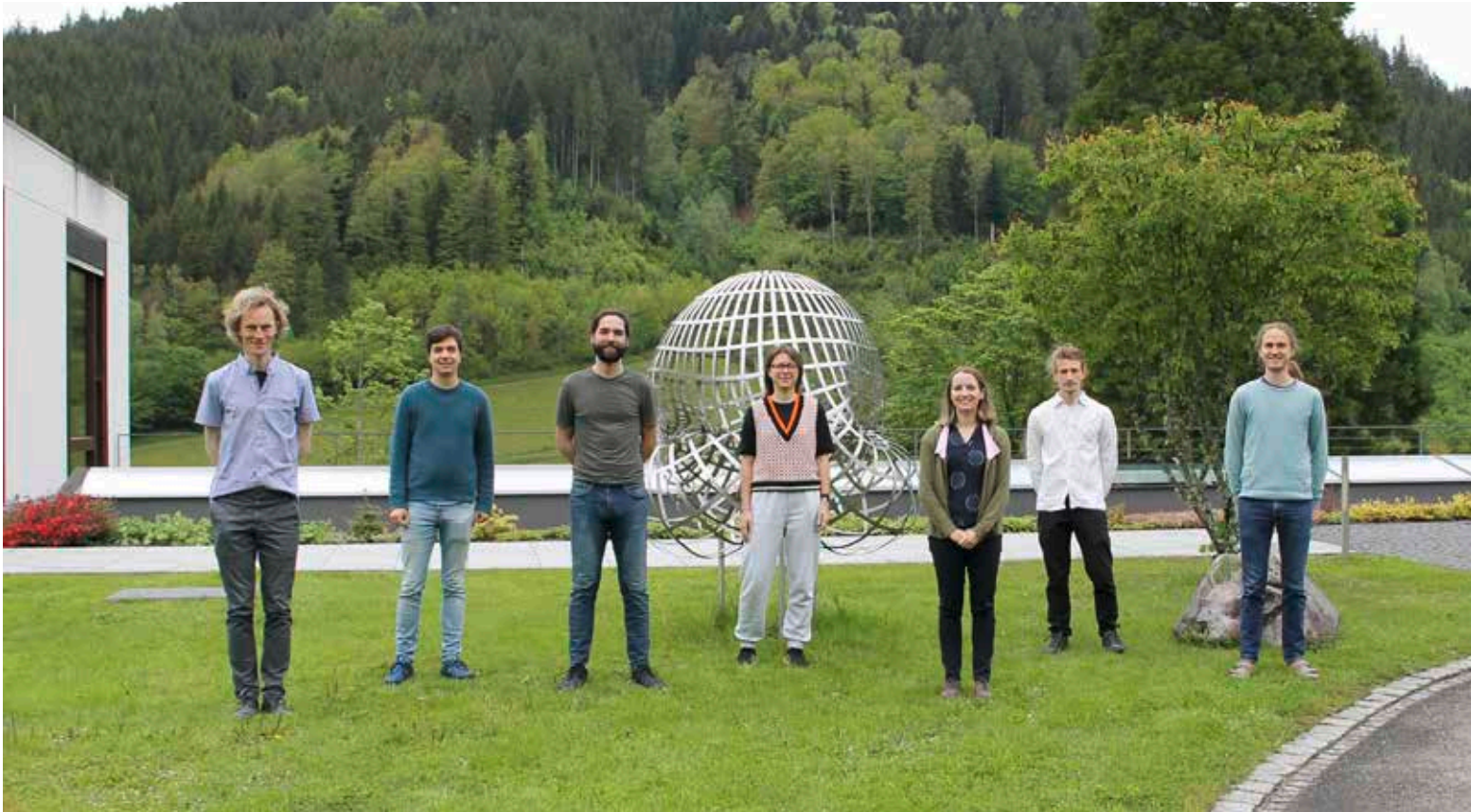
The aim of this meeting was to discuss the super-approximation of thin groups, its dynamical implications in terms of the mixing of geodesic flows, and applications to various problems in arithmetic, geometry, and dynamics. The meeting was well attended with over 50 participants (in person + zoom participants) with broad geographic representation from all continents. It was a nice blend of researchers with various backgrounds.

Participants

Bajpai, Jitendra (Dresden), Bénard, Timothée (Cambridge), Bernert, Christian (Göttingen), Calderon, Aaron (New Haven), Camacho Cadena, Fernando (New Haven), Chow, Michael (New Haven), Chung, Ping Ngai (Chicago), Corso, Emilio (Zürich), Dabeler, Antje (Münster), Dona, Daniele (Jerusalem), Drogin, Reuben (New Haven), Edeko, Nikolai (Zürich), Edelman-Munoz, Sara (Houston), Flaminio, Livio (Villeneuve d'Ascq), Fromm, Elijah (New Haven), Golsefidy, Alireza Salehi (La Jolla), Han, Jiyoung (Mumbai), Han, Zhicheng (Göttingen), Islam, Mitul (Heidelberg), Jones, Edna (Piscataway), Kim, Dongryul (New Haven), Kim, Wooyeon (Zürich), Kogler, Constantin (Cambridge), Kontorovich, Alex (Piscataway), Landesberg, Or (New Haven), Lee, Homin (Bloomington), Lee, Min Ju (New Haven), Litman, Matthew C. (Davis), Luethi, Manuel (Lausanne), Machado, Simon (Cambridge), Mallahi-Karai, Keivan (Bremen), Oh, Hee (New Haven), Park, Sungjin (New Haven), Pham, Lam (Waltham), Pi, Weite (New Haven), Pikhurko, Oleg (Coventry), Sarkar, Pratyush (New Haven), Sert, Cagri (Zürich), Spatzier, Ralf J. (Ann Arbor), Srinivas, Srivatsa (La Jolla), Stadlöder, Stefan (Regensburg), Thilmany, Francois (Bruxelles), Thom, Andreas B. (Dresden), Wang, Amy (New Haven), Winkel, Jeroen (Münster), Zhang, Xin (Hong Kong)

2.7. Oberwolfach Seminare

Oberwolfach Seminar 2121a (hybrid meeting)



23.05. - 29.05.2021

Organizers:

Cellular E_k -Algebras

Søren Galatius, København

Alexander Kupers, Toronto

Oscar Randal-Williams, Cambridge UK

Abstract

This seminar was an introduction to the homotopy theory of E_k -algebras in spaces and chain complexes, aimed towards applications to the homology of moduli spaces. We covered foundational topics including cellular E_k -algebras, derived E_k -indecomposables (i.e. topological Quillen homology), the Hurewicz theorem in this context, the relationship between derived E_k -indecomposables and iterated bar constructions, the description of the homology of free E_k -algebras, and several spectral sequences associated to cellular E_k -algebras. These techniques were then applied to E_k -algebras given by various moduli spaces, where the phenomenon of homological stability can be easily understood from the perspective of E_k -cells. The highlight of this seminar was the recently discovered “secondary homological stability” for mapping class groups of surfaces. In addition to the homotopy-theoretic techniques for working with cellular E_k -algebras this required detailed input specific to mapping class groups, which we surveyed.

Participants

Baker, Andrew J. (Glasgow), Bernard, Calista K. (København), Bianchi, Andrea (København), Bødigheimer, Carl-Friedrich (Bonn), Bonatto, Luciana (Oxford), Booth, Matt (Antwerpen), Boyd, Rachael Jane (Bonn), Brück, Benjamin (Zürich), Cantero Morán, Federico (Madrid), Carlson, Jeffrey (London), Carmona Sanchez, Victor (Sevilla), Carr, Matthew B. (Columbus), Cepek, Anna (Bozeman), Fu, Xin (Suwon), Galatius, Søren (København), Hertl, Thorsten (Göttingen), Himes, Zachary (West Lafayette), Khoroshavkina, Nadezhda (Moscow), Kranhold, Florian (Bonn), Kupers, Alexander (Cambridge), Lahtinen, Anssi (København), Malin, Connor (Notre Dame), Medina-Mardones, Anibal (Bonn), Meisel, Moritz O. (Augsburg), Nariman, Sam (West Lafayette), Pacheco-Tallaj, Natalia (Cambridge), Pham, Viet-Cuong (Bonn), Prigge, Nils (Zürich), Randal-Williams, Oscar (Cambridge), Reinhold, Jens (Münster), Rognes, John (Oslo), Schonscheck, Nikolas C. (Columbus), Semikina, Julia (Münster), Sierra, Ismael (Cambridge), Soulié, Arthur (Glasgow), Sroka, Robin (København), Steinebrunner, Jan (Oxford), Sytilidis, Filippos (Oxford), Taggart, Niall (Bonn), Tamaroff, Pedro (Dublin), Zhang, Adela (YiYu) (Cambridge), Zhang, Yu (Columbus)



23.05. - 29.05.2021

Organizers:

Introduction to Convex Integration

Daniel Faraco, Madrid

Stefano Modena, Darmstadt

László Székelyhidi, Leipzig

Abstract

Convex integration is a technique for the construction of solutions to certain nonlinear systems of partial differential equations. The technique originates in the work of John Nash 1954 on C^1 isometric embeddings and has been developed into a powerful general method in Gromov's book for certain problems in differential geometry. The key condition for applicability of the method in Gromov's framework is "ampleness" of the differential relation – however, this condition excludes most PDE systems arising in classical physics. In the last decade new versions of this technique have been developed primarily for applications in fluid mechanics. Most notable achievements are (1) the non-uniqueness of weak solutions to the incompressible Euler system and to the p -system of compressible ideal flows; (2) the resolution of Onsager's conjecture on anomalous dissipation in the context of the K41 theory of turbulence; and (3) the non-uniqueness of distributional solutions of the Navier-Stokes equations and of distributional solutions of the linear transport equation with Sobolev vectorfields. The analytical techniques differ substantially. The lectures aimed to provide an exposition to the separate issues and to address the corresponding developments at the forefront of this still emerging theory.

Participants

Binz, Tim (Darmstadt), Buck, Miriam (Darmstadt), Burczak, Jan (Leipzig), Caputo, Emanuele (Trieste), Faraco, Daniel (Madrid), Fossemò, Andrea (L'Aquila), Giardi, Matteo (Leipzig), Gorini, Michele (L'Aquila), Guerra, Andre (Oxford), Horlbein, Eva (Würzburg), Iakunin, Sergei (Bilbao, Bizkaia), Inversi, Marco (Pisa), Koley, Ujjwal (Bangalore, Bengaluru), Krupa, Sam G. (Leipzig), Lenz, Jonas (Mainz), Lindberg, Sauli (Aalto), Markfelder, Simon (Cambridge), Martin, Robert (Essen), Marveggio, Alice (Klosterneuburg), Mekki, Mohamed (Oran), Mengual, Francisco (Madrid), Modena, Stefano (Darmstadt), Navarro Fernandez, Victor (Münster), Ried, Sandra (Leipzig), Santos Rodriguez, Jaime (Bonn), Schenke, Andre (Bielefeld), Schneider, Simon (Mainz), Schömer, Andreas (Mainz), Sengupta, Banhirup (Bellaterra), Solera Diana, Marcos (Burdjassot), Sorella, Massimo (Lausanne), Székelyhidi Jr., László (Leipzig), Voso, Riccardo (Wien), Wagner, Raphael (Ulm)



24.10. - 30.10.2021

Tropical Curves, Logarithmic Structures, and Enumerative Geometry

Organizers:

Renzo Cavalieri, Fort Collins
Hannah Markwig, Tübingen
Dhruv Ranganathan, Cambridge UK

Abstract

Enumerative geometry and the theory of moduli spaces of curves are two cornerstones of modern algebraic geometry; the two subjects have had a significant influence on each other. In the last 15 years, discrete and combinatorial methods, systematized within tropical geometry, have begun to provide new avenues of access into these two subjects. These tropical methods find combinatorial limits in degenerations of algebraic varieties, and the resulting polyhedral combinatorics provides a fundamentally new tool to constrain and understand geometric questions. These ideas have led to new results in Brill-Noether theory, classical enumerative geometry, and the compactification of moduli spaces. This seminar explored these ideas in the context of Gromov-Witten theory. Logarithmic Gromov-Witten theory lies at the heart of modern approaches to mirror symmetry, but also opens up a number of new directions in enumerative geometry of a more classical flavour. Tropical geometry forms the calculus through which calculations in this subject are carried out. The seminar covered the foundational aspects of this tropical calculus, geometric aspects of the degeneration formula for Gromov-Witten invariants, and the practical nuances of working with and enumerating tropical curves. Our objective was to give participants an assisted entry route to the subject, focusing on examples and explicit calculations.

Participants

Afandi, Adam (Münster), Blomme, Thomas (Genève), Borzi, Alessio (Coventry), Bousseau, Pierrick (Orsay), Cavalieri, Renzo (Fort Collins), Chidambaram, Nitin Kumar (Bonn), Corey, Daniel Joseph (Berlin), Geiger, Alheydis (Tübingen), Hahn, Marvin A. (Paris), Herr, Leo (Salt Lake City), Kühn, Kevin (Frankfurt am Main), Lewanski, Danilo (Gif-sur-Yvette), Markwig, Hannah (Tübingen), Pflueger, Nathan (Amherst), Ranganathan, Dhruv (Cambridge), Röhrle, Felix (Frankfurt am Main), Schaller, Karin (Berlin), Schleis, Victoria (Tübingen), Schröter, Benjamin (Stockholm), Shafi, Qaasim (London)



24.10. - 30.10.2021

Organizers:

New Techniques in Resolution of Singularities

Dan Abramovich, Providence
Anne Frühbis-Krüger, Oldenburg
Michael Temkin, Jerusalem
Jaroslaw Włodarczyk, West Lafayette

Abstract

Resolution of singularities is notorious as a difficult topic within algebraic geometry, and people who master it have a “superhuman” aura. Recent work, aiming at resolution of families and semistable reduction infused the subject with logarithmic geometry and algebraic stacks, two techniques essential for the current theory of moduli spaces. As a byproduct a short, simple and efficient functorial resolution procedure in characteristic 0 using just algebraic stacks was produced. The goals of the Seminar were to introduce participants to algebraic stacks; introduce participants to logarithmic geometry; impart explicit techniques of resolution, with access to computer implementation; and introduce participants to resolution in families and semistable reduction methods. Evening study sessions focussed on exercises, computation of examples, and study groups of sources and papers, possibly leading to publications.

Participants

Abramovich, Dan (Providence), Annala, Toni Mikael (Vancouver), Argüz, Hülya (Versailles), Battistella, Luca (Heidelberg), Bosco, Guido (Paris), Braun, Lukas (Freiburg i. Br.), Carocci, Francesca (Lausanne), Contreras, Ryan (Chestnut Hill), del Buey, Celia (Madrid), Felten, Simon (Bures-sur-Yvette), Frühbis-Krüger, Anne (Oldenburg), Gomez, Tanuj (Freiburg i. Br.), Hippold, Matthias (Jerusalem), Krishnamoorthy, Subrahmanya (Wuppertal), Kroon, Ivo (Düsseldorf), Lueders, Morten (Paris), Modin, Ludvig (Stockholm), Moe, Simen (London), Motzkin, Alexander (Jerusalem), Niu, Jingchen (Jerusalem), Nowak, Robert (Oldenburg), Núñez, Pedro (Freiburg i. Br.), Pascual Escudero, Beatriz (Leganes), Quek, Ming Hao (Providence), Ronzon Lavie, Ramon (Toronto), Schlegel Mejia, Sebastian (Edinburgh), Temkin, Michael (Jerusalem), Terenzi, Luca (Freiburg i. Br.), Vo, Anh Duc (Cambridge), Waeterschoot, Art (Leuven), Weißmann, Dario (Essen), Włodarczyk, Jaroslaw (West Lafayette)



21.11. - 27.11.2021

Organizers:

The Cutoff Phenomenon for Finite Markov Chains

Charles Bordenave, Marseille

Persi Diaconis, Stanford

Hubert Lacoïn, Rio de Janeiro

Justin Salez, Paris

Abstract

The cutoff phenomenon is an abrupt convergence to equilibrium for Markov chains on a large finite state space. It was originally discovered by Aldous, Diaconis and Shahshahani in the context of card shuffling in the eighties. It is now established for several other chains arising in various settings such as random walks on groups, interacting particle systems or random walks on random graphs. However, despite many efforts, the general conditions underpinning this phase transition are still very far from being understood. There have been some recent developments which propose new approaches to the cutoff phenomenon. The aim of the seminar was to gather PhD students and young researchers around three leaders of the field: Persi Diaconis (Stanford), Hubert Lacoïn (IMPA) and Justin Salez (Paris Dauphine) who gave lectures on three complementary aspects of the cutoff phenomenon.

Participants

Arras, Adam (Marseille), Baraquin, Isabelle (Besançon), Barrera Vargas, Gerardo (Helsinki), Bordenave, Charles (Marseille), Cao, Fei (Tempe), Conchon-Kerjan, Guillaume (Bath), Diaconis, Persi W. (Stanford), Dubail, Bastien (Paris), Gerencser, Balazs (Budapest), Hartarsky, Ivailo (Paris), He, Jimmy (Cambridge), Lacoïn, Hubert (Rio de Janeiro), Lafrenière, Nadia (Hanover), Marinho de Souza, Rodrigo (Porto Alegre), Quattropani, Matteo (Leiden), Rey, Lucas (Paris), Salez, Justin (Paris), Sau, Federico (Klosterneuburg), Schmid, Dominik (Princeton), Schuh, Katharina (Bonn), Teyssier, Lucas (Wien), Tran, Hong Quan (Paris), Yang, Shangjie (Rio de Janeiro), Zhong, Chenyang (Stanford)



21.11. - 27.11.2021

Organizers:

Combinatorial and Geometric Knot Theory

Colin C. Adams, Williamstown

Louis H. Kauffman, Chicago

Sofia Lambropoulou, Athens

Abstract

The goal of this seminar was to enable an exchange of methods and ideas as well as exploration of fundamental research problems in the fields of knot theory and low-dimensional topology, from theory to applications. Knot theory is the study of the topology of embeddings of the circle into 3-dimensional space. Combinatorial knot theory uses piecewise-linear techniques and diagrammatic translations to study geometric and topological problems and their interrelationships with algebra. The focal topics of this seminar included a wide range of invariants of knots and links and related topics such as three- and four-dimensional manifolds, virtual knot theory, braids and knot algebras, quantum invariants, skein modules, link homology, quandles and their homology, hyperbolic knots and geometric structures of threedimensional manifolds. Knot theory originated in the daring 19th century conjecture of Lord Kelvin that atoms were knotted vortices in the luminiferous aether. The aether theory proved incorrect, but the knot theory continued, and now has applications to vortices and other aspects of natural science such as DNA. We touched upon the scientific applications and gave key examples.

Participants

Adams, Colin C. (Williamstown), Amankwah, Daniel (Reykjavik), Ashraf, Rehana (Lahore), Barkataki, Kasturi (Chattanooga), Brejevs, Vitalijs (Glasgow), Cavicchioli, Paolo (Modena), Chatterjee, Rima (Köln), Claudell, Jacob (Chestnut Hill), Diamantis, Ioannis (Maastricht), Egorov, Andrei (Novosibirsk), Gabrovsek, Bostjan (Ljubljana), Gügümcü, Neslihan (Izmir), Halkiadakis, Eftichios (Athens), Horvat, Eva (Ljubljana), Howie, Joshua (Davis), Huszar, Kristof (Sophia-Antipolis), Ivanov, Maxim (Novosibirsk), Jablonowski, Michal (Gdańsk), Kauffman, Louis H. (Chicago), Kaufman, Dani (Heidelberg), Kokkinakis, Anastasios (Athens), Kumar, Pravin (Mohali), Lambropoulou, Sofia (Athens), Liu, Jessica (Chengjiu) (Toronto), Mahato, Tumpa (Pune), Mahmoudi, Sonia (Sendai), Makri, Stavroula (Caen), Manchester, Alex (Houston), Manouras, Manousos (Pau), Minarcik, Jiri (Praha), Montoya-Vega, Gabriel (Washington), Nogueira, Joao (Coimbra), Palak Bakshi, Rhea (Zürich), Panagiotou, Eleni (Chattanooga), Pongtanapaisan, Puttipong (Saskatoon), Rosenstein, Ori (Jerusalem), Rudd, Cameron (Urbana), Rushworth, Will (Syracuse), Sahihi, Taliya (Milano), Scherich, Nancy (Providence), Silvero Casanova, Marithania (Huelva), Stenhede, Eric (Wien), Sukaiti, Mark Essa (AL Ain), Wang, Yi (Philadelphia), Yasuda, Jumpei (Osaka), Zahoransky von Worlik, Max Jakob (Berlin)

2.8. Fortbildungsveranstaltungen/Training weeks

Internationale Mathematik-Olympiade 2128a



14.07. - 24.07.2020

Organizers:

Internationale Mathematik-Olympiade

Patrick Bauermann, Bonn

Eric Müller, Münster

Jürgen Prestin, Lübeck

Abstract

Due to the Covid-19 pandemic the 62nd International Mathematical Olympiad was held in remote format. The format required an exam centre in every participating country, supervised by a neutral IMO Commissioner. Socially distanced exams were observed by webcams, with the video feeds sent to the invigilation team in Saint-Petersburg, Russia. The German participants solved their contest tasks in Oberwolfach.

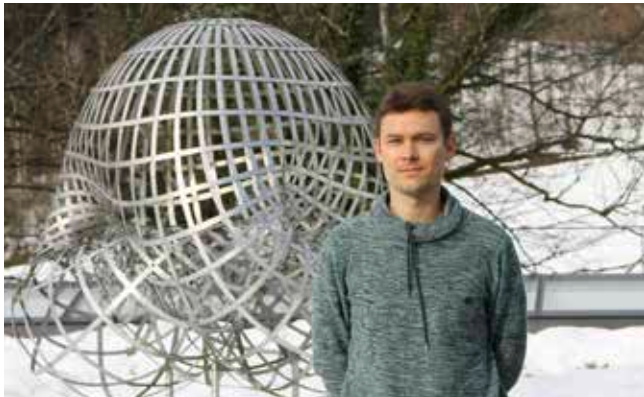
Participants

Grabbel, Lennart Christian; Hauck, Maximilian; Kaganskiy, Juri; Karabash, Illia; Lörke, Timo; Meyer, Samuel; Müller, Eric; Prestin, Jürgen; Reinhold, Jens; Völlmecke, Julian Robin; Wagner, Ferdinand

2.9. Research in Pairs and Oberwolfach Research Fellows

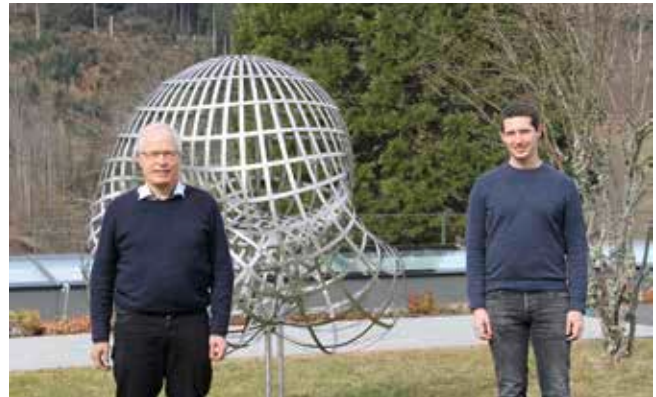
Die folgenden Forscherinnen und Forscher nahmen 2021 am RiP/OWRF Programm teil:

The following researchers attended the RiP/OWRF program in 2021:



Feng Dai, Alberta
Yurii Kolomoitsev, Lübeck
Sergey Tikhonov, Barcelona (on the photo)

17.01. - 30.01.2021



Friedrich Klaus, Karlsruhe (right)
Herbert Koch, Bonn (left)

28.02. - 13.03.2021



Gennadiy Averkov, Cottbus (right)
Claus Scheiderer, Konstanz (left)

21.02. - 27.02.2021



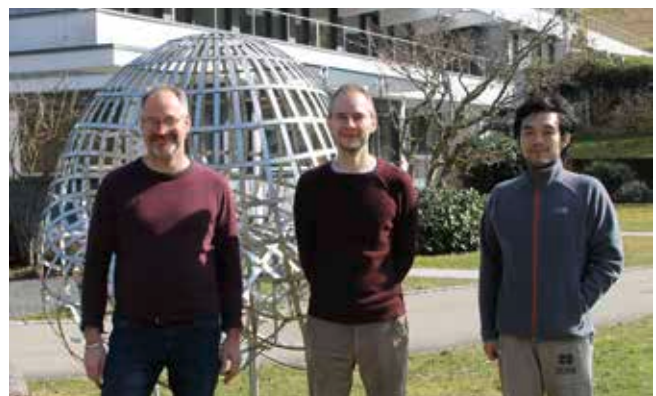
Bernhard Böhmler, Kaiserslautern (left)
Niamh Farrell, Hannover (middle)
Caroline Lassueur, Kaiserslautern (right)

28.02. - 13.03.2021



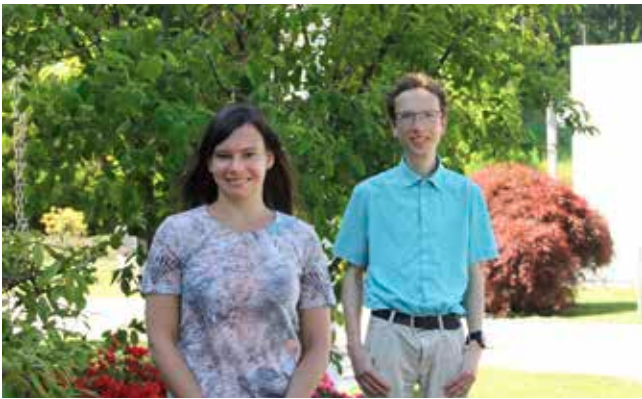
Jitendra Bajpai, Dresden (right)
Mattia Cavicchi, Dijon (left)

28.02. - 27.03.2021



Pablo Cubides Kovacsics, Düsseldorf (middle)
Martin Hils, Münster (left)
Jinhe Ye, Beijing (right)

07.03. - 20.03.2021



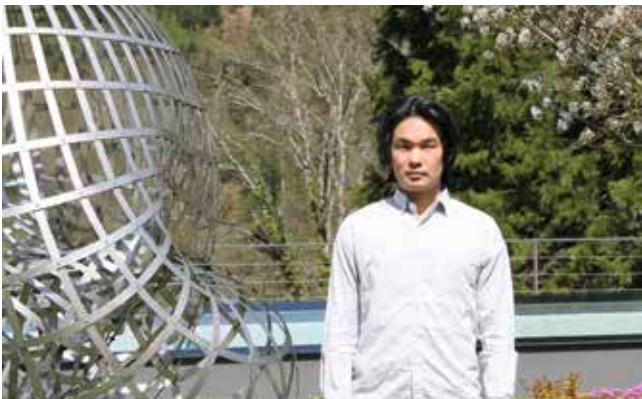
Lisa Hartung, Mainz (left)
Maximilian Fels, Bonn (right)
Oren Loudior, Haifa

28.03. - 05.06.2021



Andrei Moroianu, Orsay (left)
Uwe Semmelmann, Stuttgart (right)

09.05. - 22.05.2021



Yoh Tanimoto, Rome

30.03. - 01.05.2021



Birgit Jacob, Wuppertal (left)
Kirsten Morris, Waterloo (right)

16.05. - 05.06.2021



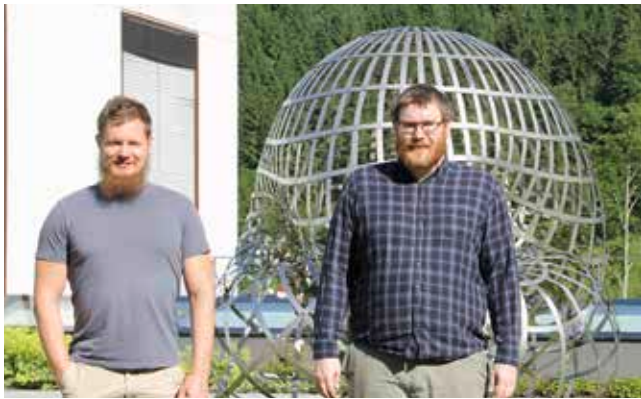
Barbara Kaltenbacher, Klagenfurt (left)
William Rundell, College Station (right)

09.05. - 22.05.2021



Nicos Georgiou, Brighton (right)
Dominik Schmid, Garching bei München (left)

16.05. - 05.06.2021



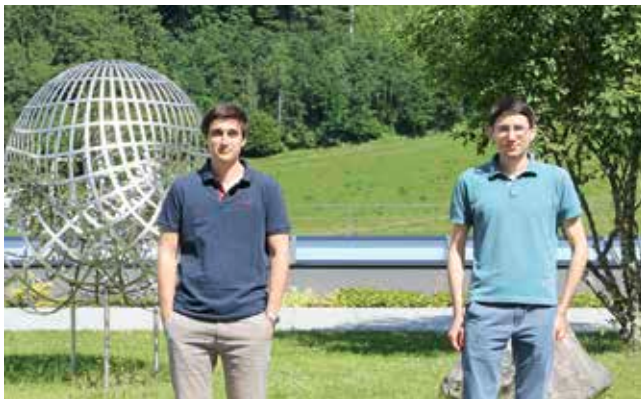
Adrian M. Ruf, Oslo (left)
Espen Sande, Roma (right)
Susanne Solem, Trondheim

06.06. - 19.06.2021



Aron Landesman, Stanford

27.06. - 17.07.2021



Tommaso Bruno, Gent (left)
Mattia Calzi, Milano (right)

13.06. - 26.06.2021



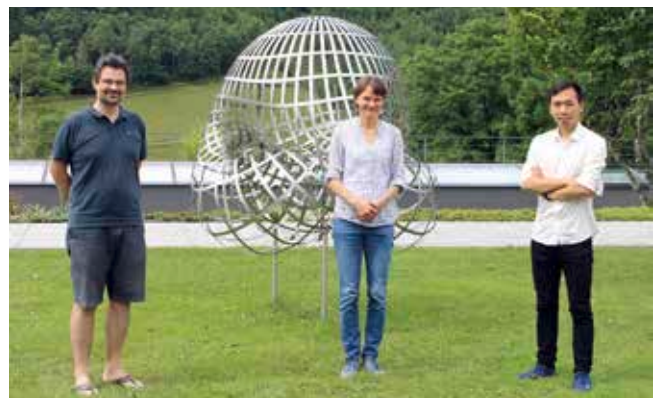
Ilia Itenberg, Paris (right)
Eugenii Shustin, Tel Aviv (left)

11.07. - 24.07.2021



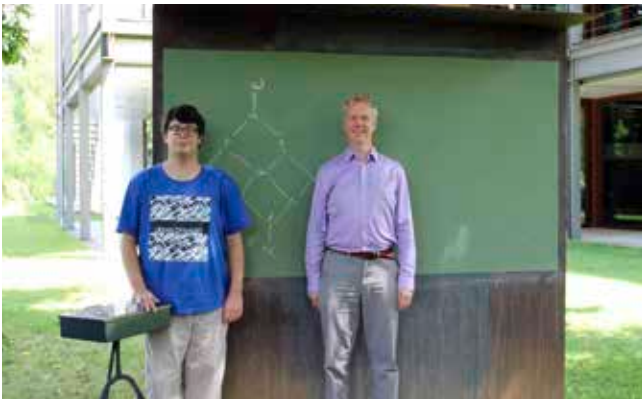
Volker Mehrmann, Berlin (left)
Peter Kunkel, Leipzig (right)

27.06. - 17.07.2021



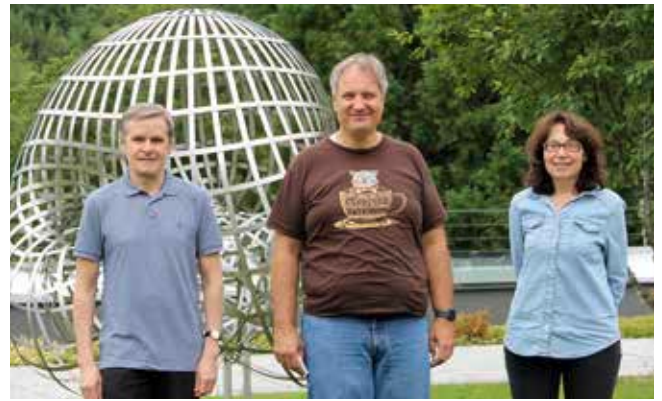
Klemens Fellner, Graz (left)
Stefanie Sonner, Nijmegen (middle)
Bao Quoc Tang, Graz (right)

18.07. - 31.07.2021



Darij Grinberg, Philadelphia (left)
Thomas W. Roby, Storrs (right)

18.07. - 07.08.2021



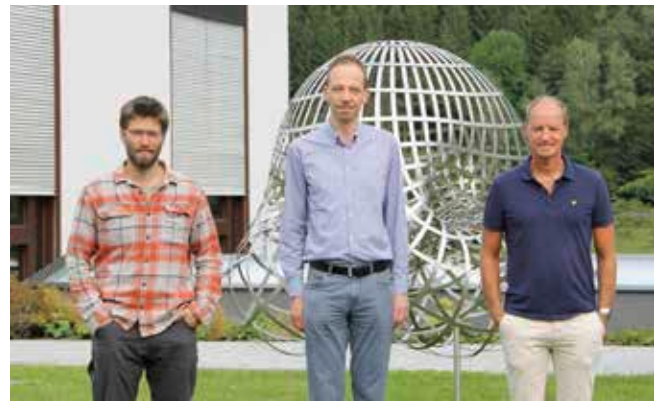
Alla Detinko, Hull (right)
Dane Flannery, Galway (left)
Alexander Hulpke, Fort Collins (middle)

01.08. - 14.08.2021



Petra Schwer, Magdeburg

25.07. - 07.08.2021



Ellery Ames, Arcata (left)
Håkan Andreasson, Göteborg (right)
Oliver Rinne, Berlin (middle)

08.08. - 14.08.2021



Alina Chertock, Raleigh (middle left)
Michael Herty, Aachen (left)
Alexander Kurganov, Shenzhen (right)
Mária Lukáčová-Medvid'ová, Mainz
(middle right)

01.08. - 14.08.2021



Rachel Boyd, Bonn (left)
Corey Bregman, Portland ME (right)

08.08. - 21.08.2021



Alessio Corti, London (right)
Helge Ruddat, Mainz (left)

15.08. - 28.08.2021



Jordy Timo van Velthoven, Gent (right)
Felix Voiglaender, München (left)

15.08. - 28.08.2021



Geoffrey Janssens, Brussels (left)
Doryan Temmerman, Hasselt (right)

15.08. - 28.08.2021



Christian Haase, Berlin (middle)
Raman Sanyal, Frankfurt (right)
Christopher Voll, Bielefeld (left)

22.08. - 04.09.2021



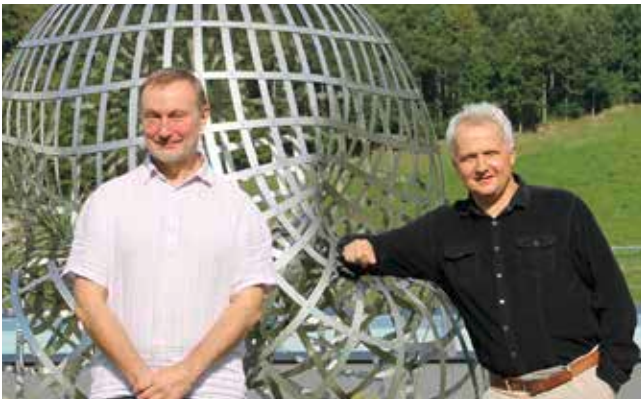
Pierre-Louis Curien, Paris

15.08. - 04.09.2021
21.11. - 11.12.2021



Jürgen Herzog, Essen (middle)
Somayeh Moradi, Ilam (left)
Masoomah Rahimbeigi, Sanandaj (right)
Guangjun Zhu, Suzhou

05.09. - 25.09.2021



Alexey V. Bolsinov, Loughborough (left)
Andrey Konyaev, Moscow
Vladimir Matveev, Jena (right)

05.09. - 18.09.2021



Michael Baake, Bielfeld (right)
Uwe Grimm, Milton Keynes (left)
Robert V. Moody, Victoria (middle)

19.09. - 09.10.2021



Sergey Finashin, Ankara (left)
Viatcheslav Kharlamov, Strasbourg (right)

19.09. - 02.10.2021



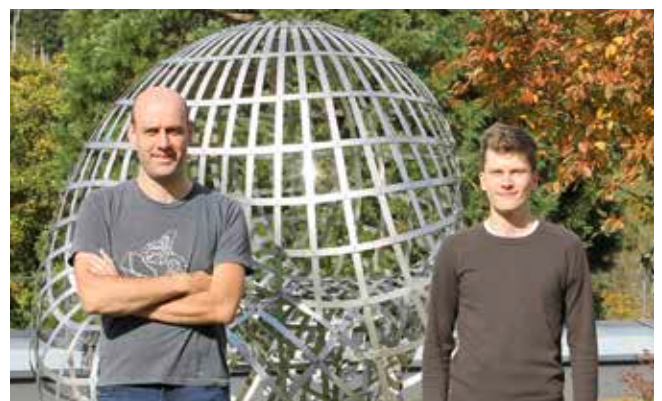
Dirk Hundertmark, Karlsruhe (middle)
Michal Jex, Paris (right)
Markus Lange, Vancouver (left)

26.09. - 09.10.2021



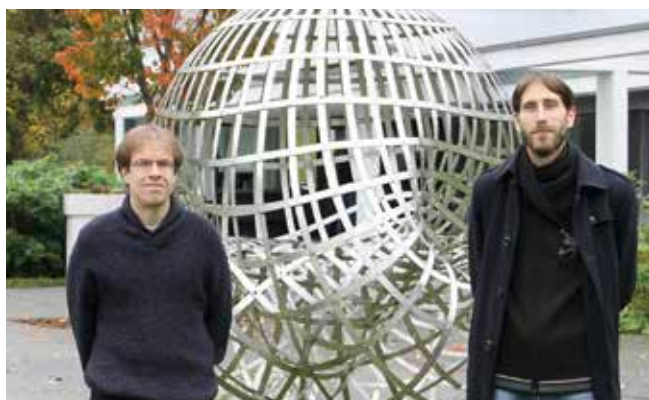
Dominic Bunnett, Berlin (left)
Alejandra Rincón Hidalgo, Trieste (right)

19.09. - 02.10.2021



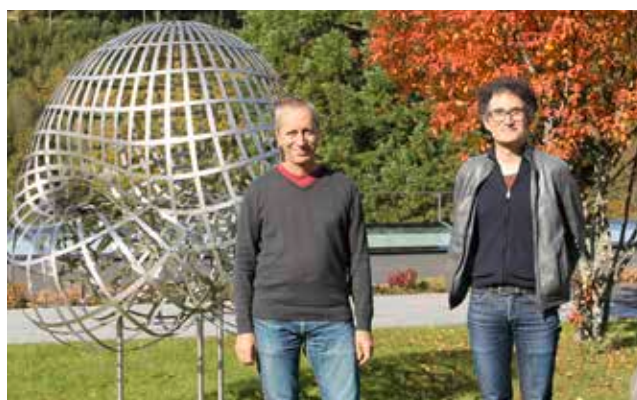
Wouter Castryck, Leuven (left)
Floris Vermeulen, Leuven (right)
Yongqiang Zhao, Hangzhou

03.10. - 23.10.2021



Heiko Gimperlein, Edinburg (left)
Ceyhun Özdemir, Graz (right)

03.10. - 16.10.2021



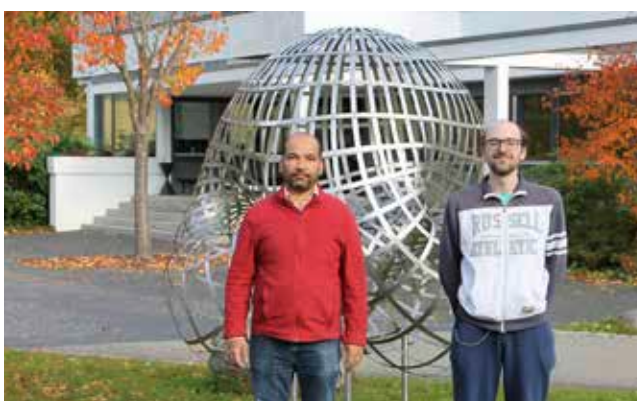
Michel Balazard, Marseille (left)
Bruno Martin, Calais (right)

17.10. - 30.10.2021



Michiel van den Berg, Bristol (left)
Erwin Bolthausen, Zürich (middle)
Frank den Hollander, Leiden (right)

03.10. - 16.10.2021



Jitendra Bajpai, Dresden (left)
Daniele Dona, Jerusalem (right)

17.10. - 23.10.2021



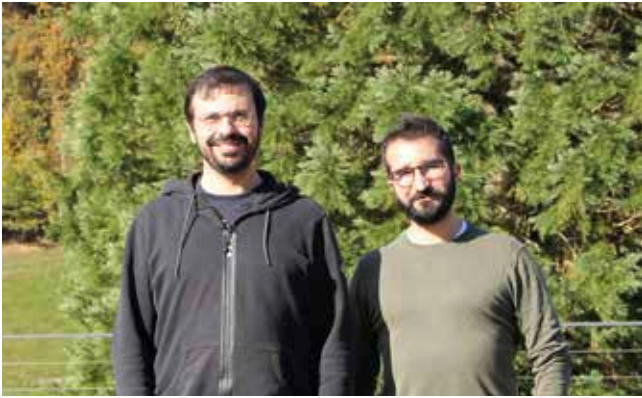
Norbert A'Campo, Basel (middle)
Athanase Papadopoulos, Strasbourg (right)
Sumio Yamada, Tokyo (left)

10.10. - 23.10.2021



Richard M. Höfer, Talence (right)
Richard Schubert, Aachen (left)

24.10. - 06.11.2021



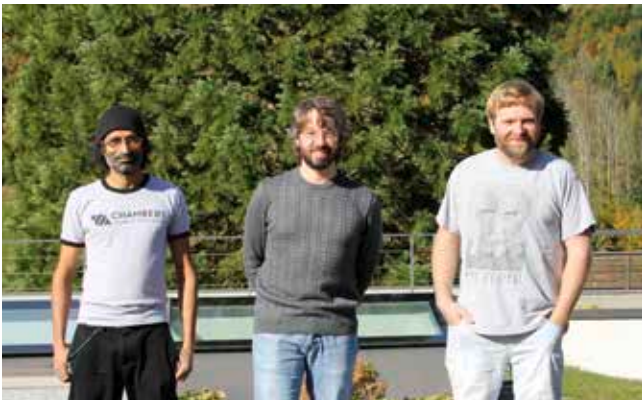
Mauro Porta, Strasbourg (left)
Francesco Sala, Pisa (right)

24.10. - 06.11.2021



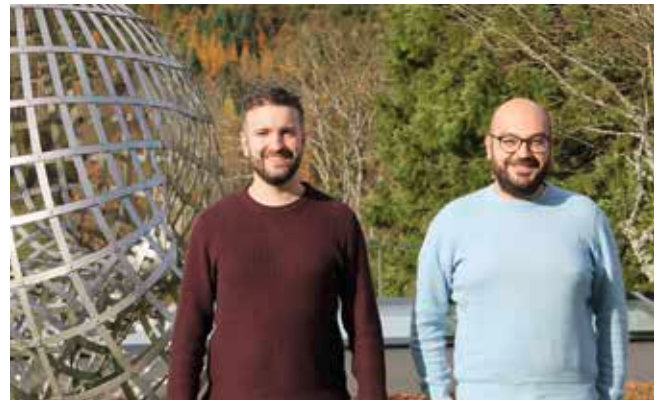
Jeanne Peiffer, Aubervilliers (left)
Maria Remenyi, Wuppertal
Volker Remmert, Wuppertal (right)

31.10. - 06.11.2021



Andrea Appel, Parma (middle)
Sachin Gautam, Columbus (left)
Curtis Wendlandt, Saskatoon (right)

24.10. - 30.10.2021



Alessandro Neri, München (left)
Ferdinando Zullo, Caserta (right)

07.11. - 20.11.2021



Albert Garreta, Bilbao (right)
Marialaura Noce, Salerno (left)

31.10. - 13.11.2021



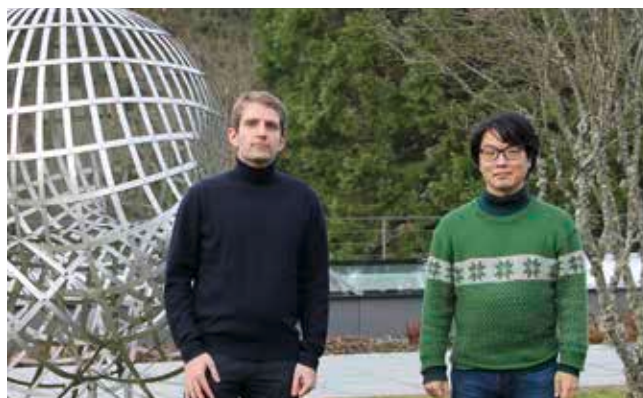
Christof Geiss, Odense (right)
David Hernandez, Paris (left)
Bernard Leclerc, Caen (middle)

07.11. - 13.11.2021



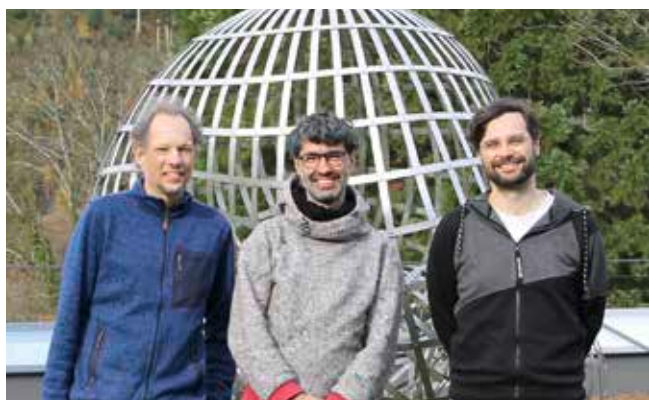
Maarten De Boeck, Eindhoven

07.11. - 04.12.2021



Lorenzo Dello Schiavo, Klosterneuburg (left)
Kohei Suzuki, Pisa (right)

21.11. - 18.12.2021



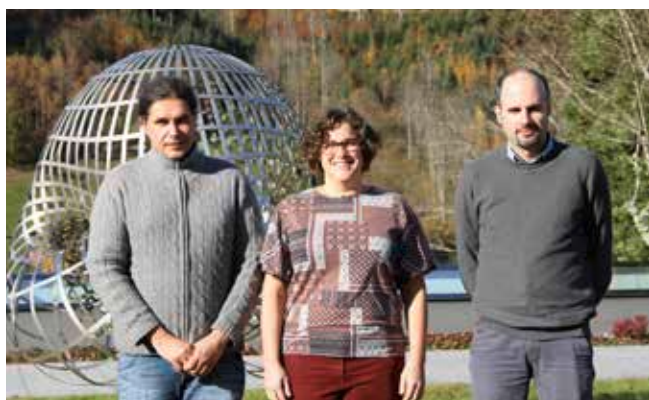
Markus Penz, Innsbruck (middle)
Michael Ruggenthaler, Hamburg (right)
Robert van Leeuwen, Jyväskylä (left)

07.11. - 20.11.2021



Rémi Abgrall, Zürich (middle left)
Eduar Feireisl, Praha (right)
Mária Lukáčová-Medvid'ová, Mainz (middle right)
Andreas Schömer, Mainz (left)

21.11. - 04.12.2021



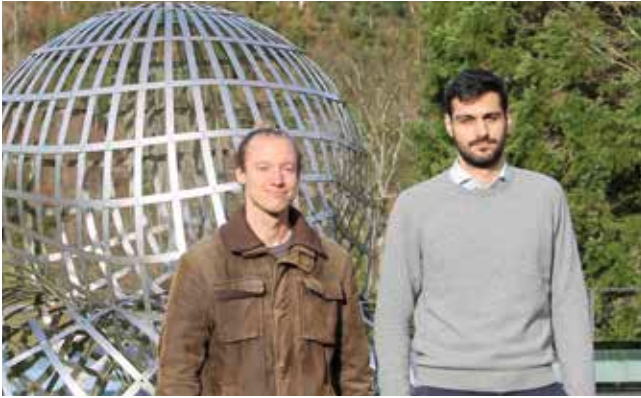
Petra Csomos, Budapest (middle)
Bálint Farkas, Wuppertal (left)
Balázs Kovács, Regensburg (right)

07.11. - 13.11.2021



Hung-Hsu Chou, Aachen (right)
Johannes Maly, Eichstätt (left)

21.11. - 04.12.2021



Aleksander Milivojevic, Bonn (right)
Jonas Stelzig, München (left)

05.12. - 18.12.2021



Paula Macedo Lins de Araujo, Kortijk (left)
Yuri Santos Rego, Magdeburg (right)

28.11. - 11.12.2021



Kevin Coulebier, Sydney
Ivan Penkov, Bremen (left)
Vera V. Serganova, Berkeley (right)

05.12. - 18.12.2021

2.10. Oberwolfach Leibniz Fellows

Im Rahmen des Nachwuchsförderprogramms Oberwolfach Leibniz Fellows verbrachten die folgenden Personen im Jahr 2021 einen Forschungsaufenthalt in Oberwolfach:

Within the program for junior researchers, Oberwolfach Leibniz Fellows, the following persons spent a research stay in Oberwolfach in the year 2021:

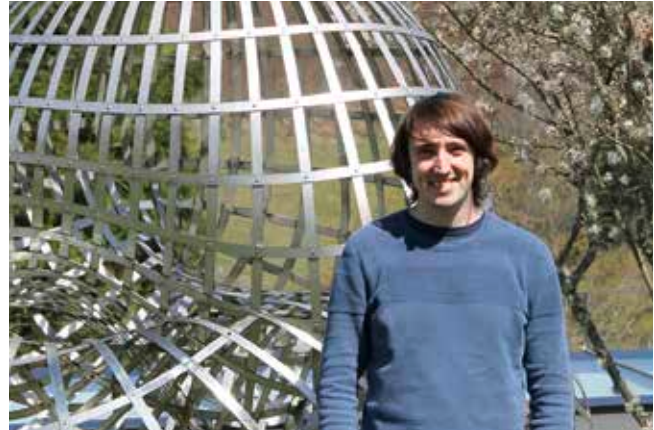


Kevin Iván Piterman, Buenos Aires (right)

04.02. - 30.04.2021
22.08. - 13.11.2021

external guest researcher:

Volkmar Welker, Marburg (left)
31.10. - 06.11.2021



Adam Morgan, Bonn

31.01. - 01.05.2021



Safoura Zadeh, Bonn (left)

31.01. - 01.05.2021

external guest researchers:

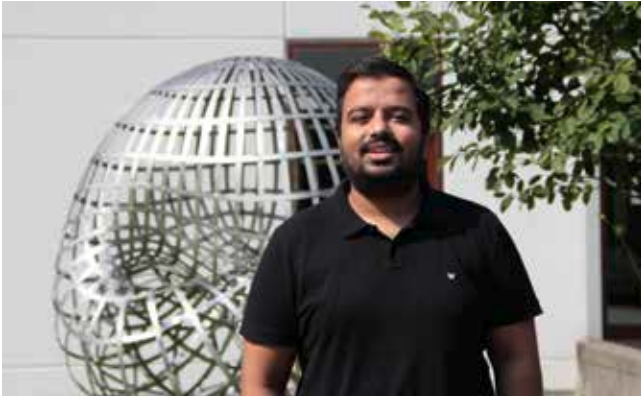
Oleksiy Klurman, Bristol (right)
16.04. - 01.05.2021

Kivanc Ersoy, Berlin (middle)
24.04. - 30.04.2021



Maria Stella Adamo, Roma

31.01. - 01.05.2021



Ayush Kumar Tewari, Berlin

16.05. - 14.08.2021



Daniel Hoff, Los Angeles

04.07. - 02.10.2021



Anneleen De Schepper, Gent (middle)

23.05. - 12.06.2021

19.09. - 22.10.2021

external guest researchers:

Hendrik Van Maldeghem, Gent (right)

23.05. - 03.06.2021

19.09. - 05.10.2021

Victoor Magali, Gent (left)

19.09. - 02.10.2021



Michael Harrison, Pittsburgh

06.06. - 14.07.2021

2.11. Publikationen 2021

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 Programm von Springer).

Oberwolfach Reports (OWR)

OWR wird in Zusammenarbeit mit EMS Press veröffentlicht und enthält die Ergebnisse der Workshops, Miniworkshops und Arbeitsgemeinschaften in Form von erweiterten Abstracts der Vorträge. 2021 sind die Bände OWR 18.1 bis 18.4 mit mehr als 3.000 Seiten erschienen.



2.11. Publications 2021

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 the Birkhäuser program at Springer).

Oberwolfach Reports (OWR)

OWR is published in cooperation with EMS Press and contains extended abstracts of the talks in the Workshops, Mini-Workshops, and Arbeitsgemeinschaften. In 2021, the issues OWR 18.1 to 18.4 were published with more than 3,000 pages in total.



Oberwolfach Preprints (OWP)

In OWP werden Resultate von längerfristigen Forschungsaufenthalten publiziert, aber auch von mathematischen Vorträgen am MFO im Rahmen von besonderen Veranstaltungen, z.B. der Oberwolfach Vorlesung. 2021 sind die folgenden Preprints erschienen:

- Boundary Conditions for Scalar Curvature
[OWP-2021-01] Bär, Christian; Hanke, Bernhard
- Lifting Spectral Triples to Noncommutative Principal Bundles
[OWP-2021-02] Schwieger, Kay; Wagner, Stefan
- Amorphous Complexity of Group Actions with Applications to Quasicrystals
[OWP-2021-03] Fuhrmann, Gabriel; Gröger, Maik; Jäger, Tobias; Kwietniak, Dominik
- The C-Map as a Functor on Certain Variations of Hodge Structure
[OWP-2021-04] Mantegazza, Mauro; Saha, Arpan
- The Elser Nuclei Sum Revisited
[OWP-2021-05] Grinberg, Darij
- On the Computational Content of the Theory of Borel Equivalence Relations
[OWP-2021-06] Bazhenov, Nikolay; Monin, Benoit; San Mauro, Luca; Zamora, Rafael
- Diophantine Approximation in Metric Space
[OWP-2021-07] Fraser, Jonathan M.; Koivusalo, Henna; Ramírez, Felipe A.

Oberwolfach Preprints (OWP)

OWP mainly contains research results related to a longer stay in Oberwolfach, but this can also include an Oberwolfach Lecture, for example. The following Preprints were published in 2021:

- Weak*-Continuity of Invariant Means on Spaces of Matrix Coefficients [OWP-2021-08] de Laat, Tim; Zadeh, Safoura
- Fundamental Theorem of Projective Geometry over Semirings [OWP-2021-09] Tewari, Ayush Kumar
- Reflection Positivity and Hankel Operators- the Multiplicity Free Case [OWP-2021-10] Adamo, Maria Stella; Neeb, Karl-Hermann; Schober, Jonas

Schnappschüsse moderner Mathematik aus Oberwolfach

In den „Schnappschüssen moderner Mathematik aus Oberwolfach“ bereiten Teilnehmerinnen und Teilnehmer der wissenschaftlichen Programme des MFO einen besonders spannenden Aspekt ihrer Forschung für die interessierte Öffentlichkeit auf. Im Jahr 2021 sind insgesamt 11 Schnappschüsse aus unterschiedlichen mathematischen Gebieten erschienen:

Snapshots of modern mathematics from Oberwolfach

In the “snapshots of modern mathematics from Oberwolfach” participants of the scientific programs at the MFO explain an especially exciting aspect of their research to an interested public. 11 snapshots from distinct mathematical areas have been published in 2021:

- From the dollar game to the Riemann-Roch Theorem (No. 1/2021) Lamboglia, Sara; Ulirsch, Martin
- C*-algebras: structure and classification (No. 2/2021) Kerr, David
- Searching for structure in complex data: a modern statistical quest (No. 3/2021) Loh, Po-Ling
- Invitation to quiver representation and Catalan combinatorics (No. 4/2021) Rognerud, Baptiste
- Zopfgruppen, die Yang–Baxter-Gleichung und Unterfaktoren (No. 5/2021) Lechner, Gandalf
- Ultrafilter methods in combinatorics (No. 6/2021) Goldbring, Isaac
- Reflections on hyperbolic space (No. 7/2021) Haensch, Anna
- The Enigma behind the Good–Turing formula (No. 8/2021) Balabdaoui, Fadoua; Kulagina, Yulia
- Describing distance: from the plane to spectral triples (No. 9/2021) Arici, Francesca; Mesland, Bram
- Finite geometries: pure mathematics close to applications (No. 10/2021) Storme, Leo
- Lagrangian mean curvature flow (No. 11/2021) Lotay, Jason D.

3. Infrastruktur und Finanzen

3.1. Übersicht der Bereiche

Die wissenschaftliche Arbeit der Forschungsgäste wird durch eine effiziente Infrastruktur ermöglicht.

Von besonderer Bedeutung ist 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 Gästen rund um die Uhr zur Verfügung.

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

Zur Planung, Durchführung und Begleitung der wissenschaftlichen Programme waren am Institut etwa 23 Stellen in den Bereichen der wissenschaftlichen Verwaltung, Bibliothek, IT-Abteilung, Verwaltungsleitung, Öffentlichkeitsarbeit, Gästebetreuung und Hauswirtschaft besetzt. Für die effiziente, konzentrierte Arbeit der Gäste 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.

3.2 Bibliothek

Die Bibliothek des MFO ist für die Forschungsgäste in Oberwolfach das wichtigste Arbeitsmittel. Sie wird intensiv von Teilnehmenden aller Programme genutzt. Viele ziehen eine Einladung nach Oberwolfach anderen Einladungen vor, da sie am MFO Literatur vorfinden, die für sie sonst nicht zugänglich ist. Neben dem hohen internationalen Standard des wissenschaftlichen Programms und den exzellenten Rahmenbedingungen für den persönlichen Gedankenaustausch ist die Bibliothek ein wichtiger Grund für das hohe Ansehen des MFO weltweit.

Der hohe Stellenwert der Bibliothek wird auch deutlich in dem großen Engagement verschiedener Stiftungen wie der Klaus Tschira Stiftung gGmbH, der Marga und Kurt Möllgaard-Stiftung, der VolkswagenStiftung sowie der Carl Friedrich von Siemens Stiftung. So haben die Klaus Tschira

3. Facilities and Finances

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 (email, internet, and information services).

For the planning and realization of the scientific program approximately 23 positions in various divisions, such as scientific and administration management, library, IT-service, outreach and media, 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.

3.2 Library

The library is the most important working tool for scientific research in Oberwolfach. It is used intensively by participants of all scientific programs. Many mathematicians prefer an invitation to Oberwolfach to other invitations because they find literature here that is otherwise unavailable for them. In addition to the high international standard of the scientific program and the excellent conditions for the face-to-face exchange of ideas, the library is an important factor for the high reputation of the MFO worldwide.

The high significance of the library is also reflected in the great commitment of various foundations, such as the Klaus Tschira Stiftung gGmbH, the Marga and Kurt Möllgaard-Foundation, the Volkswagen Foundation and the Carl Friedrich von Siemens Foundation. For example,

Stiftung und die VolkswagenStiftung zu gleichen Teilen den Erweiterungsbau der Oberwolfacher Bibliothek finanziert und damit Platz für etwa 20 weitere Jahre geschaffen. Die Carl Friedrich von Siemens Stiftung unterstützt die Oberwolfacher Bibliothek seit 1999 mit einem regelmäßigen Betrag für den Erwerb von Büchern. In 2015-2016 konnte durch Mittel der VolkswagenStiftung die Informations- und Kommunikations-Infrastruktur der Bibliothek modernisiert und eine Kompaktanlage für die gebundenen Zeitschriften eingerichtet werden. Darüber hinaus hat die Deutsche Forschungsgemeinschaft (DFG) seit 2004 zahlreiche Projekte im Rahmen des Förderprogramms „Wissenschaftliche Literaturversorgungs- und Informationssysteme“ finanziert.

Bibliotheksprofil

Die Oberwolfacher Bibliothek hat die Aufgabe, die Fachliteratur aus allen Bereichen der Mathematik sowie aus angrenzenden Gebieten so vollständig wie möglich zu erwerben und bereit zu stellen. Im Fokus stehen dabei insbesondere mathematische Fachzeitschriften sowie Monographien und Kongressberichte der relevanten Fachverlage. Schwerpunktmäßig werden Bücher in gedruckter Form angeschafft, Zeitschriften hingegen bevorzugt elektronisch. Aber auch E-Books werden seit 2014 gezielt und in Ergänzung zum gedruckten Bestand erworben. Die relevante Literatur wird gekauft, im Tausch gegen institutseigene Publikationen erworben oder als Geschenk empfangen.

Die Bibliothek des MFO ist eine reine Präsenzbibliothek und für die Forschungsgäste rund um die Uhr geöffnet. Sämtliche Bestände stehen innerhalb der Bibliothek ohne Einschränkung zur Verfügung. Es findet keinerlei Ausleihe statt, auch Fernleihe ist nur in begründeten Einzelfällen möglich (z.B. bei Alleinbesitz).

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.

Bestand

Zum Bestand der Bibliothek gehörten in 2021 ca. 68.800 gedruckte Bücher, davon 47.100 Monographien und 9.100 Kongressberichte. Die Zahl der E-Books konnte auf etwa 26.600 gesteigert werden. Vor allem durch DFG-Nationallizenzen und weitere Allianzlizenzen stehen am

the Klaus Tschira Stiftung and the Volkswagen Foundation have funded the extension of the library building in equal parts, creating space for another 20 years. The Carl Friedrich von Siemens Foundation has supported the Oberwolfach library since 1999 with a regular amount for the purchase of books. In 2015-2016 the MFO received support from the Volkswagen Foundation to modernize the library infrastructure of information and communication and to install compact shelves for the bound journal volumes. In addition, since 2004, the Deutsche Forschungsgemeinschaft (German Research Foundation, DFG) has financed numerous projects within the funding program "Scientific Library Services and Information Systems".

Library profile

The task of the library in Oberwolfach is to acquire and to provide specialist literature from all fields of mathematics and its neighboring areas as complete as possible. In particular, the acquisition focuses on mathematical journals and monographs as well as on conference proceedings of the relevant academic publishers. Books are primarily acquired in printed form, while journals are preferred electronically. However, since 2014 e-books have also been systematically acquired in addition to the printed stock. The relevant literature is either purchased, acquired in exchange for publications of the Institute, or received as a gift.

The library of the MFO is a reference library and can be used by our research guests 24 hours a day. The complete collection is available within the library without restriction. There is no lending system, interlibrary lends are only possible in justified individual cases (e.g. in the case of exclusive possession).

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.

Inventory

In 2021, the stock of the library contained about 68,800 printed books, in particular 47,100 monographs and 9,100 conference proceedings. The number of e-books could be increased to almost 26,600. Including the national and alliance licenses, the MFO can offer access to more

MFO über 9.000 E-Journals zur Verfügung. Die Zahl der zusätzlich vom MFO abonnierten Zeitschriften in 2021 betrug ca. 950, die meisten davon wurden nur noch als E-Journal bezogen. In den Kompaktregalen befanden sich weiterhin ca. 33.000 gedruckte Zeitschriftenbände, nicht alles davon ist digital erhältlich.

Fernzugriff auf lizenzierte Inhalte

Seit April 2021 können wir den Forschungsgästen auch Fernzugriff auf vom MFO lizenzierte Inhalte anbieten. Dies wurde umso wichtiger, da auf Grund der Corona-Pandemie vielen Workshop-Teilnehmern eine persönliche Anreise nicht möglich war. So konnten sie nicht nur online an den Workshops teilnehmen sondern zusätzlich auch auf Inhalte zugreifen, die für sie nur am MFO zugänglich waren.

Der Fernzugriff ist beschränkt auf die Dauer des geplanten Aufenthaltes am MFO, zuzüglich einer Woche im Voraus sowie zwei Wochen nach Beendigung eines Workshops oder eines Langzeit-Aufenthaltes.

Derzeit ist der Fernzugriff über den Dienst „Shibboleth“ möglich. Dies deckt jedoch nicht alle Verlage und Anbieter ab. Wir planen deshalb eine Ausweitung des Angebots im Jahr 2022, sodass dann alle lizenzierten Inhalte zugänglich gemacht werden können.

Buchausstellung

Die ständige Buchausstellung gibt interessierten wissenschaftlichen Verlagen die Möglichkeit, ihre Neuerscheinungen im Bereich Mathematik am MFO über einen längeren Zeitraum zu präsentieren. Die Bibliothek des MFO profitiert von dieser Kooperation, indem sie die kostenlos gelieferten Neuerscheinungen in ihren Bestand integrieren kann. 2021 gingen insgesamt 574 Bücher im Rahmen der Buchausstellung in den Bibliotheksbestand ein. Wir danken den folgenden Verlagen für ihre Unterstützung und ihr Mitwirken in unserem Buchausstellungsprogramm:

- American Mathematical Society (AMS)
- Atlantis Press (Co-publishing with Springer)
- Birkhäuser Science
- Cambridge University Press
- De Gruyter GmbH & Co. KG
- Edition am Gutenbergplatz Leipzig EAG.LE
- European Mathematical Society Publishing House
- International Press of Boston, Inc.

than 9,000 e-journals, where the MFO has subscribed to about 950 additional journals in 2021, most of them in the e-only version. Additionally, the compact shelves of the library contain about 33,000 bound journal volumes, where not all of them are also electronically available.

Remote access to licensed content

Since April 2021, we have been able to offer research guests remote access to content licensed from the MFO. This became even more important because due to the Corona pandemic, many workshop participants were unable to travel in person. This allowed them to not only participate in the workshops online, but also to access content that was only available to them at MFO.

Remote access to licensed content is limited to the duration of participation in one of the Oberwolfach Research Programs plus one week prior to the start date and two weeks after the end of a workshop or long-term stay.

Currently, remote access is possible via the “Shibboleth” service. However, this does not cover all publishers and providers. We are therefore planning to expand the service in 2022 so that all licensed content can then be made accessible.

Book exhibition

The permanent book exhibition enables academic publishers to present their new publications in the field of mathematics at the MFO for a certain period of time. The library of the MFO benefits from this cooperation, because all books from the exhibition can be included free of charge into the inventory of the library. In the year 2021 the library received a total of 574 books this way. We wish to thank the following publishers for taking part in our book exhibition program:

- Iwanami Shoten Publishers
- Mathematical Society of Japan
- Oxford University Press
- Princeton University Press
- Société Mathématique de France (SMF)
- Society for Industrial and Applied Mathematics (SIAM)
- Springer Nature
- Springer Spektrum
- XYZ Press by AwesomeMath (distributed by AMS)

Oberwolfach Photo Collection

Zum Bibliotheksbestand gehört eine umfangreiche Sammlung an Porträts von Mathematikern und Mathematikerinnen, 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 zugrunde liegende Datenbank ist eine Eigenentwicklung des MFO. Die Sammlung wird laufend ergänzt durch eigene Aufnahmen sowie durch externe Beiträge. Sie wird unter anderem für den Bereich Mathematik in der Wikipedia unter den Bedingungen der Creative Commons License Attribution-Share Alike 2.0 Germany sowie in zunehmendem Maße von Verlagen für deren Publikationen genutzt.

Ende 2021 waren ca. 22.340 Fotos in der Datenbank enthalten.

3.3. IT

Die IT-Abteilung des MFO stellt den Institutsangehörigen, den Gremien und den Gästen effiziente IT-Arbeitsumgebungen zur Verfügung. Sie unterstützt die Bibliothek und den Bereich der Öffentlichkeitsarbeit bei Diensten für die mathematische Community und die interessierte Öffentlichkeit. Dabei sind Informationssicherheit und Datenschutz wichtige Aspekte, die entsprechend berücksichtigt werden.

Verwaltungsbereich

Die Verwaltung der Tagungen und der längeren Forschungsaufenthalte erfolgt mit der am MFO entwickelten Software „owconf“, die Anforderungen von wissenschaftlicher Begutachtung, Konferenzmanagement und Hotelsoftware in sich vereinigt. Neuerungen im wissenschaftlichen

Oberwolfach Photo Collection

The inventory of the library includes a large collection of mathematician portraits, collected by Prof. Dr. Konrad Jacobs, Erlangen. This collection has been digitized in the year 2004 with support of the publisher Springer Heidelberg. It is freely available on the internet with a variety of search functions. The underlying database is an in-house development of the MFO. The collection is continuously supplemented by in-house photographs and contributions by mathematicians worldwide. Among other things, the collection is used for the field of mathematics in Wikipedia according to the conditions of the Creative Commons License Attribution-Share Alike 2.0 Germany. Increasingly, publishers use the collection as well for their publications.

By the end of 2021 the database contained approximately 22,340 photos.

3.3. IT

The IT department of the MFO provides an efficient IT infrastructure for the employees of the Institute, the committees, and the visiting scientists. Furthermore, the IT department supports the library and the public relations of the MFO with regard to services for the mathematical community and the interested public. Data security and data protection are important tasks, taken into account throughout.

Administrative sector

The databased software “owconf”, developed in-house, handles all tasks arising from scientific management, conference management and guesthouse administration. In 2021, enhancements were necessary due to the innovations in the scientific program and the changing

Programm sowie pandemiebedingte Anforderungen in der Tagungsverwaltung erforderten auch 2021 eine Weiterentwicklung der Software.

Kommerzielle Software wird in den Bereichen Finanzbuchhaltung, Personalverwaltung sowie beim Bibliothekskatalog und der Literaturrecherche eingesetzt.

Das Verwaltungspersonal arbeitet hauptsächlich mit Remote-Desktop-Sitzungen, die von den PC-Arbeitsplätzen oder per VPN von mobilen Arbeitsplätzen aus genutzt werden.

Gästebereich

Wegen der relativ kurzen Aufenthalte der Gäste sind alle IT-Angebote so intuitiv wie möglich gestaltet. Die Gäste erhalten persönliche Nutzerkonten, drahtlosen und kabelgebundenen Internetzugang, SMTP-Server-Zugang sowie Scan- und Druckmöglichkeiten. Terminal-Server-Arbeitsplätze bieten neben den üblichen Office-Anwendungen Zugriff auf einen Compute-Server mit Maple, Mathematica, Magma sowie einer Vielzahl freier mathematischer Software.

Alle Vortragsräume enthalten moderne Präsentationstechnik. Bereits vor der Pandemie stand den Gästen ein Videokonferenzsystem zum virtuellen Austausch mit Einzelpersonen und kleinen Gruppen zur Verfügung. Der Forschungsbetrieb unter Pandemie-Bedingungen erforderte jedoch eine deutliche Ausweitung dieser Möglichkeiten. Nachdem bereits im Vorjahr zwei Vortragsräume zügig mit zusätzlicher Video-, Audio- und Computertechnik ausgestattet wurden, um Hybrid- und Onlinekonferenzen zu ermöglichen, wurde die Medien- und Steuerungstechnik im Jahr 2021 nochmals deutlich erweitert und verbessert. So sind inzwischen in allen drei Vortragsräumen Videokonferenzen mit größeren Gruppen möglich. Nach fachlicher Beratung durch einen Toningenieur sorgen hochwertige Deckenmikrofone, Matrixmischer und sehr gute Lautsprecher überall für eine hervorragende Tonqualität. Eine sogenannte Trackingkamera schwenkt automatisch auf den korrekten Bildausschnitt wenn sich die vortragende Person von einer Tafel zur nächsten bewegt. Alle wichtigen Funktionen zur Steuerung der Kamera, des Audiosystems sowie sonstiger Peripheriegeräte stehen den Videokonferenzassistenten auf einem übersichtlichen Tastenfeld zur Verfügung.

Webdienste

Die Webdienste für die Gäste und die weitere mathematische Community bieten Informationen über die Angebote des MFO, künftige und

requirements in conference administration related to the pandemic.

Commercial software is used for financial accounting and human resources, for the library catalog and the literature search portal.

The administrative staff mainly works with remote desktop sessions, which are accessed from the PC workstations or from mobile workstations via VPN.

Guests' working environments

Due to the relatively short stays of the guest scientists, all services are designed as easy to use as possible. Guest scientists are provided with personal accounts, wifi and cable-bound ethernet connection, SMTP server access as well as scan and print facilities. Terminal Server workplaces offer the usual office tools together with access to a compute server with Maple, Mathematica, Magma and a range of free mathematical software.

The IT section maintains modern presentation equipment in all lecture rooms. Even before the pandemic, guests had access to a video conference system for virtual exchange with individuals and small groups. After two lecture rooms were quickly equipped with additional video, audio and computer technology in the previous year to enable hybrid and online conferences, there was another significant improvement and expansion of the media technology used, in 2021. Video conferences with larger groups are now possible in all three lecture halls. After professional advice from a sound engineer, high-quality ceiling microphones, matrix mixers and very good loudspeakers ensure excellent sound quality in every room. A so-called tracking camera automatically pans to the correct section when the lecturer moves from one blackboard to the next. The important functions for controlling the camera, the audio system and other peripheral devices are available to the video conference assistant on an easy-to-use keypad.

Web services

Web services for the guest scientists and the wider mathematical community include information about MFO facilities, future and past

vergangene Forschungsprogramme und – in Zusammenarbeit mit der Bibliothek – freien Zugang zu Publikationen des Instituts.

Die speziellen Webdienste Oberwolfach Photo Collection und Oberwolfach References on Mathematical Software sind Eigenentwicklungen des MFO.

Unterstützung der Öffentlichkeitsarbeit

Die IT-Abteilung unterstützt die Öffentlichkeitsarbeit des MFO, insbesondere die „Schnappschüsse moderner Mathematik aus Oberwolfach“, für deren Produktion sie die Infrastruktur bereitstellt. Außerdem betreut die IT des MFO das Oberwolfacher Museum für Mineralien und Mathematik „MiMa“. Dieses wird von der Gemeinde Oberwolfach, dem Verein der Freunde von Mineralien und Bergbau Oberwolfach und dem MFO gemeinsam betrieben (s. Abschnitt 3.4.: Öffentlichkeitsarbeit).

Ausgewählte Exponate werden auch direkt am Institut den Forschungsgästen über einen Touchscreen bereitgestellt.

3.4. Öffentlichkeitsarbeit

Das MFO richtet sich in seiner Öffentlichkeitsarbeit sowohl an wissenschaftliche als auch an nicht-wissenschaftliche Zielgruppen. Die wissenschaftliche Kernzielgruppe, bestehend aus Mathematikern und Mathematikerinnen sowie Forschenden in angrenzenden Gebieten, erhält regelmäßig Informationen über anstehende Veranstaltungen und wissenschaftliche Programme des MFO. Das MFO verschickt dazu einen halbjährlichen Rundbrief per Email, informiert auf der eigenen Webseite und verbreitet Flyer und Poster. Außerdem nutzt das Institut die angebotenen Informationskanäle der mathematischen Fachgesellschaften, z.B. von DMV und EMS.

Zusätzlich zur wissenschaftlichen Kernzielgruppe richtet sich das MFO an im weiteren Sinne forschungsinteressierte Gruppen, insbesondere an Schülerinnen und Schüler, Studierende, Lehrkräfte und Wissenschaftsredaktionen, sowie an die breite Öffentlichkeit. Das Ziel ist es, das Verständnis für die Bedeutung der Mathematik und der modernen mathematischen Forschung zu fördern. Das MFO verfolgt dazu drei miteinander vernetzte Aktivitäten: Das Institut ist Mitbetreiber des Museums für Mineralien und Mathematik in Oberwolfach, es ist Herausgeber der Open-Source Schriftenreihe „Schnappschüsse moderner Mathematik aus Oberwolfach“ und es ist Teilhaber und Kooperationspartner der IMAGINARY gGmbH.

research programs at the MFO and open access to publications of the Institute in collaboration with the MFO library.

The special web services Oberwolfach Photo Collection (OPC) and Oberwolfach References on Mathematical Software (ORMS) have been developed in-house.

Support of outreach activities

The IT section also supports the outreach activities of the MFO, in particular it supplies the infrastructure for producing the “snapshots of modern mathematics from Oberwolfach”. Moreover, the IT section services the Museum for Minerals and Mathematics “MiMa”. It is run jointly by the local authority, the association of the Friends of Minerals and Mining and the MFO – all seated at Oberwolfach (see section 3.4.: Outreach and Media).

Selected exhibits are also provided to our research guests at the Institute on a touchscreen.

3.4. Outreach and Media

In its outreach the MFO addresses both academic and non-academic target groups. The core academic target group, consisting of mathematicians and researchers in adjacent areas, regularly receives information on forthcoming events and scientific programs of the MFO. The MFO sends a biannual newsletter via email, informs on its website and distributes flyers and posters. The institute also uses the information channels offered by national and international mathematical societies, e.g. of DMV and EMS.

In addition to the core academic target group, the MFO addresses groups interested in research in a broader sense, in particular pupils, students, teachers and science journalists, as well as the general public. The main objective with regard to these audiences is to promote the understanding of the importance of mathematics and modern mathematical research. The MFO pursues three interlinked activities: The Institute is co-operator of the Museum of Minerals and Mathematics in Oberwolfach, it is the publisher of the open-source publication “snapshots of modern mathematics from Oberwolfach” and it is shareholder and cooperation partner of the IMAGINARY gGmbH.

Mathematik im MiMa

Das Mathematische Forschungsinstitut Oberwolfach betreibt seit 2010 gemeinsam mit dem Verein der Freunde von Mineralien und Bergbau und der Gemeinde Oberwolfach das MiMa – Museum für Mineralien und Mathematik. Das Museum zeigt eine einzigartige Sammlung an Mineralien aus dem gesamten Schwarzwald und erklärt ihre kristallinen Formen und Symmetrien in interaktiven mathematischen Installationen.

Der mathematische Teil der Ausstellung bietet kunstvolle Einblicke in die Mathematik und lädt dazu ein, mathematische Phänomene spielerisch zu erforschen. Sowohl Konzepte der angewandten als auch der reinen Mathematik werden in interaktiven Programmen, Hands-on-Exponaten und Bildern dargestellt. Ein deutlicher Schwerpunkt liegt auf den mathematischen Grundlagen der Kristallografie. Durch diese Verknüpfung von Mathematik und Mineralogie bietet das Museum einen interdisziplinären Zugang zu beiden Wissenschaften und vereint zwei Besonderheiten der Region unter einem Dach.

Die Ausstellung richtet sich an ein breites Publikum. Ein besonderer Schwerpunkt liegt auf den Schulen der Region, für die spezielle Führungen angeboten werden. Im Rahmen der Reihe „Kultur im MiMa“ finden außerdem Veranstaltungen zu unterschiedlichen Themen aus Mathematik und Mineralogie statt.

Aufgrund der Corona-Pandemie war das Museum fast die gesamte erste Hälfte des Jahres 2021 geschlossen. Im zweiten Halbjahr kamen jedoch über 3000 Besucherinnen und Besucher ins MiMa.

Schnappschüsse moderner Mathematik

Das Ziel der „Schnappschüsse moderner Mathematik aus Oberwolfach“ ist es, mathematische Ideen und Probleme in verständlicher Art und Weise einem breiten Publikum zu vermitteln. Sie sollen spannende Einblicke in die aktuelle mathematische Forschung bieten. Die Schnappschüsse 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.

Das Schnappschuss-Projekt hat zum Ziel, Verständnis und Wertschätzung für moderne Mathematik und mathematische Forschung in der interessierten Öffentlichkeit weltweit zu fördern. Die angestrebte Leserschaft besteht aus

Mathematics at the MiMa

Since 2010 the Mathematisches Forschungsinstitut Oberwolfach engages in the MiMa – Museum for Minerals and Mathematics, together with the association of the Friends of Minerals and Mining in Oberwolfach and the municipality Oberwolfach. The museum shows a one-of-a-kind collection of minerals from all over the Black Forest and explains their forms and symmetries with interactive mathematical applications.

The maths exhibition delivers aesthetic insights into mathematics and enables visitors to playfully explore mathematical phenomenon. Interactive programs, hands-on exhibits, and images depict concepts of both applied and pure mathematics. A clear focus is put on the mathematical foundations of crystallography. Through this combination of mathematics and mineralogy, the museum offers an interdisciplinary approach to both sciences and presents two unique features of the region in one single spot.

The exhibition is aimed at a broad audience. A special focus is on the schools of the region, for which special tours are offered. Within the “Culture in MiMa” series, there are also events on various topics from mathematics and mineralogy.

Due to the corona pandemic, the museum was closed for almost the entire first half of 2021. In the second half of the year, however, more than 3,000 visitors came to the MiMa.

Snapshots of modern mathematics

The aim of the “snapshots of modern mathematics from Oberwolfach” is to explain mathematical problems and ideas in an understandable way to a broad audience. They shall provide exiting insights into current mathematical research. The snapshots are written by participants of the scientific program at the MFO. 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.

The snapshot project is designed to promote the understanding and appreciation of modern mathematics and mathematical research in the interested public world-wide. The targeted readership consists of mathematics teachers, science

Mathematiklehrkräften, Wissenschaftsjournalistinnen und -journalisten, Studierenden sowie fortgeschrittenen Schülerinnen und Schülern.

Das Projekt wurde 2021 von Dr. Sophia Jahns koordiniert. Sie war als Chefredaktorin für das Editieren der Texte verantwortlich. In diesem Jahr haben Dr. Dimitrios Askitis, Dr. Michela Egidi, Dr. Kelsey Houston-Edwards, Dr. Jan Kohlrus, Daniel Kronberg, Dr. Marta Maggioni, Dr. Sara Munday, Dr. Anja Randecker, Anup Anand Singh und Dr. Matthew Tam Schnappschüsse editiert. Im Laufe des Jahres wurden 11 Schnappschüsse publiziert (s. Abschnitt 2.11.: Publikationen).

Zusammenarbeit mit IMAGINARY

IMAGINARY startete am MFO anlässlich des Wissenschaftsjahres der Mathematik 2008 als interaktive Wanderausstellung und entwickelte sich über die Jahre zu einer Online-Plattform für interaktive Mathematik-Vermittlung. Seit 2016 ist IMAGINARY eine selbständige gemeinnützige GmbH mit einem breiten Spektrum an Dienstleistungen in der Mathematikkommunikation. Das MFO ist Teilhaber der gGmbH und kooperiert mit IMAGINARY im Bereich seiner Öffentlichkeitsarbeit, insbesondere bei den Schnappschüssen und dem MiMa. Beide Projekte gingen als Teilprojekte aus IMAGINARY hervor und sind heute noch am MFO angesiedelt. Im MiMa unterstützt IMAGINARY das MFO bei der Auswahl und Implementierung neuer Exponate. Die Schnappschüsse werden maßgeblich über die IMAGINARY-Plattform verbreitet sowie auf vielen IMAGINARY-Ausstellungen in der interaktiven Station „Snapshot-Slider“ gezeigt und zum Ausdrucken oder Verschicken angeboten.

Weitere Projekte

2021 war insbesondere die Bekanntmachung der während der Corona-Pandemie neu eingeführten und angepassten Veranstaltungsformate von Bedeutung. Das MFO präsentierte außerdem seine Angebote für den wissenschaftlichen Nachwuchs an einem virtuellen Stand beim Heidelberger Laureate Forum. Für positive Medienresonanz sorgten zudem die Vergabe des Oberwolfach Preises sowie die Austragung des deutschen Teils der Internationalen Mathematik-Olympiade.

journalists, undergraduate and advanced high school students.

In 2021 the project was coordinated by Dr. Sophia Jahns. As senior editor she was responsible for the editing process of the snapshots. Dr. Dimitrios Askitis, Dr. Michela Egidi, Dr. Kelsey Houston-Edwards, Dr. Jan Kohlrus, Daniel Kronberg, Dr. Marta Maggioni, Dr. Sara Munday, Dr. Anja Randecker, Anup Anand Singh und Dr. Matthew Tam worked as junior editors. 11 snapshots were published in this year (see section 2.11.: Publications).

Cooperation with IMAGINARY

IMAGINARY started at the MFO on the occasion of the science year of mathematics in 2008 as an interactive traveling exhibition and developed over the years to an online platform for interactive mathematics communication. In 2016 IMAGINARY became an independent non-profit company offering a wide range of services in mathematics communication. The MFO is a shareholder of the company and cooperates with it within the scope of outreach and media – in particular, with regard to the snapshots and the MiMa. Both projects were once founded as subprojects of IMAGINARY and are continued by the MFO. With regard to the MiMa, IMAGINARY supports the MFO in the selection and implementation of new exhibits. The snapshots are largely distributed via the IMAGINARY platform. They are also presented at many IMAGINARY exhibitions in the interactive “Snapshot-Slider” and offered for printing or mailing.

Further projects

In 2021, the announcement of the meeting formats newly introduced and adapted during the corona pandemic was particularly important. The MFO also presented its offers for junior scientists at a virtual booth during the Heidelberg Laureate Forum. The awarding of the Oberwolfach Prize and the hosting of the German part of the International Mathematics Olympiad also attracted positive attention in media.

3.5. 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 1975 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. Im Mai 2007 konnte der Erweiterungsbau der Bibliothek, finanziert von der Klaus Tschira Stiftung und der VolkswagenStiftung, feierlich eingeweiht werden. Die Nähe von Tagungsgebäude und Gästehaus erweist sich als sehr effizient, bietet sie den Gästen doch rund um die Uhr die Möglichkeit zu kreativer Arbeit, was intensiv genutzt wird. Im Frühjahr 2010 wurde die Sanierung des Gästehauses abgeschlossen.

Der Verwaltungsbereich umfasst derzeit 10,85 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 des Oberwolfach Leibniz Fellows Programmes möglich. Der Hauswirtschaftsbereich umfasst insgesamt 13,75 Stellen für Küche und Zimmerservice sowie für die Pflege von Gebäuden und Grundstück (davon waren 2021 11,3 Stellen besetzt).

3.5. 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 Volkswagen Foundation in 1975. 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 extension of the library, funded by the Klaus Tschira Stiftung and the Volkswagen Foundation was ceremonially inaugurated in May 2007. The short distance between the guest house and the library building has proved very convenient as it offers scientists the possibility to work at any time, which is used extensively. Since spring 2010 the renovation measures in the guest house have been terminated.

The administration encompasses at the moment 10.85 positions, covering scientific administration (planning and organisation of the scientific programme, 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 Volkswagen Foundation 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 13,75 positions for kitchen and room service as well as for the maintenance of the buildings and premises (11.3 positions staffed in 2021).

3.6. Finanzielle Übersicht

3.6. Financial overview

Erlöse 2021

(gerundet auf 1.000 €)

Zuwendung Bund/Länder
Selbstbewirtschaftungsmittel aus 2020
Drittmittel
Spenden
Sonstige Einnahmen
Zweckgebundene Reste aus 2020

Summe Erlöse

Revenues 2021

(rounded to 1,000 €)

Benefits from the federation/federal states	3.359.000
Benefits from 2020	64.000
Third party funds	118.000
Donations	115.000
Other income	60.000
Earmarked surpluses	447.000

Total revenues:

4.163.000

Aufwendungen 2021

(gerundet auf 1.000 €)

Personalausgaben
Materialaufwand
Aufwand für bezogene Leistungen
Abschreibungen
Sonstige Aufwendungen (inklusive Sachausgaben Bibliothek)
Rückstellungen für zweckgebundene Reste
Investitionen

Summe Aufwendungen

Expenses 2021

(rounded to 1,000 €)

Personnel department	1.823.000
Purchases	227.000
Expenses for drawn benefits	124.000
Consumption of fixed capital	150.000
Other expenses (with material expenses for the library)	1.181.000
Provisions for earmarked surpluses	634.000
Investments	24.000

Total expenses:

4.163.000

Erläuterungen

Der Anteil von Drittmitteln, Spenden und sonstigen Einnahmen bezogen auf die Gesamtsumme der Erlöse liegt im Haushaltsjahr 2021 bei 8,7%. Die zweckgebundenen Reste und Selbstbewirtschaftungsmittel aus 2020 sind dabei nicht berücksichtigt.

Öffentliche Mittel

Das MFO erhielt im Haushaltsjahr 2021 insgesamt 3,359 Mio. Euro Zuwendung von Bund und Ländern.

Drittmittel

Die projektbezogenen Drittmittel rekrutierten sich im Haushaltsjahr 2021 insbesondere aus Mitteln der National Science Foundation (NSF) der USA, und der Simons Foundation.

Explanations

The proportion of private resources (own income, third-party-funds and donations) of the total sum of revenues is 8.7%. Funds carried forward from 2020 are disregarded here.

Public funding

In the fiscal year 2021 the MFO received 3.359 million Euro funding from the federation and the federal states.

Third-party funds

Earmarked third party funds in the fiscal year 2021 are mainly composed of the grants from the US National Science Foundation (NSF) and the Simons Foundation.

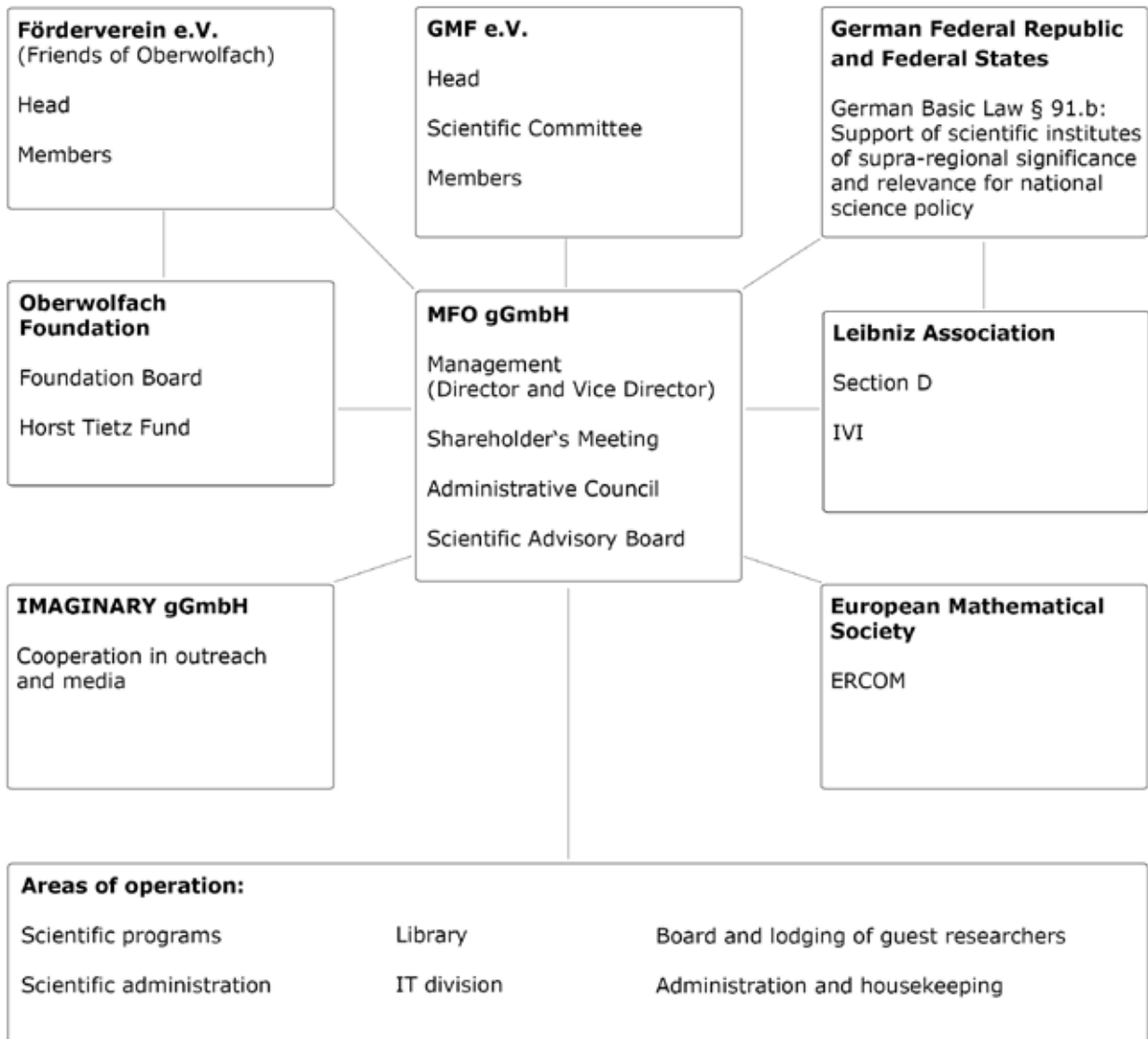
Förderverein und Oberwolfach Stiftung

Zweckgebundene Spenden erhielt das MFO auch im Haushaltsjahr 2021 vom Förderverein, der Oberwolfach Stiftung und der Carl Friedrich von Siemens Stiftung. Die Gelder wurden für Reisekostenzuschüsse in besonderen Fällen, für die Unterstützung von Kinderbetreuungskosten, die Beschaffung von Büchern in der Bibliothek und als Zuschuss zu Baumaßnahmen verwendet.

3.7. Dank

Ein besonders herzliches Dankeschön gilt den Zuwendungsgebern (Bund und Länder). Weiter gilt unser Dank allen Drittmittelgebern wie der Carl Friedrich von Siemens Stiftung, der National Science Foundation (NSF) und der Simons Foundation. Ein besonderes Dankeschön gilt natürlich auch dem Förderverein und der Oberwolfach Stiftung für die großzügige Unterstützung des MFO.

3.8. Organigramm



Förderverein and Oberwolfach Foundation

Earmarked donations have been received by the Förderverein, the Oberwolfach Foundation, and the Carl Friedrich von Siemens Foundation. These funds have been used to support travel costs for scientists in special cases, for child support, for special literature, and as additional support for building measures.

3.7. Acknowledgement

A particular thank-you goes to the federation and the federal states for their financial support. We would also like to thank for the third-party funds received from the Carl Friedrich von Siemens Foundation, 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.

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 Mathematikerinnen und 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 Mathematikerinnen und 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.

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 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 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. 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, Friends of Oberwolfach) has about 600 members and provides additional financial support for the MFO by its membership fees. The Oberwolfach Foundation, a foundation of public utility within the Förderverein, provides further financial support by economic and private means. Within the Oberwolfach Foundation the Horst Tietz Fund plays an important role by providing special funds.

Das Institut ist außerdem Gesellschafter der IMAGINARY gGmbH und kooperiert mit dieser im Bereich der Öffentlichkeitsarbeit. IMAGINARY begann als Projekt des MFO im Jahr 2008 und wurde 2016 als selbständiger Dienstleister im Bereich der Mathematik-Kommunikation ausgegründet.

Furthermore the Institute is a shareholder of the IMAGINARY gGmbH and cooperates with the company in the field of public relations. IMAGINARY started in 2008 as a project of the MFO. Since 2016 it is an independent service provider in the field of mathematics communication.

Beschäftigte des MFO

Staff of the MFO

2021

Wissenschaftliche Verwaltung

Direktor
Stellvertretender Direktor
Wissenschaftlicher Administrator
Wissenschaftliche Mitarbeiterin
Sekretärinnen für Workshops, RiP und Seminare

Scientific Administration

Director
Vice Director
Scientific Administrator
Scientific Assistant
Secretaries for Workshops, RiP and Seminars

Prof. Dr. Gerhard Huisken
Prof. Dr. Matthias Hieber
apl. Prof. Dr. Stephan Klaus
Dr. Tatjana Ruf
Silke Okon,
Andrea Schillinger

Verwaltung

Verwaltungsleitung
Sekretärinnen im Gästebüro

Administration

Head of Administration
Secretaries in the guest services office
Librarian
Library Assistant

Susanne Riester
Annette Disch, Petra Lein,
Katrin Schmid
Verena Franke
Jennifer Hinneburg

Bibliothekarin
Fachangestellte für Medien- und Informationsdienste (FaMI)
Auszubildende FaMI
IT

Trainee in the library
IT

Ronja Firner
Gerold Glöde,
Helmut Kastenholz,
Christoph Weber

Hauswirtschaft

Hauswirtschaftsleiterin
Hausmeister

Housekeeping

Housekeeping Manager
Caretaker

Charlotte Endres
Helmut Breithaupt,
Anton Herrmann

Weitere Beschäftigte

Further housekeeping staff

ca. 10 full time equivalent

Verwaltungsrat des MFO/Administrative Council of the MFO

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Tania Bolius

Ministerium für Wissenschaft, Forschung und Kunst, Stuttgart,
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Jan Neitzke

Bundesministerium für Bildung und Forschung, Bonn,
(stellvertretender Vorsitzender/Vice Chair)

Prof. Dr. Jean-Pierre Bourguignon
Dr. Franz Dettenwanger
Prof. Dr. Friedrich Götze
Christian Mees
Prof. Dr. Felix Otto

President of the European Research Council
VolkswagenStiftung, Hannover
Fakultät für Mathematik, Universität Bielefeld
Staatskanzlei des Saarlandes
Direktor des Max-Planck-Instituts für Mathematik in den
Naturwissenschaften, Leipzig

Prof. Dr. Thomas Schick
Beate Spiegel

Universität Göttingen
Geschäftsführerin der Klaus Tschira Stiftung gGmbH,
Heidelberg

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Prof. Dr. Ulrike Tillmann, Oxford (until June 2021)

Gesellschaft für Mathematische Forschung e.V. (GMF)

Vorstand der GMF/Head of the GMF

(Mitglieder/Members 2021)

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Prof. Dr. Felix Otto, Leipzig	Vorsitzender der Wissenschaftlichen Kommission/ Chair of the Scientific Committee
Prof. Dr. Joachim Schwermer, Wien	Schatzmeister/Treasurer

Wissenschaftliche Kommission der GMF/Scientific Committee of the GMF

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Prof. Dr. Markus Reineke, Bochum
Prof. Dr. Tristan Rivière, Zürich
Prof. Dr. Eero Saksman, Helsinki
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Prof. Dr. Karl-Theodor Sturm, Bonn
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Prof. Dr. Corinna Ulcigrai, Zürich
Prof. Dr. Sara van de Geer, Zürich
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