Mathematisches
Forschungsinstitut
Oberwolfach

Mitglied der Leibniz Gemeinschaft

Jahresbericht 2017
Annual Report

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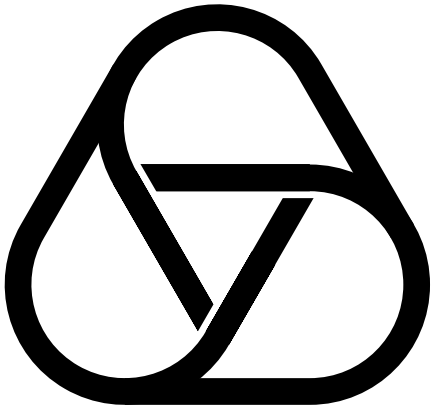

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Jahresbericht 2017 – Annual Report 2017

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Gerhard Huisken

Vorwort des Direktors

2017 war erneut ein spannendes und erfolgreiches Jahr für das MFO. Gleich zwei Höhepunkte bildeten die feierliche Verleihung des Oberwolfach Preises an Jacob Fox (Stanford) für herausragende Leistungen in der diskreten Mathematik am 14. Oktober 2017 sowie die Verleihung des John Todd Award an Christoph Ortner (Warwick) für exzellente Leistungen in der numerischen Analysis am 30. März 2017.

Ebenso erfreulich war für uns die abschließende Stellungnahme des Senats der Leibniz-Gemeinschaft zur turnusmäßigen wissenschaftlichen Evaluierung im Jahr 2016. Der Senat bescheinigte uns, dass wir eine „exzellente soziale Forschungsinfrastruktur von hoher internationaler Strahlkraft" seien. Es gelinge dem Institut, die internationale Mathematik erheblich zu bereichern und neue Entwicklungen in der Forschung anzustoßen.

Ich denke, dies ist uns auch 2017 wieder gelungen. Unser wissenschaftliches Programm war eine hochkarätige Mischung aus Workshops, Miniworkshops, Seminaren, Arbeitsgemeinschaften sowie Forschungsaufenthalten von kleineren Gruppen und Einzelpersonen, welche die gesamte Vielfalt der aktuellen internationalen mathematischen Forschung abdeckten. Die Informationen zu den einzelnen Veranstaltungen im Innern dieses Berichts belegen dies eindrucksvoll.

Director's foreword

2017 was another exciting and successful year for the Mathematisches Forschungsinstitut Oberwolfach. Two highlights of the year were the festive award of the Oberwolfach Prize to Jacob Fox (Stanford) for outstanding achievements in discrete mathematics on October 14, 2017, and the presentation of the John Todd Award to Christoph Ortner (Warwick) for excellent achievements in numerical analysis on March 30, 2017.

We were also pleased with the concluding statement by the senate of the Leibniz Association on the regular scientific evaluation in 2016. The senate certified that we are an "excellent social research infrastructure of high international reputation". The Institute succeeds in significantly enriching international mathematics and initiating new developments in research.

I think, we succeeded in 2017 as well. The scientific program comprised a top-class mixture of Workshops, Mini-Workshops, Seminars, Study Groups, and research visits by smaller groups and individuals, covering the entire variety of current international mathematical research. This is impressively documented by the information on the individual events inside this report.

Trotz wachsender internationaler Konkurrenz ist die Zahl der Anträge für Tagungen und Forschungsaufenthalte am MFO nach wie vor hoch. Bei den Programmen „Research in Pairs" und „Oberwolfach Leibniz Fellows" konnte die Antragslage sogar noch gesteigert werden. Es freut mich ganz besonders, dass unsere stetigen Bemühungen, für den internationalen wissenschaftlichen Nachwuchs noch attraktiver zu werden, offensichtlich Früchte tragen. Im Einklang mit den Empfehlungen der Evaluierungskommission ist es darüber hinaus unser Ziel, den Anteil an Tagungsleiterinnen und Tagungsteilnehmerinnen zu erhöhen. Dazu haben wir in der Vergangenheit bereits einige Maßnahmen auf den Weg gebracht und werden diese weiter intensivieren.

Despite growing international competition, the number of applications for meetings and research stays at the MFO remains at a high level. The number of applications even increased in the programs "Research in Pairs" and "Oberwolfach Leibniz Fellows". I am particularly pleased that our continuing efforts to become even more attractive to international junior researchers are obviously bearing fruit. In line with the recommendations of the evaluation committee, our additional goal is to increase the proportion of female workshop organizers and participants. We have already taken some measures in the past and will intensify them further.

Im Laufe des Jahres haben wir unser Informations- und Serviceangebot für die wissenschaftliche Gemeinschaft weiter ausgebaut. Die Webseite des Instituts wurde überarbeitet und bietet nun, unter anderem, gebündelte Informationen zu unseren Fördermöglichkeiten für den wissenschaftlichen Nachwuchs und für Forschungsgäste mit Kindern. Ein neuer Publikationsserver erleichtert den Zugang zu den institutseigenen Veröffentlichungen „Oberwolfach Preprints" und „Snapshots of modern mathematics from Oberwolfach". Außerdem arbeitet die Bibliothek des MFO gemeinsam mit der TIB Hannover an einem Projekt zur Langzeitarchivierung von mathematischen Zeitschriften. Die Ausgründung der IMAGINARY gGmbH, mit der wir auch in Zukunft bei der Veröffentlichung der „Snapshots" und der Betreuung des „MiMa" zusammen arbeiten werden, ist auf einem guten Weg und wird von der Leibniz-Gemeinschaft bis 2018 unterstützt.

During the year, we continued to expand our information services for the scientific community. The website of the Institute has been revised and now presents, among other things, bundled information about our funding opportunities for junior scientists and research guests with children. A new publication server facilitates access to the Institute's own publications "Oberwolfach Preprints" and "Snapshots of modern mathematics from Oberwolfach". In addition, the library of the MFO is working on a project for the long-term archiving of mathematical journals together with the TIB Hannover (German National Library of Science and Technology). The spin-off of the IMAGINARY gGmbH is proceeding successfully and is supported by the Leibniz Association through 2018. We will continue to cooperate on the publication of "snapshots" and the support of "MiMa".

Im Baubereich standen im Jahr 2017 Erhaltungsmaßnahmen im Bibliotheks- und Vortragsgebäude im Vordergrund. Die Lüftungsanlage wurde erneuert, wodurch sich vor allem die Kühlung der Vortragsräume in den Sommermonaten verbessert hat. Ein Teil des Dachs wurde ebenfalls erneuert. Außerdem haben wir die turnusmäßige Renovierung der Gästezimmer fortgeführt.

Concerning construction work, this years' focus was on maintenance measures in the library and lecture building. The ventilation system has been renewed, which has improved the cooling of the lecture halls during the summer months. Part of the roof was also renewed. In addition, we have continued the regular renovation of the guest rooms.

Unser volles wissenschaftliches Programm und unser Service für die wissenschaftliche Gemeinschaft waren nur in weiterhin guten finanziellen Rahmenbedingungen möglich. Dafür danken wir dem Bund und den Ländern, insbesondere dem Land Baden-Württemberg, die im Rahmen der Leibniz-Gemeinschaft den Hauptteil unserer Haushaltsmittel bereitstellen. Ein herzlicher Dank gilt außerdem der Oberwolfach Stiftung und dem Förderverein, sowie allen, die sich dort engagiert und gespendet haben. Ebenso danke ich unseren Drittmittelgebern: Der Carl Friedrich

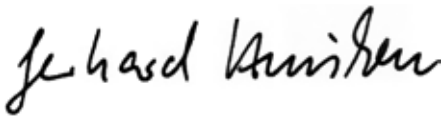
Our full scientific program and our services for the scientific community were only possible due to continued stable financial conditions. We would like to thank the federal and state governments, especially the state of Baden-Württemberg, for providing the bulk of our budgetary resources within the Leibniz Association. Many thanks also go to the Oberwolfach Foundation and the Friends of Oberwolfach, as well as to all people who have committed and donated within these institutions. I would also like to thank our third-party donors: The Carl Friedrich von

von Siemens Stiftung für die Förderung der Oberwolfach Seminare und der Bibliothek, der National Science Foundation der USA für die Unterstützung des wissenschaftlichen Nachwuchses bei den Reisekosten und der Simons Foundation für die Förderung der Zusammenarbeit von Forschenden in und außerhalb Europas.

Ich danke außerdem allen ehrenamtlichen Mitgliedern in den beratenden Gremien, den Mitgliedern der Gesellschaft für Mathematische Forschung sowie unseren Mitarbeiterinnen und Mitarbeitern. Wie bereits in den Vorjahren konnten wir uns auch im Jahr 2017 auf Ihr Engagement für die wissenschaftliche Exzellenz des Instituts verlassen. Ich bedanke mich bei Ihnen allen für die bereichernde Zusammenarbeit.

Siemens Foundation for the promotion of the Oberwolfach Seminars and the library, the National Science Foundation of the United States for the support of junior researchers in travel expenses and the Simons Foundation for the promotion of cooperation between researchers in and outside of Europe.

Furthermore, I would like to thank all honorary members in our various committees, as well as the members of the Gesellschaft für Mathematische Forschung, and our staff. We could rely on your commitment to the scientific excellence of the Institute in 2017 as well as in the preceding years. I thank you all for the inspiring cooperation.



Gerhard Huisken

1. Institutsnachrichten

1.1. Verleihung des John Todd Award

Christoph Ortner hat den John Todd Award 2016 erhalten. Die Preisverleihung fand am 30. März 2017 im Mathematischen Forschungsinstitut Oberwolfach statt.

Christoph Ortner studierte Mathematik an der Technischen Universität Wien und promovierte anschließend in Oxford. Seit 2014 ist er Professor am Warwick Mathematics Institute in Coventry. Er forscht an der numerischen Analyse von Multiskalen-Problemen in der Materialwissenschaft und hat erheblich zu den Fortschritten auf diesem Gebiet beigetragen. Einblicke bietet die auf den folgenden Seiten dargestellte Laudatio von Endre Süli.

Die Oberwolfach Stiftung und das Mathematische Forschungsinstitut Oberwolfach verleihen den John Todd Award circa alle drei Jahre an herausragende Nachwuchsforscherinnen und -forscher auf dem Gebiet der Numerischen Analysis. Über die Vergabe entscheidet die Wissenschaftliche Kommission der Gesellschaft für Mathematische Forschung.

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

1. News from the Institute

1.1. Presentation of the John Todd Award

Christoph Ortner received the John Todd Award 2016. The ceremony took place on 30 March 2017 at the Mathematisches Forschungsinstitut Oberwolfach.

Christoph Ortner studied mathematics at the Vienna University of Technology and afterwards earned his doctorate in Oxford. Since 2014, he is professor at the Warwick Mathematics Institute in Coventry. Christoph Ortner has made seminal contributions to the numerical analysis of several multiscale problems in materials science. The laudation by Endre Süli, which is presented on the following pages, provides an overview.

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

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

Christoph Ortner

Gerhard Huisken, Christoph Ortner, Harry Yserentant

Laudation for Prof. Dr. Christoph Ortner

by Prof. Dr. Endre Süli

It is befitting to write this laudation on the tenth anniversary of the death of John Todd (May 16, 1911 – June 21, 2007), a British mathematician and a pioneering figure in the field of Numerical Analysis, who made notable contributions to several branches of mathematics and had an important role after the end of World War II in securing the survival of the MFO.

The work of the MFO's 2017 John Todd Award winner, Christoph Ortner, based at the University of Warwick (UK), focuses on deep and difficult questions that arise in the numerical approximation of mathematical models in Materials Science and Solid Mechanics. Ortner completed his doctoral studies at the University of Oxford in 2006. He then became a Postdoctoral Research Assistant in the EPSRC-funded five-year Critical Mass Programme *New Frontiers in the Mathematics of Solids*, whose aim was to strengthen the interactions between Applied Analysis, Materials Science and Engineering Solid Mechanics. In 2007 Ortner was appointed to a prestigious RCUK Academic Fellowship in *Solid Mechanics and the Mathematics of Solids* in the Mathematical Institute at Oxford in association with Merton College. In 2011 he became Associate Professor at the University of Warwick, where he quickly rose to the rank of Professor. He is the recipient of a Philip Leverhulme Prize and the 2015 Whitehead Prize of the London Mathematical Society.

Much of Ortner's current research emerged from his doctoral project, which had several aspects, the most prominent of which was concerned with atomistic models in materials science, and more specifically the mathematical analysis of the quasicontinuum (QC) method: a difficult and mathematically poorly understood, yet practically relevant, subject. Ortner has, over the last decade, made outstanding contributions to the numerical analysis of quasicontinuum methods and is widely considered to be a world-leading specialist in this field.

The quasicontinuum method is a coarse-graining technique for reducing the complexity of atomistic simulations in a static and quasistatic setting. In his doctoral thesis Ortner gave a complete analysis of the quasicontinuum method in one space dimension, including both a-priori and a-posteriori bounds on the approximation error between the quasicontinuum solution and the full atomistic solution, and provided a careful argument how these results could be extended to several space dimensions. By considering atomistic models with Lennard–Jones type long-range interactions, he proved the existence, the local uniqueness and the stability, with respect to the discrete $\mathrm{W}^{1,\infty}$-norm, of elastic and fractured atomistic solutions, which then enabled him to establish the existence of a quasicontinuum approximation satisfying an optimal a-priori error bound. He also proved that, for a stable QC solution with a sufficiently small residual, which is computed in a discrete Sobolev-type norm, there exists an exact solution of the atomistic model problem for which an a-posteriori error estimate holds. He then derived practically computable bounds on the residual and on the inf-sup constants, which measure the stability of the QC solution. Finally, by supplementing the QC method with a proximal point optimization method with local-error control, he proved that the parameters can be adjusted so that at each step of the optimization algorithm there exists

an exact solution to a related atomistic problem whose distance to the numerical solution is smaller than a pre-set tolerance.

Ortner has also made an original contribution to the Gamma-convergence of Galerkin finite element approximations of nonconvex variational problems. Another excellent piece of work has been his proof that if the residual of a stable numerical solution is sufficiently small, then there exists a nearby exact solution for which an a-posteriori error estimate holds. This result demonstrates that it is not necessary to assume the existence of exact solutions in the a-posteriori error analysis of numerical approximations of nonlinear equations. He pursued the analysis at a general level, in a Banach space setting, and the practical implications of this important theoretical work were shown through numerical simulations. Possible applications include an improved a-posteriori error analysis for nonlinear equations but also a numerical investigation of the existence of solutions to nonlinear partial differential equations where insufficient analytical knowledge is available about the solution.

Ortner's current research falls into three general areas: Atomistic-Continuum Hybrid Numerical Methods, Numerical Approximation of Variational Problems in Fracture Mechanics, and Numerical Analysis of Partial Differential Equations. The primary focus of his current research is the analysis of quasicontinuum methods. In a recent collaboration with Mitchell Luskin (University of Minnesota in Minneapolis) he developed a careful stability analysis of a large class of quasicontinuum methods. This research provides clearer understanding of how well quasicontinuum methods are able to predict nucleation, stability, and motion of defects. Many difficult questions, particularly for complex lattices (more than one species of atoms), are still open and one of Ortner's research objectives is to investigate these. In a related collaboration with Luskin and Dobson, Ortner carried out, what is, the first rigorous analysis of the force-based quasicontinuum method. They showed that the operator resulting from the force-based quasicontinuum method is not coercive, nor is it stable in the most commonly used function spaces. This mathematical result has important practical repercussions in engineering computations. Much of this work is summarized in the 112-page survey paper with Luskin published in Acta Numerica in 2013.

Another significant contribution is Ortner's work with Florian Theil (*Justification of the Cauchy–Born approximation of elastodynamics.* Arch. Ration. Mech. Anal. 207 (2013) no. 3, 1025–1073.). The main contribution of this article is a rigorous approximation error analysis of the Cauchy–Born wave equation in atomistic models. A convergence result is formulated for a general class of many-body interactions in an infinite lattice, which only requires the assumptions that the reference lattice is a stable Bravais lattice and that the interaction strength decays sufficiently fast.

Ortner's paper *Analysis of blended atomistic/continuum hybrid methods* (Numer. Math. 134 (2016), no. 2, 275–326.), with Li, Shapeev and Van Koten, provides detailed and careful numerical analysis of two prototypical atomistic-to-continuum coupling methods of blending type: the energy-based and the force-based quasi-continuum methods in two and three dimensions, for finite-range many-body interactions, and in the presence of lattice defects. The paper considers point defects and dislocations. The two main ingredients in the analysis are new force and energy consistency error estimates; and a new technique for proving energy norm stability of atomistic-continuum couplings that requires only the assumption that the exact atomistic solution is a stable equilibrium.

The paper *Analysis of boundary conditions for crystal defect atomistic simulations* (Arch. Ration. Mech. Anal. 222 (2016), no. 3, 1217–1268.), with Ehrlacher and Shapeev, is concerned with numerical simulations of crystal defects. Such simulations are necessarily

restricted to finite computational domains, supplying artificial boundary conditions that emulate the effect of embedding the defect in an effectively infinite crystalline environment. This work develops a rigorous framework within which the accuracy of different types of boundary conditions can be precisely assessed. The paper formulates the equilibration of crystal defects as a variational problem in a discrete energy space and establishes qualitatively sharp regularity estimates for the associated minimisers. Using this foundation the paper then presents rigorous error estimates for: (i) a truncation method (corresponding to the imposition of Dirichlet boundary conditions on the boundary of the, finite, computational domain); (ii) periodic boundary conditions, (iii) boundary conditions from linear elasticity, and (iv) boundary conditions from nonlinear elasticity. The theoretical results are assessed through detailed numerical experiments, which confirm the sharpness of the numerical analysis.

Ortner's work *Atomistic/continuum blending with ghost force correction* (SIAM J. Sci. Comput. 38 (2016), no. 1, A346–A375.), co-authored with Zhang, combines the ideas of atomistic/continuum energy blending and ghost-force correction to obtain an energy-based atomistic/continuum coupling scheme which exhibits, for a range of benchmark problems, the same convergence rates as optimal force-based coupling schemes. The paper presents the construction of this new scheme, including numerical results exploring the accuracy of the proposed scheme in comparison with established schemes, as well as a rigorous error analysis for an instructive special case.

Ortner's 2017 paper *QM/MM methods for crystalline defects. Part 2: Consistent energy and force-mixing* (Multiscale Model. Simul. 15 (2017), no. 1, 184–214.) with Chen, develops and analyzes QM/MM (quantum/classical) hybrid methods for crystalline defects within the context of the tight-binding model. QM/MM methods employ accurate quantum mechanical (QM) models only in regions of interest (which are, typically, regions of material defects) and switch to computationally cheaper interatomic potential molecular mechanics (MM) models to describe the crystalline bulk. The paper proposes new energy-based and force-based QM/MM methods, building on two principles: (i) locality of the QM model; and (ii) constructing the MM model as an explicit and controllable approximation of the QM model. This approach enables rigorous quantification of convergence rates in terms of the size of the QM region, which represents a significant contribution to the field.

Another important paper published this year is Ortner's work with Nazar *Locality of the Thomas–Fermi–von Weizsäcker equations* (Arch. Ration. Mech. Anal., 224(3), 2017.). The paper establishes a pointwise stability estimate for the TFW model, which demonstrates that a local perturbation of a nuclear arrangement results also in a local response in the electron density and electrostatic potential. The proof adapts the arguments for existence and uniqueness of solutions to the TFW equations in the thermodynamic limit by Catto, Le Bris and Lions. To demonstrate the utility of this combined locality and stability result several consequences are derived, including an exponential convergence rate for the thermodynamic limit, the partition of the total energy into exponentially localized site energies (and consequently, exponential locality of forces), and generalized and strengthened results on the charge neutrality of local defects.

Ortner's work in the field of Numerical Analysis demonstrates impressive mathematical breadth and depth, — very much in the spirit of the MFO's John Todd Award. Christoph Ortner has identified a practically significant, highly nontrivial, and mathematically uncharted field of research, and has made imaginative, important and lasting contributions to it. He is most certainly one of the top specialists in the world in his generation working on the numerical analysis of problems in materials science and solid mechanics.

1.2. Verleihung des Oberwolfach Preises

Die Verleihung des Oberwolfach Preises fand am 14. Oktober 2017 statt. Der Preis ging an Jacob Fox, Professor für Mathematik an der Universität Stanford, für seine herausragenden Leistungen in der Diskreten Mathematik.

Jacob Fox studierte Mathematik am Massachusetts Institute of Technology (MIT) und promovierte anschließend in Princeton. Seit 2015 forscht und lehrt er in Stanford. Seine Arbeit führte zu bedeutenden Fortschritten in der Kombinatorik und der theoretischen Informatik. Einen Überblick bietet die im Folgenden dargestellte Laudatio von Benjamin Sudakov.

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

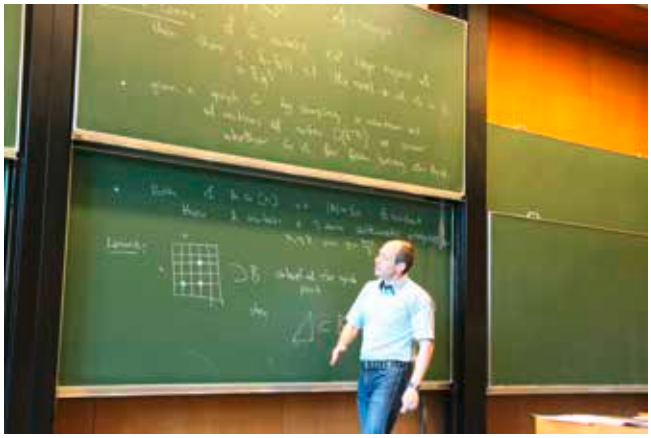
1.2. Presentation of the Oberwolfach Prize

The presentation of the Oberwolfach Prize took place on October 14, 2017. The award went to Jacob Fox, professor of mathematics at Stanford University, for his outstanding achievements in discrete mathematics.

Jacob Fox studied mathematics at the Massachusetts Institute of Technology (MIT) and subsequently earned his doctorate at Princeton. Since 2015 he has been researching and teaching in Stanford. His work has led to significant advances in combinatorics and theoretical computer science. The following laudation by Benjamin Sudakov presents an overview.

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

Jacob Fox



Benjamin Sudakov

Jacob Fox presenting his current research

Jacob Fox receiving the medal from Gerhard Huisken

Laudation for Prof. Dr. Jacob Fox

by Prof. Dr. Benjamin Sudakov

Jacob Fox completed his Ph.D at Princeton University in 2010 and is currently a Professor of Mathematics at Stanford University. Despite being in an early stage of his academic career, Fox has already earned a unique international reputation, making deep contributions in many key areas of Discrete Mathematics.

The celebrated Szemerédi Regularity Lemma, which gives a structural classification of large graphs, is a central tool in Graph Theory and in Theoretical Computer Science with applications in other areas including Additive Number Theory and Group Theory. It states that every large enough graph can be divided into subsets of about the same size so that the edges between different subsets behave almost randomly. The quantitative bounds on the number of parts one gets from the proof of the regularity lemma are enormous. One of the most important consequences of this result is the so called graph removal lemma. It states that every graph on n vertices with only $o(n^h)$ copies of a fixed graph H on h vertices can be made H-free by removing $o(n^2)$ edges. In addition to Graph Theory, this result has important applications in several areas including Additive Combinatorics, Discrete Geometry, and Theoretical Computer Science. Fox gave a new proof of the graph removal lemma that avoids Szemerédi's regularity lemma and gives a much better quantitative estimate.

The hypergraph Ramsey number $r_k(s, n)$ is the minimum N such that every red-blue coloring of the k-tuples of an N-element set contains a red set of size s or a blue set of size n, where a set is called red (blue) if all k-tuples in it are red (blue, respectively). Determining or estimating these numbers is one of the most central problems in combinatorics. The case of uniformity $k = 3$ is particularly important for our understanding of hypergraph Ramsey numbers, since there is a known construction that transforms any improvement in this case to analogous improvements for every higher uniformity k. Despite great efforts of many top researches over the last 80 years, there are still significant gaps between the known upper and lower bounds for $r_k(s, n)$. Moreover during the last 40 years there was almost no progress in obtaining better bounds for these Ramsey numbers. Fox together with Conlon and Sudakov obtained new upper and lower bound for $r_k(s, n)$ for $k \geq 3$ and fixed s, significantly improving the previous best results.

The celebrated Green-Tao theorem states that the primes contain arbitrarily long arithmetic progressions. The proof has two main parts, one of which is to establish a so called relative Szemerédi theorem. This theorem states that every relatively dense subset of a (possibly sparse) pseudorandom set of integers contains long arithmetic progressions. In his joint paper with Conlon and Zhao, Fox gives a simple proof of a strengthening of the relative

Szemerédi theorem, showing that a much weaker pseudo-randomness condition is sufficient. One of the immediate advantages of this new relative Szemerédi theorem is that it simplifies the proof of the Green-Tao theorem and removes the need for the number-theoretic estimates involved in establishing the correlation condition for the almost primes. Since then, the densification technique introduced in their paper has become an important tool in the area. In particular, this technique was used recently by Tao and Ziegler to prove the existence of narrow polynomial progressions in the primes.

Jacob Fox is an extremely powerful researcher, and is already one of the leading figures in Combinatorics. For his impressive body of results, Fox is awarded the 2016 Oberwolfach prize by the Oberwolfach foundation.

Presentation of the award: Jacob Fox, Gerhard Huisken, Ursula Gather, Friedrich Götze

1.3. Nachrufe

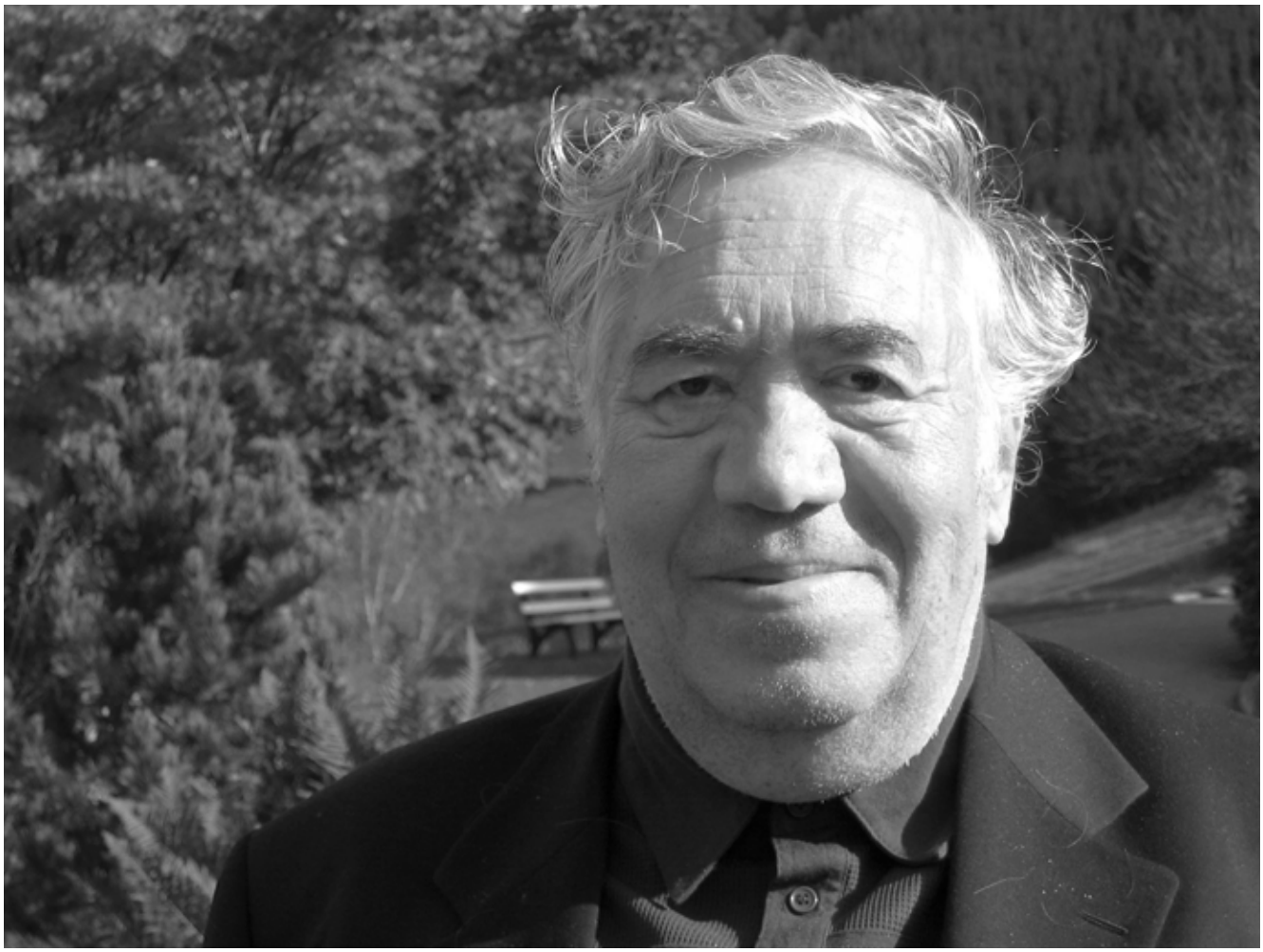
Eberhard Zeidler (1940-2016)

Am 18. November 2016 starb Eberhard Zeidler in Leipzig. Die Gesellschaft für Mathematische Forschung und das Mathematische Forschungsinstitut Oberwolfach betrauern den Verlust eines einzigartigen Mathematikers und einer herzlichen Persönlichkeit.

1.3. Obituaries

Eberhard Zeidler (1940-2016)

Eberhard Zeidler passed away in Leipzig on 18 November 2016. The Gesellschaft für Mathematische Forschung and the Mathematisches Forschungsinstitut Oberwolfach bemoan the loss of a uniquely gifted mathematician and a warm personality.



Eberhard Zeidler begann 1959 ein Mathematikstudium an der Universität Leipzig, das aufgrund seiner kritischen Haltung gegenüber der damaligen DDR 1961-1964 zwangsweise unterbrochen wurde. Im Jahre 1967 promovierte er bei Herbert Beckert über das Thema „Über eine Klasse nichtlinearer singulärer Randwertaufgaben der Funktionentheorie mit Symmetrieverhalten". Mit seiner Habilitation 1970 wurde er Dozent an der Universität Leipzig und erhielt dort 1974 eine Professur für Analysis, die er bis 1996 inne hatte. In dieser Zeit war er 1979-1980 Gastprofessor an der University of Wisconsin-Madison und leitete 1992-1996 die DFG-Forschergruppe „Nichtlineare Funktionalanalysis und ihre An-

Eberhard Zeidler started to study mathematics at the university of Leipzig in 1959, but was relegated from the university for political reasons in the former DDR (the east German Democratic Republic) in 1961-1964. In 1967 he received his doctoral degree with the thesis "On a class of nonlinear singular boundary value problems in function theory with symmetry", with Herbert Beckert as supervisor. He was habilitated in 1979, received an assistant professorship and then a full professorship in analysis at the university of Leipzig from 1974 to 1996. During this period, he was guest professor at the University of Wisconsin-Madison in 1979-1980 and head of the DFG research group "nonlinear functional

wendungen". Im Wendejahr 1990 setzte er sich zusammen mit anderen Kollegen tatkräftig für die Erneuerung der Universität Leipzig ein.

Eberhard Zeidler wurde 1996 der Gründungsdirektor des Max-Planck-Instituts für Mathematik in den Naturwissenschaften in Leipzig, an dem er weit über seine formale Emeritierung im Jahre 2007 hinaus wissenschaftlich aktiv war. Eberhard Zeidler leistete mit dem Aufbau dieses Instituts einen ganz wesentlichen Beitrag zur Stärkung der Mathematik in Deutschland. Seit 1994 war er Mitglied der Deutschen Akademie der Naturforscher Leopoldina und gehörte zu den Gründungsmitgliedern der 2003 gegründeten Stiftung Benedictus Gotthelf Teubner. 2006 erhielt er den Alfried-Krupp-Wissenschaftspreis und 2014 den Wissenschaftspreis der Teubner-Stiftung zur Förderung der Mathematischen Wissenschaften.

Eberhard Zeidler hat durch seine bedeutenden Beiträge zur Nichtlinearen Funktionalanalysis und deren Anwendungen in Mathematischer Physik hohes internationales Ansehen errungen. Seine Bücher mit einer ganzheitlichen Sicht auf dieses große Forschungsgebiet gelten heute als Standardwerke. Er verfolgte stets die große Vision der Einheit von Mathematik und Physik, so auch in seinem letzten großen Werk, einer umfassenden mathematischen Auseinandersetzung mit der Quantenfeldtheorie, das er nicht mehr ganz vollenden konnte.

Von Januar 1992 bis Dezember 1999 war Eberhard Zeidler Mitglied des wissenschaftlichen Beirats der GMF und unterstützte das MFO durch seine große interdisziplinäre Fachkompetenz. Seit 1992 leitete er auch mehrere Workshops am MFO. Wir werden ihn in anerkennender Erinnerung behalten.

analysis and its applications" in 1992-1996. Following the political changes of 1990 Eberhard Zeidler was strongly engaged in the renewal of Leipzig University.

In 1996, Eberhard Zeidler became the founding director of the Max-Planck-Institute for Mathematics in the Sciences in Leipzig. With his scientific input and prudent guidance well beyond his official retirement in 2007 he was instrumental in quickly establishing the new institute internationally, thereby making a major contribution to the longterm strength of mathematics in Germany. In 1994 he became member of the academy "Deutsche Akademie der Naturforscher Leopoldina" and he was charter member of the foundation "Stiftung Benedictus Gotthelf Teubner" in 2003. He was awarded the prize "Alfried-Krupp-Wissenschaftspreis" in 2006 and the scientific prize of the Teubner Foundation for Mathematical Sciences in 2014.

Eberhard Zeidler made essential contributions to nonlinear functional analysis with its applications in mathematical physics. His authoritative treatment of the subject in several volumes of books is now a standard reference. The main theme of his scientific work was a grand vision of the unity of mathematics and physics, again visible in his fundamental work on the mathematics of quantum field theory, which he couldn't fully complete.

From January 1992 to December 1999 Eberhard Zeidler was a member of the scientific board of the GMF and supported the MFO by sharing his great interdisciplinary expertise. Starting in 1992, he organized several workshops in Oberwolfach. We will remember him with great appreciation.

Walter Benz (1931-2017)

Am 13. Januar 2017 verstarb Walter Benz im Alter von 85 Jahren. Das Mathematische Forschungsinstitut Oberwolfach und die Gesellschaft für Mathematische Forschung betrauern den Tod eines Mathematikers, der das Institut für viele Jahre als Mitglied des wissenschaftlichen Beirats unterstützt hat.

Walter Benz studierte Mathematik und Physik von 1951 bis 1955 an der Universität Mainz, wo er 1956 bei Robert Furch mit der Arbeit „Axiomatischer Aufbau der Kreisgeometrie auf Grund von Doppelverhältnissen" promovierte; die Habilitation erfolgte 1959. Von 1961 bis 1966 lehrte er an der Universität Frankfurt, war ab 1966

Walter Benz (1931-2017)

On 13 January 2017 Walter Benz passed away at the age of 85. The Mathematisches Forschungsinstitut Oberwolfach and the Gesellschaft für Mathematische Forschung mourn the death of a mathematician, who supported the Institute for many years as a member of the scientific board.

Walter Benz studied mathematics and physics at the university of Mainz from 1951 until 1955. In 1956 he received his doctor's degree, supervised by Robert Furch, on the subject "Axiomatic foundation of disc geometry based on cross-ratios". The habilitation took place in 1959. From 1961 to 1966 he gave lectures at the university

Professor an der Universität Bochum, der University of Waterloo und ab 1974 an der Universität Hamburg als Nachfolger von Emanuel Sperner.

Walter Benz hat hauptsächlich als Geometer gearbeitet und geforscht, hat aber auch wichtige Beiträge zur Differentialgeometrie, zur Gruppentheorie und zur Relativitätstheorie geleistet. Nach ihm sind die Benz-Ebenen benannt, welche die ebenen Geometrien von Möbius, Laguerre und Minkowsky vereinheitlichen.

Das Zentralblatt für Mathematik listet 172 Publikationen einschließlich 11 Bücher von ihm auf und im Genealogy Projekt sind 24 Doktoranden von ihm verzeichnet.

Walter Benz gab die Gesammelten Werke von Emanuel Sperner und von Wilhelm Blaschke heraus. Er war lange Zeit Herausgeber des Jahresberichts der Deutschen Mathematiker-Vereinigung. Die St.-Kliment-Ohridski-Universität in Sofia verlieh ihm die Ehrendoktorwürde und er war Ehrenmitglied der Mathematischen Gesellschaft in Hamburg sowie der Ungarischen Akademie der Wissenschaften.

of Frankfurt and received his professorship at the university of Bochum in 1966. Later he moved to the university of Waterloo and to the university of Hamburg in succession of Emanuel Sperner.

Walter Benz' main field of research was geometry, but he contributed also to differential geometry, to group theory and to relativity theory. He invented the Benz planes which are a unification of the plane geometries of Möbius, Laguerre and Minkowski.

The Zentralblatt of Mathematics refers to 172 publications including 11 books and the genealogy project lists 24 doctoral students supervised by him.

Walter Benz was editor of the collected works of Emanuel Sperner and of Wilhelm Blaschke. For many years, he was an editor of the "Jahresbericht der Deutschen Mathematiker-Vereinigung" (annual report of the German Mathematical Society). He received the honorary doctoral degree from the university of Sofia "St. Kliment Ohridksi" and he was honorary member of the Mathematical Society of Hamburg and of the Hungarian Academy of Science.

Walter Benz hat zahlreiche Tagungen am MFO geleitet und war seit 1973 Mitglied der Gesellschaft für Mathematische Forschung. Das Mathematische Forschungsinstitut Oberwolfach und die Gesellschaft für Mathematische Forschung werden ihm ein ehrendes Andenken bewahren.

Walter Benz organized many workshops at the MFO and he was member of the "Gesellschaft für Mathematische Forschung" since 1973. The Mathematisches Forschungsinstitut Oberwolfach and the Gesellschaft für Mathematische Forschung will honor his memory.

Heinz Günther Tillmann (1924-2017)

Das Mathematische Forschungsinstitut Oberwolfach und die Gesellschaft für Mathematische Forschung trauern um Heinz Günther Tillmann, der am 26. August 2017 im Alter von 92 Jahren verstarb. Er hat das Institut für viele Jahre als Mitglied des wissenschaftlichen Beirats unterstützt.

Heinz Günther Tillmann (1924-2017)

The Mathematisches Forschungsinstitut Oberwolfach and the Gesellschaft für Mathematische Forschung mourn the death of Heinz Günther Tillmann who died at the age of 92 years on 26 August 2017. He supported the Institute for many years as a member of the scientific board.

Heinz Günther Tillmann studierte nach dem Zweiten Weltkrieg an der Universität Münster Mathematik und promovierte dort 1951 bei Helmut Ulm über „Gleichungstheorie im Hilbertschen Raum". Er wurde 1957 an der Universität Mainz habilitiert, wo er von 1962 bis 1976 als Professor tätig war. 1976 wechselte er an die Universität Münster bis zu seiner Emeritierung.

After the Second World War, Heinz Günther Tillmann studied mathematics at the university of Münster and received his doctoral degree in 1951 with the thesis "On the theory of equations in Hilbert space", supervised by Helmut Ulm. He was habilitated at the university of Mainz in 1957 and held a professorship there from 1962 to 1976. In 1976, he moved to the university of Münster, where he stayed until his retirement.

Heinz Günther Tillmann arbeitete auf dem Gebiet der Funktionalanalysis. Unter seinen 17 Doktoranden befinden sich viele, die auf Professuren an verschiedenen Universitäten in Deutschland berufen wurden. Das Genealogy Project weist insgesamt 117 nachfolgende Mathematiker aus.

Heinz Günther Tillmann war seit 1966 Mitglied der Gesellschaft für Mathematische Forschung. Er hat am MFO zahlreiche Workshops geleitet und war auch noch im hohen Alter am Institut präsent. Das MFO und die Mitglieder der Gesellschaft für Mathematische Forschung werden ihn in dankbarer Erinnerung behalten.

Heinz Günther Tillmann's field of research was functional analysis. He had 17 doctoral students and many of them received professorships at German universities. According to the genealogy project, there are 117 descendants.

Heinz Günter Tillmann was a member of the Gesellschaft für Mathematische Forschung since 1966. He organized many workshops at the MFO and attended several meetings even at an advanced age. The MFO and the members of the Gesellschaft für Mathematische Forschung remember him gratefully.

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 Euro pro Tag des Gastaufenthalts an der Universität und wird für bis zu zwei Wochen gezahlt. Die beteiligten Universitäten stellen Unterkünfte für die Dauer des Besuches 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 Euro 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.

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.

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 zweimal jährlich für jeweils eine Woche statt und wird von Prof. Dr. Christopher Deninger und Prof. Dr. Gerd Faltings organisiert. Sie richtet sich sowohl an den wissenschaftlichen Nachwuchs als auch an etablierte Forscherinnen und Forscher.

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 twice per year for one week each time and is organized by Prof. Dr. Christopher Deninger and Prof. Dr. Gerd Faltings. It is aimed both at senior and junior researchers.

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.

The Oberwolfach Seminars

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

Wir freuen uns, dass die Carl Friedrich von Siemens Stiftung die Oberwolfach Seminare von Sommer 2008 bis Ende 2019 substanziell unterstützt.

We are pleased that the Carl Friedrich von Siemens Foundation substiantially supports the Oberwolfach Seminars from summer 2008 to 2019.

Das Research in Pairs Programm

Ein weiterer Schwerpunkt ist das Programm Research in Pairs (RiP). Dieses Programm 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.

The Research in Pairs program

A further main activity of the Institute is the Research in Pairs (RiP) program. This program is aimed at small groups of 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.

Oberwolfach Leibniz Fellows

In diesem Postdoktoranden-Programm werden besonders qualifizierte Nachwuchsforscherinnen und -forscher in einer entscheidenden Phase ihrer wissenschaftlichen Laufbahn durch die Bereitstellung idealer Arbeitsbedingungen in einem internationalen Umfeld gefördert. Einzelpersonen oder Kleingruppen können sich für die Durchführung eines Forschungsprojekts in Oberwolfach von zwei bis zu sechs Monaten bewerben. Entscheidend ist die Einbindung der Oberwolfach Leibniz Fellows in eine aktive Arbeitsgruppe

Oberwolfach Leibniz Fellows

The focus of this postdoctoral program 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 out a research project, individually or in small groups, for a period from two to six months. Oberwolfach Leibniz Fellows should be involved in an active research group with an established senior researcher at a university or another research institute. This is part of a

mit einem etablierten Wissenschaftler einer Universität oder einer Forschungseinrichtung. Es besteht eine Kooperation mit dem europäischen Postdoktorandennetzwerk EPDI, an dem bekannte mathematische Institute teilnehmen (IHES, Newton-Institut, Max-Planck-Institute in Bonn und Leipzig, Mittag-Leffler-Institut, Erwin Schrödinger Institut in Wien, Banach Center in Warschau, Centre de Recerca Matematica in Barcelona, Forschungsinstitut der ETH Zürich).

Oberwolfach Leibniz Graduate Students

Seit Beginn des Jahres 2009 unterstützt das MFO die Teilnahme von im Durchschnitt fünf 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).

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.

Um die Ergebnisse der Workshops einem international weiten Kreis zugänglich zu machen wurde 2004 die Buchserie „Oberwolfach Reports" (OWR) in Zusammenarbeit mit dem Publishing House der European Mathematical Society gegründet. Sie erscheint jährlich mit vier Ausgaben von insgesamt mehr als 3.000 Seiten in einer Auflage von 300 Stück. 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 Verlag (Basel), die den Inhalt der Oberwolfach Seminare für ein größeres Publikum zugänglich macht.

cooperation with the European Post-Doctoral Institute (EPDI) in which well-known mathematical institutes are already participating (IHES, Newton-Institute, Max-Planck-Institute in Bonn and Leipzig, Mittag-Leffler-Institute, Erwin Schrödinger Institute in Vienna, Banach Center in Warsaw, Centre de Recerca Matematica in Barcelona, Research Institute of ETH Zürich).

Oberwolfach Leibniz Graduate Students

Since the beginning of 2009, the MFO has been supporting the participation of an average of five doctoral students per Oberwolfach Workshop. This program fosters excellent graduate students and recent post docs (the Ph.D./Dr. degree must be received not more than two years ago), in particular by the reimbursement of travel costs. For this program, each Oberwolfach Workshop is given an extra capacity of five places which may not be taken by senior researchers.

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).

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" from Birkhäuser.

The Oberwolfach Reports (OWR) were initiated in 2004 in collaboration with the Publishing House of the European Mathematical Society. They appear quarterly in an edition of 300 copies. The 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 Birkhäuser. In this series, the material of the Oberwolfach Seminars for junior researchers is made available to an even larger audience.

In den „Oberwolfach Preprints" (OWP) werden hauptsächlich Resultate von längerfristigen Forschungsaufenthalten (RiP und OWLF) 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.

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 2017 beschäftigten sich insgesamt 15 einwöchige Workshops mit verschiedenen Aspekten dieses Forschungsfeldes.

Weitere Aktivitäten und Dienste

Das Institut beherbergte im Jahr 2017 erneut die abschließende Trainingswoche für besonders begabte Schülerinnen und Schüler zur Vorbereitung auf die Internationale Mathematik-Olympiade. Als Dienste für die Öffentlichkeit sind außerdem die Oberwolfach Fotosammlung, die Oberwolfach References for Mathematical Software (ORMS) und das Museum für Mineralien und Mathematik zu nennen.

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

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. 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.

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 2017 a total of 15 week-long Workshops covered various aspects of the MMS area of research.

Further activities and services

In 2017 the Institute again hosted the final training week for especially gifted pupils to prepare for the International Mathematical Olympiad. As further services provided for the general public the Oberwolfach Photo Collection, the Oberwolfach References for Mathematical Software (ORMS) and the Museum for Minerals and Mathematics are to be mentioned.

2.2. Jahresprogramm 2017

Im Jahr 2017 wurden während 42 Wochen 44 Workshops durchgeführt, 12 Miniworkshops während 4 Wochen, 6 Oberwolfach Seminare während 3 Wochen und 2 Arbeitsgemeinschaften während 2 Wochen. Insgesamt nahmen mehr als 2700 Forscherinnen und Forscher aus aller Welt an allen Programmen teil, davon ca. 25% aus Deutschland, 40% aus anderen europäischen Ländern und 35% aus dem nichteuropäischen Ausland. Das Institut legt großen Wert darauf, dass alle Gebiete der Mathematik und ihre Grenzgebiete, auch im Hinblick auf Anwendungen, vertreten sind. Das folgende Tagungsprogramm belegt diese Politik.

2.2. Annual schedule 2017

In the year 2017 44 workshops have taken place during 42 weeks, as well as 12 Mini-Workshops during 4 weeks, 6 Oberwolfach Seminars during 3 weeks and 2 Arbeitsgemeinschaften during 2 weeks. In total, more than 2700 researchers from all over the world attended the Oberwolfach research program, about 25% from Germany, 40% from other European countries, and 35% from non-European countries. The Institute emphasizes that all fields of mathematics and related areas are represented, including applications. The following scientific program gives proof of this policy.

Workshops

01.01. – 07.01.2017 **Combinatorics**
Organizers: Jeff Kahn, Piscataway
Angelika Steger, Zürich
Benny Sudakov, Zürich

15.01. – 21.01.2017 **Cryptography**
Organizers: Johannes Buchmann, Darmstadt
Shafi Goldwasser, Cambridge MA

22.01. – 28.01.2017 **Emerging Developments in Interfaces and Free Boundaries**
Organizers: Charles M. Elliott, Warwick
Yoshikazu Giga, Tokyo
Michael Hinze, Hamburg
Vanessa Styles, Brighton

29.01. – 04.02.2017 **Applications of Optimal Transportation in the Natural Sciences**
Organizers: Jean-David Benamou, Le Chesnay
Virginie Ehrlacher, Marne-la-Vallée
Daniel Matthes, Garching

12.02. – 18.02.2017 **Set Theory**
Organizers: Ilijas Farah, Toronto
Sy-David Friedman, Wien
Ralf Schindler, Münster
Hugh Woodin, Cambridge MA

19.02. – 25.02.2017 **Representation Theory of Quivers and Finite Dimensional Algebras**
Organizers: William Crawley-Boevey, Leeds
Osamu Iyama, Nagoya
Henning Krause, Bielefeld

26.02. – 04.03.2017 **Mathematics of Quantitative Finance**
Organizers: Peter Friz, Berlin
Antoine Jacquier, London
Josef Teichmann, Zürich

05.03. – 11.03.2017 **Real Algebraic Geometry With a View Toward Moment Problems and Optimization**
Organizers: Didier Henrion, Toulouse
Maria Infusino, Konstanz
Salma Kuhlmann, Konstanz
Victor Vinnikov, Beer-Sheva

12.03. – 18.03.2017 **Space-time Methods for Time-dependent Partial Differential Equations**
Organizers: Ricardo Nochetto, College Park
Stefan Sauter, Zürich
Christian Wieners, Karlsruhe

19.03. – 25.03.2017 **Statistical Recovery of Discrete, Geometric and Invariant Structures**
Organizers: Peter Bühlmann, Zürich
Axel Munk, Göttingen
Martin Wainwright, Berkeley
Bin Yu, Berkeley

26.03. – 01.04.2017 **Multiscale and High-Dimensional Problems**
Organizers: Albert Cohen, Paris
Wolfgang Dahmen, Aachen
Ronald A. DeVore, College Station
Angela Kunoth, Köln

09.04. – 15.04.2017 **Discrete Geometry**
Organizers: Imre Barany, London
Xavier Goaoc, Marne-la-Vallee
Günter Rote, Berlin

16.04. – 22.04.2017 **Algebraic Statistics**
Organizers: Mathias Drton, Seattle
Thomas Kahle, Magdeburg
Bernd Sturmfels, Berkeley
Caroline Uhler, Cambridge MA

23.04. – 29.04.2017 **Algebraic Groups**
Organizers: Corrado De Concini, Roma
Peter Littelmann, Köln
Zinovy Reichstein, Vancouver

30.04. – 06.05.2017 **O-Minimality and its Applications to Number Theory and Analysis**
Organizers: Tobias Kaiser, Passau
Jonathan Pila, Oxford
Patrick Speissegger, Hamilton
Alex Wilkie, Oxford

07.05. – 13.05.2017 **Geophysical Fluid Dynamics**
Organizers: Yoshikazu Giga, Tokyo
Matthias Hieber, Darmstadt
Edriss S. Titi, College Station/ Rehovot

14.05. – 20.05.2017 **Computational Inverse Problems for Partial Differential Equations**
Organizers: Liliana Borcea, Ann Arbor
Thorsten Hohage, Göttingen
Barbara Kaltenbacher, Klagenfurt

21.05. – 27.05.2017 **Harmonic Analysis and the Trace Formula**
Organizers: Werner Müller, Bonn
Sug Woo Shin, Berkeley
Birgit Speh, Ithaca
Nicolas Templier, Ithaca

28.05. – 03.06.2017 **Stochastic Analysis: Geometry of Random Processes**
Organizers: Alice Guionnet, Lyon
Martin Hairer, Warwick
Grégory Miermont, Lyon

11.06. – 17.06.2017 **Nonlinear Waves and Dispersive Equations**
Organizers: Herbert Koch, Bonn
Pierre Raphael, Nice
Daniel Tataru, Berkeley
Monica Visan, Los Angeles

18.06. – 24.06.2017 **Reaction Networks and Population Dynamics**
Organizers: Ellen Baake, Bielefeld
Tom Kurtz, Madison
Carsten Wiuf, Copenhagen

18.06. – 24.06.2017 **Nonlinear Partial Differential Equations on Graphs**
Organizers: Reika Fukuizumi, Sendai
Jeremy Marzuola, Chapel Hill
Dmitry Pelinovsky, Hamilton
Guido Schneider, Stuttgart

25.06. – 01.07.2017 **Geometric Structures in Group Theory**
Organizers: Martin Bridson, Oxford
Linus Kramer, Münster
Bertrand Rémy, Palaiseau
Karen Vogtmann, Warwick

02.07. – 08.07.2017 **Differentialgeometrie im Großen**
Organizers: Gerard Besson, Saint Martin d'Heres
Ursula Hamenstädt, Bonn
Michael Kapovich, Davis
Ben Weinkove, Evanston

09.07. – 15.07.2017 **Dynamische Systeme**
Organizers: Hakan Eliasson, Paris
Helmut Hofer, Princeton
Vadim Kaloshin, College Park
Jean-Christophe Yoccoz, Paris

16.07. – 22.07.2017 **Material Theories**
Organizers: Sergio Conti, Bonn
Antonio DeSimone, Trieste
Stephan Luckhaus, Leipzig
Lev Truskinovsky, Paris

23.07. – 29.07.2017 **Real Analysis, Harmonic Analysis, and Applications**
Organizers: Michael Christ, Berkeley
Detlef Müller, Kiel
Christoph Thiele, Bonn

30.07. – 05.08.2017 **Partial Differential Equations**
Organizers: Camillo De Lellis, Zürich
Richard M. Schoen, Stanford/Irvine
Peter M. Topping, Warwick

06.08. – 12.08.2017 **Analysis, Geometry and Topology of Positive Scalar Curvature Metrics**
Organizers: Bernd Ammann, Regensburg
Bernhard Hanke, Augsburg
André Neves, London

13.08. – 19.08.2017 **Proof Complexity and Beyond**
Organizers: Albert Atserias, Barcelona
Jakob Nordström, Stockholm
Toniann Pitassi, Toronto
Alexander Razborov, Chicago/Moscow

20.08. – 26.08.2017 **Low-dimensional Topology and Number Theory**
Organizers: Paul E. Gunnells, Amherst
Walter D. Neumann, New York
Adam S. Sikora, New York
Don B. Zagier, Bonn

27.08. – 02.09.2017 **Komplexe Analysis**
Organizers: Philippe Eyssidieux, Saint Martin d'Hères
Jun-Muk Hwang, Seoul
Stefan Kebekus, Freiburg
Mihai Paun, Seoul

03.09. – 09.09.2017 **Automorphic Forms and Arithmetic**
Organizers: Valentin Blomer, Göttingen
Emmanuel Kowalski, Zürich
Philippe Michel, Lausanne

10.09. – 16.09.2017 **Mathematical Questions and Challenges in Quantum Electrodynamics and its Applications**
Organizers: Volker Bach, Braunschweig
Miguel Ballesteros, Mexico
Dirk-André Deckert, München
Israel Michael Sigal, Toronto

24.09. – 30.09.2017 **Algebraic Geometry: Birational Classification, Derived Categories, and Moduli Spaces**
Organizers: Christopher Hacon, Salt Lake City
Daniel Huybrechts, Bonn
Bernd Siebert, Hamburg
Chenyang Xu, Beijing

01.10. – 07.10.2017 **Spectral Structures and Topological Methods in Mathematical Quasicrystals**
Organizers: Michael Baake, Bielefeld
David Damanik, Houston
Johannes Kellendonk, Villeurbanne
Daniel Lenz, Jena

29.10. – 04.11.2017 **Interplay between Number Theory and Analysis for Dirichlet Series**
Organizers: Frédéric Bayart, Aubière
Kaisa Matomäki, Turku
Eero Saksman, Helsinki
Kristian Seip, Trondheim

29.10. – 04.11.2017 **Copositivity and Complete Positivity**
Organizers: Abraham Berman, Haifa
Immanuel M. Bomze, Vienna
Mirjam Dür, Trier
Naomi Shaked-Monderer, Yezreel Valley

05.11. – 11.11.2017 **Mathematical Logic: Proof Theory, Constructive Mathematics**
Organizers: Samuel R. Buss, La Jolla
Rosalie Iemhoff, Utrecht
Ulrich Kohlenbach, Darmstadt
Michael Rathjen, Leeds

12.11. – 18.11.2017 **Variational Methods for Evolution**
Organizers: Alexander Mielke, Berlin
Mark Peletier, Eindhoven
Dejan Slepcev, Pittsburgh

26.11. – 02.12.2017 **Reflection Positivity**
Organizers: Arthur Jaffe, Harvard
Karl-Hermann Neeb, Erlangen
Gestur Olafsson, Baton Rouge
Benjamin Schlein, Zürich

03.12. – 09.12.2017 **Classical and Quantum Mechanical Models of Many-Particle Systems**
Organizers: Anton Arnold, Wien
Eric Carlen, Piscataway
Laurent Desvillettes, Paris

10.12. – 16.12.2017 **Network Models: Structure and Function**
Organizers: Louigi Addario-Berry, Montreal
Shankar Bhamidi, Chapel Hill
Remco van der Hofstad, Eindhoven
Frank den Hollander, Leiden

17.12. – 23.12.2017 **Mathematical Instruments between Material Artifacts and Ideal Machines: Their Scientific and Social Role before 1950**
Organizers: Samuel Gessner, Lisboa
Ulf Hashagen, München
Jeanne Peiffer, Paris
Dominique Tournès, Sainte-Clotilde

Miniworkshops

08.01. – 14.01.2017 **Women in Mathematics: Historical and Modern Perspectives**
Organizers: Tinne Hoff Kjeldsen, Copenhagen
Nicola Oswald, Wuppertal
Renate Tobies, Jena

08.01. – 14.01.2017 **Spaces and Moduli Spaces of Riemannian Metrics**
Organizers: F. Thomas Farrell, Beijing
Wilderich Tuschmann, Karlsruhe

08.01. – 14.01.2017 **Adaptive Methods for Control Problems Constrained by Time-Dependent PDEs**
Organizers: Max Gunzburger, Tallahassee
Karl Kunisch, Graz
Angela Kunoth, Köln

05.02. – 11.02.2017 **Cluster Expansions: From Combinatorics to Analysis through Probability**
Organizers: Roberto Fernández, Utrecht
Sabine Jansen, Brighton
Dimitrios Tsagkarogiannis, Brighton

05.02. – 11.02.2017 **Stochastic Differential Equations: Regularity and Numerical Analysis in Finite and Infinite Dimensions**
Organizers: Martin Hutzenthaler, Essen
Annika Lang, Göteborg
Lukasz Szpruch, Edinburgh
Larisa Yaroslavtseva, Passau

05.02. – 11.02.2017 **Perspectives in High-dimensional Probability and Convexity**
Organizers: Joscha Prochno, Hull
Christoph Thäle, Bochum
Elisabeth Werner, Cleveland

17.09. – 23.09.2017 **MASAs and Automorphisms of C*-Algebras**
Organizers: Selcuk Barlak, Odense
Wojciech Szymanski, Odense
Wilhelm Winter, Münster

17.09. – 23.09.2017 **Positivity in Higher-dimensional Geometry: Higher-codimensional Cycles and Newton-Okounkov Bodies**
Organizers: Mihai Fulger, Lausanne
Alex Küronya, Frankfurt
Brian Lehmann, Chestnut Hill

17.09. – 23.09.2017 **Lattice Polytopes: Methods, Advances, Applications**
Organizers: Takayuki Hibi, Osaka
Akihiro Higashitani, Kyoto
Katharina Jochemko, Stockholm
Benjamin Nill, Magdeburg

22.10. – 28.10.2017 **PDE Models of Motility and Invasion in Active Biosystems**
Organizers: Leonid Berlyand, State College
Jan Fuhrmann, State College
Anna Marciniak-Czochra, Heidelberg
Christina Surulescu, Kaiserslautern

22.10. – 28.10.2017 **Reflectionless Operators: The Deift and Simon Conjectures**
Organizers: David Damanik, Houston
Fritz Gesztesy, Waco
Peter Yuditskii, Linz

22.10. – 28.10.2017 **Interactions between Low-dimensional Topology and Complex Algebraic Geometry**
Organizers: Stefan Friedl, Regensburg
Laurentiu Maxim, Madison
Alexander Suciu, Boston

Oberwolfach Seminare

04.06. – 10.06.2017 **Compressible and Incompressible Multiphase Flows: Modelling, Analysis, Numerics**
Organizers: Dieter Bothe, Darmstadt
Stéphane Popinet, Paris
Christian Rohde, Stuttgart
Richard Saurel, Marseille

04.06. – 10.06.2017 **Discontinuous Petrov-Galerkin Methods**
Organizers: Carsten Carstensen, Berlin
Leszek F. Demkowicz, Austin
Norbert Heuer, Santiago

15.10. – 21.10.2017 **Scaling Limits of Random Planar Maps and Liouville Quantum Gravity**
Organizers: Jason Miller, Cambridge UK
Scott Sheffield, Cambridge MA

15.10. – 21.10.2017 **Algebraic K- and L-Theory and Geometric Group Theory**
Organizers: Arthur Bartels, Münster
Wolfgang Lück, Bonn
Karen Vogtmann, Warwick

19.11. – 25.11.2017 **Mathematical Modeling in Systems Biology**
Organizers: Jan Hasenauer, Neuherberg
Susanna Röblitz, Berlin
Heike Siebert, Berlin
Steffen Waldherr, Leuven

19.11. – 25.11.2017 **Lower Curvature Bounds and Topology**
Organizers: Fuquan Fang, Beijing
Wilderich Tuschmann, Karlsruhe

Arbeitsgemeinschaften

02.04. – 08.04.2017 **Higher Gross Zagier Formulas**
Organizers: Zhiwei Yun, Stanford
Wei Zhang, New York

08.10. – 13.10.2017 **Additive Combinatorics, Entropy, and Fractal Geometry**
Organizers: Emmanuel Breuillard, Münster
Mike Hochman, Jerusalem
Pablo Shmerkin, Buenos Aires

Fortbildungen/Training activities

21.05. – 26.05.2017 **Trainings- und Abschluss-Seminar für die Internationale Mathematik-Olympiade**
Organizer: Jürgen Prestin, Lübeck

2.3. Workshops

Workshop 1701

01.01. – 07.01.2017 **Combinatorics**

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

Abstract

Combinatorics is a fundamental mathematical discipline that focuses on the study of discrete objects and their properties. The present workshop featured research in such diverse areas as Extremal, Probabilistic and Algebraic Combinatorics, Graph Theory, Discrete Geometry, Combinatorial Optimization, Theory of Computation and Statistical Mechanics. It provided current accounts of exciting developments and challenges in these fields and a stimulating venue for a variety of fruitful interactions.

Participants

Adiprasito, Karim A. (Jerusalem), Alon, Noga (Tel Aviv), Balla, Igor (Zürich), Balogh, Jozsef (Urbana), Barvinok, Alexander (Ann Arbor), Björner, Anders (Stockholm), Bukh, Boris (Pittsburgh), Chudnovsky, Maria (Princeton), Coja-Oghlan, Amin (Frankfurt am Main), Conlon, David (Oxford), Ferber, Asaf (Cambridge), Fox, Jacob (Stanford), Friedgut, Ehud (Rehovot), Furedi, Zoltan (Budapest), Gamarnik, David (Cambridge), Haxell, Penny E. (Waterloo), Kahn, Jeff (Piscataway), Kalai, Gil (Jerusalem), Kang, Mihyun (Graz), Keevash, Peter (Oxford), Kopparty, Swastik (New Brunswick), Kral, Daniel (Coventry), Krivelevich, Michael (Tel Aviv), Kühn, Daniela (Birmingham), Linial, Nathan (Jerusalem), Loh, Po-Shen (Pittsburgh), Luczak, Tomasz (Poznań), Meshulam, Roy (Haifa), Montgomery, Richard H. (Cambridge), Morris, Robert (Rio de Janeiro), Mousset, Frank (Zürich), Osthus, Deryk (Birmingham), Pach, Janos (Lausanne), Panagiotou, Konstantinos (München), Peled, Ron (Ramat Aviv, Tel Aviv), Perkins, Will (Birmingham), Reiher, Christian (Hamburg), Riordan, Oliver M. (Oxford), Rödl, Vojtech (Atlanta), Samotij, Wojciech (Tel Aviv), Saraf, Shubhangi (New Brunswick), Sauermann, Lisa (Stanford), Schacht, Mathias (Hamburg), Schrijver, Alexander (Amsterdam), Shapira, Asaf (Ramat Aviv, Tel Aviv), Skubch, Kathrin (Frankfurt am Main), Solymosi, József (Vancouver), Steger, Angelika (Zürich), Sudakov, Benjamin (Zürich), Szabó, Tibor (Berlin), Verstraete, Jacques A. (La Jolla), Zhao, Yufei (Oxford), Ziegler, Günter M. (Berlin)

15.01. – 21.01.2017 **Cryptography**
Organizers: Johannes Buchmann, Darmstadt
Shafi Goldwasser, Cambridge MA

Abstract
The Oberwolfach Workshop Cryptography brought together scientists from cryptography with mathematicians specializing in the algorithmic problems underlying cryptographic security. The goal of the workshop was to stimulate interaction and collaboration that enables a holistic approach to designing cryptography from the mathematical foundations to practical applications. The workshop addressed fundamental research results leading to innovative cryptography for protecting security and privacy.

Participants
Applebaum, Benny (Ramat Aviv, Tel Aviv), Bernstein, Daniel J. (Chicago), Boyle, Elette (Haifa), Brakerski, Zvika (Rehovot), Buchmann, Johannes (Darmstadt), Canetti, Ran (Boston), Cohen, Aloni (Cambridge), Demirel, Denise (Darmstadt), Ding, Jintai (Cincinnati), Gentry, Craig B. (Yorktown Heights), Goldwasser, Shafi (Cambridge), Halevi, Shai (Yorktown Heights), Heninger, Nadia (Philadelphia), Hofheinz, Dennis (Karlsruhe), Holmgren, Justin (Cambridge), Hülsing, Andreas (Eindhoven), Ishai, Yuval (Los Angeles), Joux, Antoine (Paris Cedex), Kalai, Yael (Cambridge), Kiltz, Eike (Bochum), Klein, Saleet (Cambridge), Komargodski, Ilan (Rehovot), Krämer, Juliane (Darmstadt), Lange, Tanja (Eindhoven), Lenstra, Hendrik W. (Leiden), Lin, Huijia (Rachel) (Santa Barbara), Lyubashevsky, Vadim (Rüschlikon), Müller-Quade, Jörn (Karlsruhe), Naor, Moni (Rehovot), Nissim, Kobbi (Cambridge), Ostrovsky, Rafail (Los Angeles), Paneth, Omer (Boston), Pass, Rafael (Ithaca), Pietrzak, Krzysztof (Klosterneuburg), Rabin, Tal (Yorktown Heights), Richelson, Silas (Cambridge), Rosen, Alon (Herzliya), Rothblum, Guy (Rehovot), Rothblum, Ron (Cambridge), Scafuro, Alessandra (Boston), Schabhueser, Lucas (Darmstadt), Segev, Gil (Jerusalem), Sendrier, Nicolas (Paris), Traverso, Giulia (Darmstadt), Vaikuntanathan, Vinod (Cambridge), van Vredendaal, Christine (Eindhoven), Vasudevan, Prashant (Cambridge), Venkitasubramaniam, Muthuramakrishnan (Rochester), Wee, Hoeteck (Paris), Wichs, Daniel (Boston), Wunderer, Thomas (Darmstadt)

22.01. – 28.01.2017

Emerging Developments in Interfaces and Free Boundaries

Organizers: Charles M. Elliott, Warwick
Yoshikazu Giga, Tokyo
Michael Hinze, Hamburg
Vanessa Styles, Brighton

Abstract
The field of the mathematical and numerical analysis of systems of nonlinear partial differential equations involving interfaces and free boundaries is a well established and flourishing area of research. This workshop focused on recent developments and emerging new themes. By bringing together experts in these fields we achieved progress in open questions and developed novel research directions in mathematics related to interfaces and free boundaries. This interdisciplinary workshop brought together researchers from distinct mathematical fields such as analysis, computation, optimization and modelling to discuss emerging challenges.

Participants
Abels, Helmut (Regensburg), Aland, Sebastian (Dresden), Alphonse, Amal C. (Berlin), Antil, Harbir (Fairfax), Barrett, John (London), Bartels, Sören (Freiburg i. Br.), Blank, Luise (Regensburg), Chambolle, Antonin (Palaiseau), Church, Lewis (Coventry), Collins, Matthew T. (Coventry), Deckelnick, Klaus (Magdeburg), Djurdjevac, Ana (Berlin), Elliott, Charles M. (Coventry), Fritz, Hans (Regensburg), Garcke, Harald (Regensburg), Giga, Mi-Ho (Tokyo), Giga, Yoshikazu (Tokyo), Gräser, Carsten (Berlin), Hamamuki, Nao (Sapporo), Hintermüller, Michael (Berlin), Hinze, Michael (Hamburg), Kahle, Christian (Garching bei München), Kenmochi, Nobuyuki (Warszawa), Kimura, Masato (Kanazawa), King, John R. (Nottingham), Kornhuber, Ralf (Berlin), Kröner, Heiko (Hamburg), Lam, Andrew (Regensburg), Lehrenfeld, Christoph (Göttingen), Liu, Chun (University Park), Luckhaus, Stephan (Leipzig), Miura, Tatsu-Hiko (Tokyo), Miura, Tatsuya (Tokyo), Nochetto, Ricardo H. (College Park), Ohtsuka, Takeshi (Maebashi), Olshanskii, Maxim A. (Houston), Otto, Felix (Leipzig), Ranner, Tom (Leeds), Ren, Xiaofeng (Washington), Reusken, Arnold (Aachen), Rodrigues, Jose-Francisco (Lisboa), Salgado, Abner J. (Knoxville), Schmitz, Felicitas (Freiburg i. Br.), Schoenlieb, Carola-Bibiane (Cambridge), Schulz, Volker (Trier), Shirakawa, Ken (Chiba), Siebenborn, Martin (Trier), Stinner, Björn (Coventry), Stoll, Martin (Magdeburg), Styles, Vanessa (Brighton), van Gennip, Yves (Nottingham), Venkataraman, Chandrasekhar (St. Andrews), Wirth, Benedikt (Münster), Yamamoto, Masahiro (Tokyo)

29.01. – 04.02.2017

Applications of Optimal Transportation in the Natural Sciences

Organizers: Jean-David Benamou, Le Chesnay
Virginie Ehrlacher, Marne-la-Vallée
Daniel Matthes, Garching

Abstract

The aim of this workshop was to gather a mixed group of experts and young researchers from different areas of applied mathematics in which optimal transport plays a central role. Thematically, the talks illustrated the variety of applications of optimal transport theory in the natural sciences: physics, chemistry and biology. The diversity of the topics and participants stimulated a lot of fruitful discussion between the persons working in the different fields and gave rise to new collaborations, in particular for the younger generation of researchers.

Participants

Benamou, Jean-David (Le Chesnay), Blanchet, Adrien (Toulouse), Brenier, Yann (Palaiseau), Burger, Martin (Münster), Buttazzo, Giuseppe (Pisa), Cancès, Clément (Villeneuve-d'Ascq), Carlen, Eric A. (Piscataway), Carlier, Guillaume (Paris), Carrillo de la Plata, Jose Antonio (London), Cullen, Mike (Exeter), Desvillettes, Laurent (Cachan), Dolbeault, Jean (Paris), Ehrlacher, Virginie (Marne-la-Vallée), Erbar, Matthias (Bonn), Fathi, Max (Berkeley), Fellner, Klemens (Graz), Friesecke, Gero (Garching bei München), Froese, Brittany D. (Newark), Georgiou, Tryphon T. (Davis), Gori-Giorgi, Paola (Amsterdam), Jüngel, Ansgar (Wien), Kim, Inwon C. (Los Angeles), Kinderlehrer, David (Pittsburgh), Kopfer, Eva (Bonn), Lewin, Mathieu (Paris), Matthes, Daniel (Garching bei München), McCann, Robert J. (Toronto), Mérigot, Quentin (Paris), Mittnenzweig, Markus (Berlin), Oberman, Adam (Montreal), Orrieri, Carlo (Roma), Otto, Felix (Leipzig), Pass, Brendan (Edmonton), Patacchini, Francesco S. (London), Peletier, Mark A. (Eindhoven), Peyré, Gabriel (Paris), Plazotta, Simon (Garching bei München), Pratelli, Aldo (Erlangen), Raoul, Gael (Paris), Rumpf, Martin (Bonn), Santambrogio, Filippo (Orsay), Savare, Giuseppe (Pavia), Schoenlieb, Carola-Bibiane (Cambridge), Seis, Christian (Bonn), Slepcev, Dejan (Pittsburgh), Sturm, Karl-Theodor (Bonn), Tang, Quoc Bao (Graz), von Renesse, Max (Leipzig), Waldspurger, Irène (Paris), Wolansky, Gershon (Haifa), Yao, Yao (Atlanta), Zimmer, Johannes (Bath)

12.02. – 18.02.2017 **Set Theory**

Organizers: Ilijas Farah, Toronto
Sy-David Friedman, Wien
Ralf Schindler, Münster
Hugh Woodin, Cambridge MA

Abstract

Forcing and inner model theory were introduced by Kurt Gödel and Paul Cohen in their spectacular resolution of David Hilbert's First Problem, Georg Cantor's Continuum Hypothesis. Sophisticated refinements of these two methods, as well as applications of set theory, were the major themes of this successful workshop, simultaneously showing diversity and coherence of the subject. The workshop included 29 selected talks and was attended by 53 participants.

Participants

Aspero, David (Norwich), Atmai, Rachid (Wien), Ben-Neria, Omer (Los Angeles), Brendle, Jörg (Kobe), Chan, William C. (Pasadena), Conley, Clinton T. (Pittsburgh), Cramer, Scott (Piscataway), Cummings, James W. (Pittsburgh), Farah, Ilijas (Toronto), Foreman, Matthew D. (Irvine), Friedman, Sy-David (Wien), Gitik, Moti (Ramat Aviv, Tel Aviv), Hachtman, Sherwood (Chicago), Hayut, Yair (Jerusalem), Horowitz, Haim (Jerusalem), Hrusak, Michael (Morelia), Jackson, Stephen C. (Denton), Jensen, Ronald Björn (Berlin), Koepke, Peter (Bonn), Kojman, Menachem (Beer-Sheva), Krueger, John (Denton), Kwiatkowska, Aleksandra (Münster), Larson, Paul B. (Oxford), Magidor, Menachem (Jerusalem), Marks, Andrew (Los Angeles), Melleray, Julien (Villeurbanne), Mildenberger, Heike (Freiburg i. Br.), Mitchell, William J. (Gainesville), Moore, Justin Tatch (Ithaca), Nguyen Van The, Lionel (Marseille), Raghavan, Dilip (Singapore), Rinot, Assaf (Ramat Gan), Sargsyan, Grigor (Piscataway), Schindler, Ralf-Dieter (Münster), Schlutzenberg, Farmer (Münster), Sinapova, Dima (Chicago), Solecki, Slawomir (Urbana), Soukup, Daniel T. (Wien), Steel, John R. (Berkeley), Thomas, Simon (Piscataway), Todorcevic, Stevo (Paris), Törnquist, Asger (København), Tsankov, Todor (Paris), Tserunyan, Anush (Urbana), Tucker-Drob, Robin (College Station), Unger, Spencer (Los Angeles), Velickovic, Boban D. (Paris), Viale, Matteo (Torino), Wilson, Trevor (Oxford), Woodin, W. Hugh (Cambridge), Zapletal, Jindrich (Gainesville), Zeman, Martin (Irvine), Zhu, Yizheng (Münster)

19.02. – 25.02.2017 **Representation Theory of Quivers and Finite Dimensional Algebras**

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

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

Participants
Angeleri Hügel, Lidia (Verona), Bennett-Tennenhaus, Raphael (Leeds), Boalch, Philip (Orsay), Bobinski, Grzegorz (Torun), Brion, Michel (Saint-Martin-d'Hères), Brüstle, Thomas (Sherbrooke), Buan, Aslak Bakke (Trondheim), Burban, Igor (Köln), Conde, Teresa (Stuttgart), Crawley-Boevey, William (Bielefeld), Dönmez, Arif (Bochum), Erdmann, Karin (Oxford), Geiss, Christof (México), Geuenich, Jan (Bonn), Herschend, Martin (Uppsala), Hille, Lutz (Münster), Hiroe, Kazuki (Saitama), Hubery, Andrew (Bielefeld), Iyama, Osamu (Nagoya), Iyengar, Srikanth B. (Salt Lake City), Jasso, Gustavo (Bonn), Kimura, Yuta (Nagoya), King, Alastair D. (Bath), Kinser, Ryan (Iowa City), König, Steffen (Stuttgart), Krause, Henning (Bielefeld), Külshammer, Julian (Stuttgart), Kvamme, Sondre (Bonn), Laking, Rosanna D. (Bonn), Lampe, Philipp (Bielefeld), Leclerc, Bernard (Caen), Lenzing, Helmut (Paderborn), Marsh, Robert J. (Leeds), Minamoto, Hiroyuki (Osaka), Oppermann, Steffen (Trondheim), Pevtsova, Julia (Seattle), Plamondon, Pierre-Guy (Orsay), Reineke, Markus (Bochum), Reiten, Idun (Trondheim), Sauter, Julia (Bielefeld), Scherotzke, Sarah (Bonn), Schiffler, Ralf (Storrs), Schröer, Jan (Bonn), Skowronski, Andrzej (Torun), Solberg, Oyvind (Trondheim), Stevenson, Greg (Bielefeld), Stovicek, Jan (Praha), Stroppel, Catharina (Bonn), Thomas, Hugh R. (Montreal), Weist, Thorsten (Wuppertal), Xiao, Jie (Beijing), Buchweitz, Ragnar-Olaf (Toronto)

26.02. – 04.03.2017 **Mathematics of Quantitative Finance**

Organizers: Peter Friz, Berlin
Antoine Jacquier, London
Josef Teichmann, Zürich

Abstract

The field of Quantitative Finance is not owned by mathematics: statistics, computer science, economics and even physics (econophysics) all have contributed and continue to contribute to this field. That said, there is a rich community within mathematics that is devoted to further applications of mathematics to finance. We could not possibly attempt to tackle all directions of ongoing research in this meeting, but we believe it is part of the beauty of this subject that some of the most important recent developments in the field are inspired quite directly by problems from industry. This workshop focused on cutting edge areas of mathematical finance, with an emphasis on the applicability of the new techniques and models presented by the participants.

Participants

Acciaio, Beatrice (London), Alfonsi, Aurélien (Marne-la-Vallée), Alòs, Elisa (Barcelona), Antonov, Alexander (New York), Bank, Peter (Berlin), Bayer, Christian (Berlin), Beiglböck, Mathias (Wien), Bernard, Carole (Grenoble), Biagini, Francesca (München), Cuchiero, Christa (Wien), De Marco, Stefano (Palaiseau), El Euch, Omar (Palaiseau), Friz, Peter K. (Berlin), Gassiat, Paul (Paris), Gatheral, Jim (New York), Gerhold, Stefan (Wien), Guyon, Julien (New York), Harms, Philipp (Freiburg i. Br.), Henry-Labordere, Pierre (Paris), Herrera, Calypso (Zürich), Horvath, Blanka (Zürich), Jacquier, Antoine (London), Kardaras, Kostas (London), Keller-Ressel, Martin (Dresden), Klein, Irene (Wien), Krühner, Paul (Wien), Lee, Roger (Chicago), Lorig, Matthew T. (Seattle), Lyons, Terence J. (Oxford), Martini, Claude (Paris), Muguruza, Aitor (London), Muhle-Karbe, Johannes (Ann Arbor), Neuman, Eyal (London), Ouyang, Cheng (Chicago), Papapantoleon, Antonis (Berlin), Pham, Huyen (Paris), Picarelli, Athena (Oxford), Pigato, Paolo (Vandoeuvre-lès-Nancy), Rosenbaum, Mathieu (Paris), Ruf, Johannes (London), Shkolnikov, Mykhaylo (Princeton), Soner, H. Mete (Zürich), Stemper, Benjamin (Berlin), Stone, Henry (London), Tangpi, Ludovic (Wien), Tankov, Peter (Paris), Tehranchi, Mike (Cambridge), Teichmann, Josef (Zürich), Touzi, Nizar (Palaiseau), Wang, Tai-Ho (New York), Zhang, Yuchong (New York)

05.03. – 11.03.2017 **Real Algebraic Geometry With a View Toward Moment Problems and Optimization**

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

Abstract
Continuing the tradition initiated in the MFO workshop held in 2014, the aim of this workshop was to foster the interaction between real algebraic geometry, operator theory, optimization, and algorithms for systems control. A particular emphasis was given to moment problems through an interesting dialogue between researchers working on these problems in finite and infinite dimensional settings, from which emerged new challenges and interdisciplinary applications.

Participants
Albeverio, Sergio (Bonn), Ball, Joseph A. (Blacksburgh), Berg, Christian (København), Blekherman, Greg (Atlanta), Bränden, Petter (Stockholm), Burgdorf, Sabine (Amsterdam), Cimpric, Jaka (Ljubljana), Curto, Raul E. (Iowa City), de Laat, David (Delft), di Dio, Philipp (Leipzig), Dritschel, Michael A. (Newcastle upon Tyne), Dykema, Ken (College Station), Fialkow, Lawrence A. (New Paltz), Goel, Charu (Punjab), Gondard, Danielle (Paris), Hanselka, Christoph (Auckland), Helton, J. William (La Jolla), Henrion, Didier (Toulouse), Infusino, Maria (Konstanz), Joao Oliveira, Maria (Lisboa), Klep, Igor (Auckland), Knese, Gregory E. (St. Louis), Kriel, Tom-Lukas (Konstanz), Kuhlmann, Salma (Konstanz), Kummer, Mario (Leipzig), Kuna, Tobias (Reading), Laurent, Monique (Amsterdam), Lerario, Antonio (Trieste), Lopez-Quijorna, Maria (Konstanz), Lytvynov, Eugene (Swansea), McCullough, Scott (Gainesville), Mourrain, Bernard (Sophia-Antipolis), Müller, Simon (Konstanz), Netzer, Tim (Innsbruck), Plaumann, Daniel (Dortmund), Powers, Victoria (Atlanta), Prestel, Alexander (Konstanz), Reznick, Bruce (Urbana), Roy, Marie-Francoise (Rennes), Scheiderer, Claus (Konstanz), Schmüdgen, Konrad (Leipzig), Schulze, Christoph (Konstanz), Schweighofer, Markus (Konstanz), Sinn, Rainer (Atlanta), Stoyanov, Jordan (Sofia), Theobald, Thorsten (Frankfurt am Main), Thom, Andreas B. (Dresden), Tuncel, Levent (Waterloo), Vallentin, Frank (Köln), Vinnikov, Victor (Konstanz), Vinzant, Cynthia (Raleigh), Volcic, Jurij (Auckland), Woerdeman, Hugo J. (Philadelphia), Yomdin, Yosef N. (Rehovot)

12.03. – 18.03.2017 **Space-time Methods for Time-dependent Partial Differential Equations**

Organizers: Ricardo Nochetto, College Park
Stefan Sauter, Zürich
Christian Wieners, Karlsruhe

Abstract
Modern discretizations of time-dependent PDEs consider the full problem in the space-time cylinder and aim to overcome limitations of classical approaches such as the method of lines and the Rothe method. A main advantage of a holistic space-time method is the direct access to space-time adaptivity and to the backward problem. Moreover, this allows for parallel solution strategies simultaneously in time and space. Several space-time concepts where proposed but this topic has become a rapidly growing field in numerical analysis and scientific computing. In this workshop the focus was the development of adaptive and flexible space-time discretization methods for solving parabolic and hyperbolic space-time partial differential equations.

Participants
Akrivis, Georgios (Ioannina), Banjai, Lehel (Edinburgh), Behr, Marek (Aachen), Bonito, Andrea (College Station), Carstensen, Carsten (Berlin), Diao, Hanzhi (Zürich), Dörfler, Willy (Karlsruhe), Ernesti, Johannes (Karlsruhe), Falletta, Silvia (Torino), Gander, Martin (Genève), Gopalakrishnan, Jay (Portland), Grote, Marcus (Basel), Hiptmair, Ralf (Zürich), Hochbruck, Marlis (Karlsruhe), Joly, Patrick (Palaiseau), Kachanovska, Maryna (Palaiseau), Kanschat, Guido (Heidelberg), Köcher, Uwe (Hamburg), Krause, Rolf (Lugano), Lakkis, Omar (Bolzano), Langer, Ulrich (Linz), Larson, Mats G. (Umeå), Larsson, Stig (Göteborg), Leykekhman, Dmitriy (Groton), Lopez-Fernandez, Maria (Roma), Makridakis, Charalambos (Brighton), Melenk, Jens M. (Wien), Moiola, Andrea (Reading), Monk, Peter (Newark), Neumüller, Martin (Linz), Nochetto, Ricardo H. (College Park), Otárola, Enrique (Valparaiso), Reusken, Arnold (Aachen), Salgado, Abner J. (Knoxville), Sauter, Stefan A. (Zürich), Sayas, Francisco J. (Newark), Schanz, Martin (Graz), Schöberl, Joachim (Wien), Schwab, Christoph (Zürich), Smears, Iain (Paris), Steinbach, Olaf (Graz), Stevenson, Rob P. (Amsterdam), Torres, Céline (Zürich), Veeser, Andreas (Milano), Vohralik, Martin (Paris), Wieners, Christian (Karlsruhe), Wihler, Thomas P. (Bern), Wintersteiger, Christoph (Wien), Zakerzadeh, Mohammad (Aachen)

19.03. – 25.03.2017 **Statistical Recovery of Discrete, Geometric and Invariant Structures**

Organizers: Peter Bühlmann, Zürich
Axel Munk, Göttingen
Martin Wainwright, Berkeley
Bin Yu, Berkeley

Abstract
The main objective of the workshop was to bring together researchers in mathematical statistics and related areas in order to discuss recent advances and problems associated with statistical recovery of geometric and invariant structures. Topics include adaptive estimation, confidence sets and testing techniques, as well as statistical algorithms for geometrical structure recovery and data analysis.

Participants
Aue, Alexander (Davis), Balakrishnan, Sivaraman (Pittsburgh), Behr, Merle (Göttingen), Belkin, Misha (Columbus), Blanchard, Gilles (Potsdam), Bühlmann, Peter (Zürich), Candes, Emmanuel (Stanford), Cuturi, Marco (Palaiseau), del Alamo, Miguel (Göttingen), Derumigny, Alexis (Malakoff), Dette, Holger (Bochum), Donoho, David L. (Stanford), Dümbgen, Lutz (Bern), Dwivedi, Raaz (Berkeley), Elsener, Andreas (Zürich), Huckemann, Stephan (Göttingen), König, Claudia (Göttingen), Kovacs, Solt (Zürich), Levina, Elizaveta (Ann Arbor), Mammen, Enno (Heidelberg), Meinshausen, Nicolai (Zürich), Mukherjee, Sayan (Durham), Munk, Axel (Göttingen), Nguyen, Long (Ann Arbor), Nickl, Richard (Cambridge), Olhede, Sofia (London), Panaretos, Victor (Lausanne), Peters, Jonas (København), Pfister, Niklas (Zürich), Polonik, Wolfgang (Davis), Reiß, Markus (Berlin), Richardson, Thomas S. (Seattle), Rigollet, Philippe (Cambridge), Rinaldo, Alessandro (Pittsburgh), Rohde, Angelika (Freiburg i. Br.), Rothenhäusler, Dominik (Zürich), Samworth, Richard (Cambridge), Schmidt-Hieber, Johannes (Leiden), Shah, Rajen Dinesh (Cambridge), Sommerfeld, Max (Göttingen), Spokoiny, Vladimir G. (Berlin), Thanei, Gian (Zürich), Tsybakov, Alexandre B. (Palaiseau), van de Geer, Sara (Zürich), Vu, Vincent (Columbus), Wainwright, Martin (Berkeley), Wei, Yuting (Berkeley), Yi, Grace (Waterloo), Yuan, Ming (Madison), Zemel, Yoav (Lausanne), Zhao, Linda (Philadelphia), Zhou, Huibin (New Haven)

26.03. – 01.04.2017 **Multiscale and High-Dimensional Problems**

Organizers: Albert Cohen, Paris
Wolfgang Dahmen, Aachen
Ronald A. DeVore, College Station
Angela Kunoth, Köln

Abstract

High-dimensional problems cannot be solved by traditional numerical techniques, because of the so-called curse of dimensionality. They require novel theoretical and computational approaches to make them tractable and to capture fine resolutions and relevant features. Increasing computational power may even serve to heighten this demand, since the wealth of new computational data itself becomes a major obstruction. Extracting essential information from complex structures and developing rigorous models to quantify the quality of information in a high dimensional setting constitute challenging tasks from both theoretical and numerical perspective. The last decade has seen the emergence of several new methodologies which address the obstacles to solving high dimensional problems. Their common features are the nonlinearity of the solution method that prioritize variables and separate solution characteristics living on different scales. These methods have drastically advanced the frontiers of computability for certain problem classes.

Participants

Adcock, Ben (Burnaby), Bach, Francis (Paris), Bachmayr, Markus (Bonn), Bajaj, Chandrajit (Austin), Berkels, Benjamin (Aachen), Binev, Peter G. (Columbia), Bonito, Andrea (College Station), Boschert, Sandra (Köln), Canuto, Claudio (Torino), Chkifa, Abdellah (Ben Guerrir), Cohen, Albert (Paris), Dahlke, Stephan (Marburg), Dahmen, Wolfgang (Aachen), Daubechies, Ingrid (Durham), DeVore, Ronald A. (College Station), Dyn, Nira (Tel Aviv), Ehrlacher, Virginie (Marne-la-Vallée), Foucart, Simon (College Station), Glas, Silke (Ulm), Grasedyck, Lars (Aachen), Hackbusch, Wolfgang (Leipzig), Hansen, Anders C. (Cambridge), Harbrecht, Helmut (Basel), Kerkyacharian, Gerard (Paris), Klewinghaus, Angela (Aachen), Kunisch, Karl (Graz), Kunoth, Angela (Köln), Leweke, Samuel (Köln), Migliorati, Giovanni (Paris), Müller, Siegfried (Aachen), Nichols, James Ashton (Paris), Nobile, Fabio (Lausanne), Nochetto, Ricardo H. (College Park), Oseledets, Ivan (Moscow), Oswald, Peter (Bonn), Petrushev, Pencho P. (Columbia), Picard, Dominique (Paris), Popov, Bojan (College Station), Rauhut, Holger (Aachen), Schneider, Reinhold (Berlin), Schwab, Christoph (Zürich), Shadrin, Alexei (Cambridge), Stemick, Johannes (Aachen), Stevenson, Rob P. (Amsterdam), Temlyakov, Vladimir N. (Columbia), Ullrich, Tino (Bonn), Urban, Karsten (Ulm), Uschmajew, Andre (Bonn), Webster, Clayton G. (Oak Ridge), Welper, Gerrit (Los Angeles), Wojtaszczyk, Przemek (Warszawa), Wozniakowski, Henryk (New York), Yserentant, Harry (Berlin)

09.04. – 15.04.2017 **Discrete Geometry**

Organizers: Imre Barany, London
Xavier Goaoc, Marne-la-Vallee
Günter Rote, Berlin

Abstract

A number of important recent developments in various branches of discrete geometry were presented at the workshop. The presentations illustrated both the diversity of the area and its strong connections to other fields of mathematics such as topology, combinatorics or algebraic geometry. The open questions abound and many of the results presented were obtained by young researchers, confirming the great vitality of discrete geometry.

Participants

Adiprasito, Karim A. (Leipzig), Akopyan, Arseniy (Klosterneuburg), Aronov, Boris (Brooklyn), Barany, Imre (London), Barvinok, Alexander (Ann Arbor), Blagojevic, Pavle (Berlin), Bukh, Boris (Pittsburgh), Clarkson, Kenneth L. (San Jose), Dobbins, Michael G. (Binghamton), Dolnikov, Vladimir L. (Moscow), Furedi, Zoltan (Budapest), Goaoc, Xavier (Marne-la-Vallée), Gundert, Anna (Köln), Holmsen, Andreas (Daejeon), Karasev, Roman N. (Moscow), Kupavskii, Andrey (Lausanne), Kyncl, Jan (Praha), Lund, Ben (Piscataway), Magazinov, Alexander (Tel Aviv), Meunier, Frédéric (Marne-la-Vallée), Montejano, Luis (México), Mulzer, Wolfgang (Berlin), Mustafa, Nabil (Marne-la-Vallée), Nevo, Eran (Jerusalem), Oliveros, Deborah (México), Pach, Janos (Lausanne), Padrol, Arnau (Paris), Palvölgyi, Dömötör (Budapest), Paták, Pavel (Jerusalem), Patáková, Zuzana (Klosterneuburg), Pournin, Lionel (Villetaneuse), Raz, Orit (Princeton), Roldán-Pensado, Edgardo (Juriquilla Queretaro), Rote, Günter (Berlin), Rubin, Natan (Beer-Sheva), Santos, Francisco (Santander), Sharir, Micha (Tel Aviv), Solomon, Noam (Tel Aviv), Solymosi, József (Vancouver), Swanepoel, Konrad (London), Tiwary, Hans Raj (Praha), Tóth, Csaba Dávid (Northridge), Tóth, Géza (Budapest), Vallentin, Frank (Köln), Valtr, Pavel (Praha), Vogtenhuber, Birgit (Graz), Wagner, Uli (Klosterneuburg), Welzl, Emo (Zürich), Zahl, Joshua (Vancouver), Zerbib, Shira (Ann Arbor), Ziegler, Günter M. (Berlin)

16.04. – 22.04.2017 **Algebraic Statistics**

Organizers: Mathias Drton, Seattle
Thomas Kahle, Magdeburg
Bernd Sturmfels, Berkeley
Caroline Uhler, Cambridge MA

Abstract

Algebraic Statistics is concerned with the interplay of techniques from commutative algebra, combinatorics, (real) algebraic geometry, and related fields with problems arising in statistics and data science. This workshop was the first at Oberwolfach dedicated to this emerging subject area. The participants highlighted recent achievements in this field, explored exciting new applications, and mapped out future directions for research.

Participants

Allman, Elizabeth S. (Fairbanks), Améndola Cerón, Carlos Enrique (Berlin), Bränden, Petter (Stockholm), Bühlmann, Peter (Zürich), Casanellas, Marta (Barcelona), Cifuentes, Diego (Cambridge), Deistler, Manfred (Wien), Draisma, Jan (Eindhoven), Drton, Mathias (Seattle), Duarte, Eliana M. (Urbana), Evans, Robin (Oxford), Garcia-Puente, Luis D. (Huntsville), Gross, Elizabeth (San Jose), Groß, David (Köln), Haase, Christian (Berlin), Horobet, Emil (Târgu-Mureş), Huckemann, Stephan (Göttingen), Kahle, Thomas (Magdeburg), Kateri, Maria (Aachen), Kubjas, Kaie (Aalto), Kummer, Mario (Konstanz), Kuriki, Satoshi (Tokyo), Lauritzen, Steffen (København), Lin, Shaowei (Singapore), Martini, Johannes (Göttingen), Matúš, František (Praha), Mohammadi, Fatameh (Berlin), Montufar, Guido F. (Leipzig), Morton, Jason (University Park), Ottaviani, Giorgio (Firenze), Parrilo, Pablo A. (Cambridge), Peters, Jonas (København), Petrovic, Sonja (Chicago), Plaumann, Daniel (Dortmund), Riccomagno, Eva (Genova), Robeva, Elina (Cambridge), Rodriguez, José (Chicago), Römer, Tim (Osnabrück), Rousseau, Judith (Paris), Seigal, Anna (Berkeley), Solus, Liam T. (Lexington), Studený, Milan (Praha), Sturmfels, Bernd (Berkeley), Sullivant, Seth (Raleigh), Thomas, Ashleigh (Durham), Torres, Jacinta (Bonn), Uhler, Caroline (Cambridge), Weihs, Luca (Seattle), Windisch, Tobias (Magdeburg), Wynn, Henry P. (London), Yoshida, Ruriko (Monterey), Zwiernik, Piotr Wiktor (Barcelona)

23.04. – 29.04.2017 **Algebraic Groups**

Organizers: Corrado De Concini, Roma
Peter Littelmann, Köln
Zinovy Reichstein, Vancouver

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. 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), Achet, Raphael (Saint-Martin-d'Hères), Anderson, Dave (Columbus), Baumann, Pierre (Strasbourg Cedex), Bossinger, Lara (Köln), Braverman, Alexander (Toronto), Bravi, Paolo (Roma), Brion, Michel (Saint-Martin-d'Hères), Brosnan, Patrick (College Park), Cupit-Foutou, Stephanie (Bochum), De Concini, Corrado (Roma), Duncan, Alexander R. (Columbia), Florence, Mathieu (Paris), Gabber, Ofer (Bures-sur-Yvette), Gaussent, Stéphane (Saint-Étienne), Gille, Philippe (Villeurbanne), Gordon, Iain (Edinburgh), Harada, Megumi (Hamilton), Henderson, Anthony (Sydney), Hernandez, David (Paris), Jantzen, Jens Carsten (Aarhus), Juteau, Daniel (Paris), Karpenko, Nikita (Edmonton), Kaveh, Kiumars (Pittsburgh), Khovanskii, Askold (Toronto), Knop, Friedrich (Erlangen), Kumar, Shrawan (Chapel Hill), Lemire, Nicole (London), Littelmann, Peter (Köln), Maffei, Andrea (Pisa), Malle, Gunter (Kaiserslautern), Opdam, Eric M. (Amsterdam), Panyushev, Dmitri I. (Moscow), Pezzini, Guido (Roma), Pirisi, Roberto (Vancouver), Premet, Alexander (Manchester), Procesi, Claudio (Roma), Reichstein, Zinovy (Vancouver), Ressayre, Nicolas (Villeurbanne), Riche, Simon (Aubière), Röhrle, Gerhard (Bochum), Rosengarten, Zev (Stanford), Schlichtkrull, Henrik (København), Schumann, Beatrix (Köln), Soergel, Wolfgang (Freiburg i. Br.), Stroppel, Catharina (Bonn), Tange, Rudolf H. (Leeds), Testerman, Donna M. (Lausanne), Torres, Jacinta (Leipzig), Vasserot, Eric (Paris Cedex), Williamson, Geordie (Bonn), Yakimova, Oksana (Jena), Zainoulline, Kirill (Ottawa)

30.04. – 06.05.2017

O-Minimality and its Applications to Number Theory and Analysis

Organizers: Tobias Kaiser, Passau
Jonathan Pila, Oxford
Patrick Speissegger, Hamilton
Alex Wilkie, Oxford

Abstract

The workshop brought together researchers in the areas of o-minimal structures, analysis and number theory. The latest developments in o-minimality and their applications to number theory and analysis were presented in a series of talks. One focus, in particular, was on the Pila-Wilkie Theorem and its impact on diophantine problems. Other main topics of the workshop were general o-minimal geometry and how tame geometric properties of o-minimal structures lead to new insights in analysis.

Participants

Barroero, Fabrizio (Basel), Basu, Saugata (West Lafayette), Bertrand, Daniel (Paris), Binyamini, Gal (Rehovot), Capuano, Laura (Oxford), Chambert-Loir, Antoine (Paris), Chatzidakis, Zoé (Paris), Ciray, Derya (Konstanz), Cluckers, Raf (Villeneuve-d'Ascq), Comte, Georges (Le Bourget-du-Lac), Daw, Christopher M. (Reading), Edmundo, Mario Jorge (Lisboa), Eleftheriou, Pantelis (Konstanz), Frei, Christopher (Graz), Freitag, James (Chicago), Gabrielov, Andrei (West Lafayette), Galal, Zeinab (Paris), Habegger, Philipp (Basel), Jones, Gareth Owen (Manchester), Kaiser, Tobias (Passau), Kurdyka, Krzysztof (Le Bourget-du-Lac), Le Gal, Olivier (Chambery), Loeser, Francois (Paris), Loi, Ta Le (Dalat, Lamdong), MacIntyre, Angus John (Edinburgh), Marikova, Jana (Macomb), Miller, Chris (Columbus), Novikov, Dmitry (Rehovot), Orr, Martin (London), Parusinski, Adam (Nice), Pawlucki, Wieslaw (Kraków), Peterzil, Kobi (Haifa), Pieropan, Marta (Berlin), Pila, Jonathan (Oxford), Rainer, Armin (Wien), Randriambololona, Serge (Ortaköy, Istanbul), Rolin, Jean-Philippe (Dijon), Rozen, Zofia (Kraków), Sanz, Fernando (Valladolid), Scanlon, Thomas W. (Berkeley), Schmidt, Harry (Oxford), Servi, Tamara (Paris), Speissegger, Patrick (Hamilton), Spence, Haden (Oxford), Starchenko, Sergei S. (Notre Dame), Thomas, Margaret E. (Konstanz), Vorobjov, Nicolai N. (Bath), Widmer, Martin (Egham), Wilkie, Alex (Oxford), Yafaev, Andrei (London), Yakovenko, Sergei (Rehovot), Yomdin, Yosef N. (Rehovot)

07.05. – 13.05.2017 **Geophysical Fluid Dynamics**

Organizers: Yoshikazu Giga, Tokyo
Matthias Hieber, Darmstadt
Edriss S. Titi, College Station/Rehovot

Abstract

The workshop addressed recent advances in analytical, stochastic, modeling and computational studies of geophysical fluid models. Of central interest were the reduced geophysical models, that are derived by means of asymptotic and scaling techniques, and their investigations by methods from the above disciplines. In particular, contributions concerning the viscous and inviscid geostrophic models, the primitive equations of oceanic and atmospheric dynamics, tropical atmospheric models and their coupling to nonlinear dynamics of phase changes moisture, thermodynamical effects, stratifying effects, as well as boundary layers were presented and discussed.

Participants

Brenier, Yann (Palaiseau), Fang, Daoyuan (Hangzhou), Farhat, Aseel (Charlottesville), Feireisl, Eduard (Praha), Flandoli, Franco (Pisa), Förster, Clemens G. (Leipzig), Ghoul, Tej-eddine (Abu Dhabi), Giga, Mi-Ho (Tokyo), Giga, Yoshikazu (Tokyo), Gries, Mathis (Darmstadt), Hieber, Matthias (Darmstadt), Hittmeir, Sabine (Wien), Hussein, Amru (Darmstadt), Ibrahim, Slim (Victoria), Kashiwabara, Takahito (Tokyo), Khouider, Boualem (Victoria), Klein, Rupert (Berlin), Korn, Peter (Hamburg), Kukavica, Igor (Los Angeles), Li, Jinkai (Shatin, Hong Kong), Maekawa, Yasunori (Kyoto), Mahalov, Alex (Tempe), Mazzucato, Anna (University Park), Miura, Tatsu-Hiko (Tokyo), Mondaini, Cecilia (Providence), Monniaux, Sylvie (Marseille), Mucha, Piotr B. (Warszawa), Nguyen, Thieu-Huy (Hanoi), Novotny, Antonin (La Garde), Pal Choudhury, Anupam (Darmstadt), Prüß, Jan (Halle/Saale), Pütz, Christopher (Berlin), Saal, Jürgen (Düsseldorf), Saal, Martin (Darmstadt), Schlutow, Mark (Berlin), Shibata, Yoshihiro (Tokyo), Smith, Leslie (Madison), Stechmann, Samuel N. (Madison), Szekelyhidi Jr., Laszlo (Leipzig), Takada, Ryo (Fukuoka), Titi, Edriss S. (Rehovot), Tolksdorf, Patrick (Darmstadt), Tribbia, Joe (Boulder), Tuffaha, Amjad (Sharjah), Vallis, Geoffrey K. (Exeter), Wingate, Beth (Exeter), Yoneda, Tsuyoshi (Tokyo), Ziane, Mohammed (Los Angeles)

14.05. – 20.05.2017 **Computational Inverse Problems for Partial Differential Equations**

Organizers: Liliana Borcea, Ann Arbor
Thorsten Hohage, Göttingen
Barbara Kaltenbacher, Klagenfurt

Abstract
The problem of determining unknown quantities in a PDE from measurements of (part of) the solution to this PDE arises in a wide range of applications in science, technology, medicine, and finance. The unknown quantity may e.g. be a coefficient, an initial or a boundary condition, a source term, or the shape of a boundary. The identification of such quantities is often computationally challenging and requires profound knowledge of the analytical properties of the underlying PDE as well as numerical techniques. The focus of this workshop was on applications in phase retrieval, imaging with waves in random media, and seismology of the earth and the sun, a further emphasis was put on stochastic aspects in the context of uncertainty quantification and parameter identification in stochastic differential equations.

Participants
Agaltsov, Alexey (Palaiseau), Arridge, Simon R. (London), Bender, Christian (Saarbrücken), Borcea, Liliana (Ann Arbor), Chabassier, Juliette (Pau), Cherkaev, Elena (Salt Lake City), Clason, Christian (Essen), de Hoop, Maarten V. (Houston), Druskin, Vladimir L. (Cambridge), Dunker, Fabian (Göttingen), Egger, Herbert (Darmstadt), Faucher, Florian (Pau), Fournier, Damien (Göttingen), Garnier, Josselin (Palaiseau), Gillman, Adrianna (Houston), Gizon, Laurent (Göttingen), Gomez, Christophe (Marseille), Griesmaier, Roland (Würzburg), Guevara Vasquez, Fernando (Salt Lake City), Hanke-Bourgeois, Martin (Mainz), Hiptmair, Ralf (Zürich), Hohage, Thorsten (Göttingen), Kaipio, Jari (Auckland), Kaltenbacher, Barbara (Klagenfurt), Kirsch, Andreas (Karlsruhe), Maaß, Peter (Bremen), Mamonov, Alexander (Houston), Maretzke, Simon (Göttingen), Meng, Shixu (Minneapolis), Moskow, Shari (Philadelphia), Novikov, Alexei (University Park), Novikov, Roman G. (Palaiseau), Pokern, Yvo (London), Previatti, Mario (Klagenfurt), Reiß, Markus (Berlin), Ren, Kui (Austin), Rieder, Andreas (Karlsruhe), Scherzer, Otmar (Wien), Schoenlieb, Carola-Bibiane (Cambridge), Schotland, John C. (Ann Arbor), Schuster, Thomas (Saarbrücken), Siltanen, Samuli (University of Helsinki), Stadler, Georg (New York), Stannat, Wilhelm (Berlin), Tarvainen, Tanja (Kuopio), von Harrach, Bastian (Frankfurt am Main), Weidling, Frederic (Göttingen), Zaslavsky, Mikhail (Cambridge), Zeltmann, Uwe (Karlsruhe)

21.05. – 27.05.2017 **Harmonic Analysis and the Trace Formula**

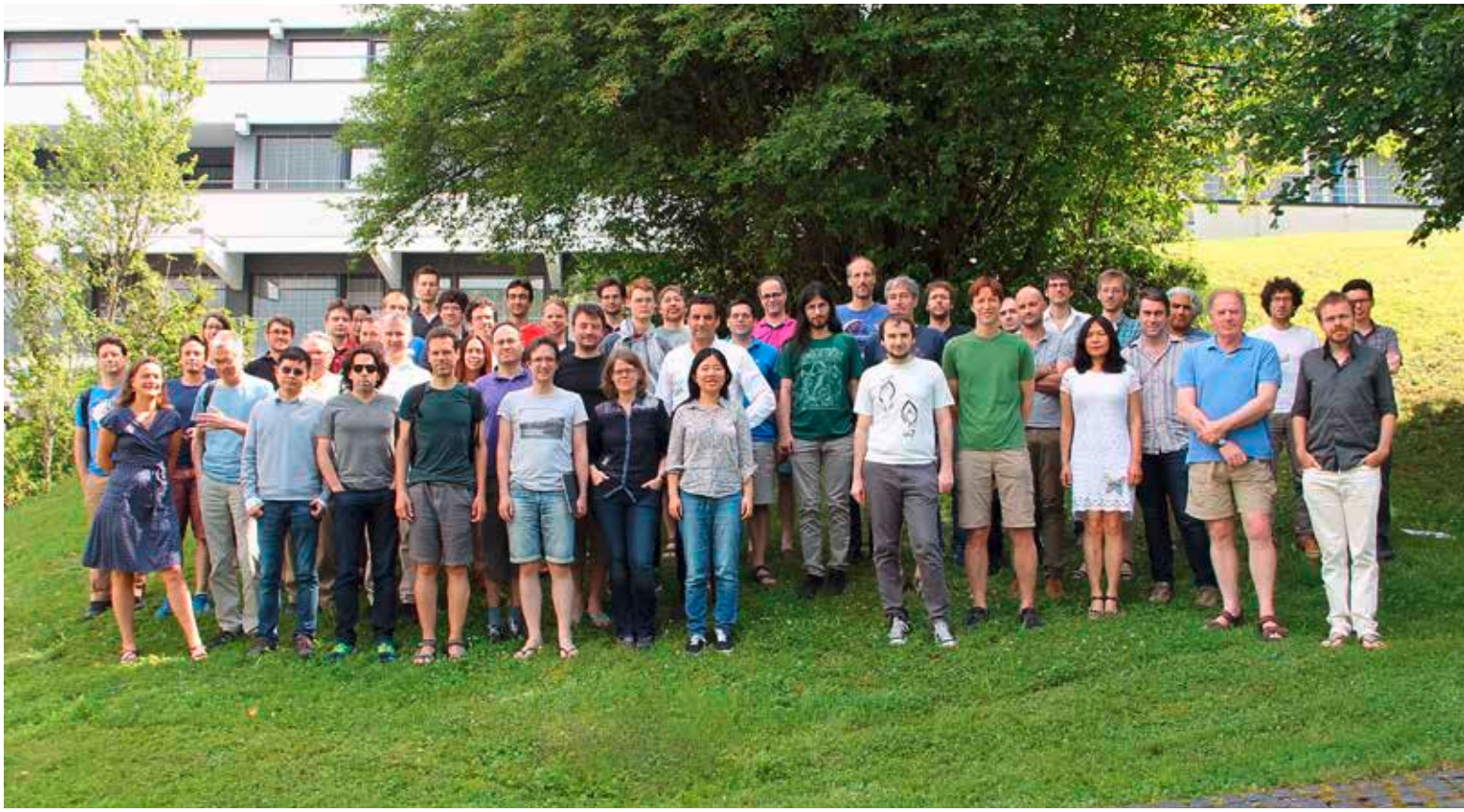
Organizers: Werner Müller, Bonn
Sug Woo Shin, Berkeley
Birgit Speh, Ithaca
Nicolas Templier, Ithaca

Abstract

The Oberwolfach Workshop brought together 50 participants. There were 25 talks of 45 minutes each. A motivation of the subject can be seen from the far-reaching reciprocity and functoriality conjectures of Langlands, according to which all reasonable *L*-functions arising from Galois representations, arithmetic geometry and harmonic analysis should be automorphic. One of the main tools to study automorphic *L*-functions is the Arthur-Selberg trace formula. The trace formula is used to globalize local representations into global automorphic forms, and it is essential in the concept of families where one studies an object by deforming it. The trace formula continues to motivate a wide-range of techniques in algebra, representation theory on p-adic, real and adelic groups, in analysis, and in differential and algebraic geometry. The purpose of this workshop was to discuss recent results in harmonic analysis that arise in the study of the trace formula.

Participants

Altug, Ali (Cambridge), Arthur, James (Toronto), Beuzart-Plessis, Raphael (Paris), Blomer, Valentin (Göttingen), Brumley, Farrell (Villetaneuse Cedex), Chaudouard, Pierre-Henri (Paris), Chenevier, Gaetan (Orsay), Cunningham, Clifton (Calgary), Delorme, Patrick (Marseille), Fedosova, Ksenia (Göteborg), Finis, Tobias (Leipzig), Gan, Wee-Teck (Singapore), Getz, Jayce Robert (Durham), Gordon, Julia (Vancouver), Grobner, Harald (Wien), Harder, Günter (Bonn), He, Xuhua (College Park), Heiermann, Volker (Marseille), Hoffmann, Werner (Bielefeld), Kaletha, Tasho (Princeton), Kobayashi, Toshiyuki (Tokyo), Kret, Arno (Amsterdam), Labesse, Jean-Pierre (Marseille), Lapid, Erez M. (Rehovot), Li, Chao (New York), Li, Wen-Wei (Beijing), Mao, Zhengyu (Newark), Marshall, Simon (Madison), Matz, Jasmin (Jerusalem), Mezo, Paul (Ottawa), Moeglin, Colette (Paris), Müller, Werner (Bonn), Murnaghan, Fiona (Toronto), Offen, Omer (Haifa), Prasad, Dipendra (Mumbai), Shahidi, Freydoon (West Lafayette), Shin, Sug Woo (Berkeley), Speh, Birgit (Ithaca), Taibi, Olivier N. (London), Takeda, Shuichiro (Columbia), Templier, Nicolas (Ithaca), Wakatsuki, Satoshi (Kanazawa), Waldspurger, Jean-Loup (Paris), Wan, Chen (Minneapolis), Wong, Tian An (Pune), Xu, Bin (Calgary), Zhang, Genkai (Göteborg), Zhang, Ruixiang (Princeton), Zhu, Yihang (Cambridge), Zydor, Michal (Rehovot)



28.05. – 03.06.2017 **Stochastic Analysis: Geometry of Random Processes**

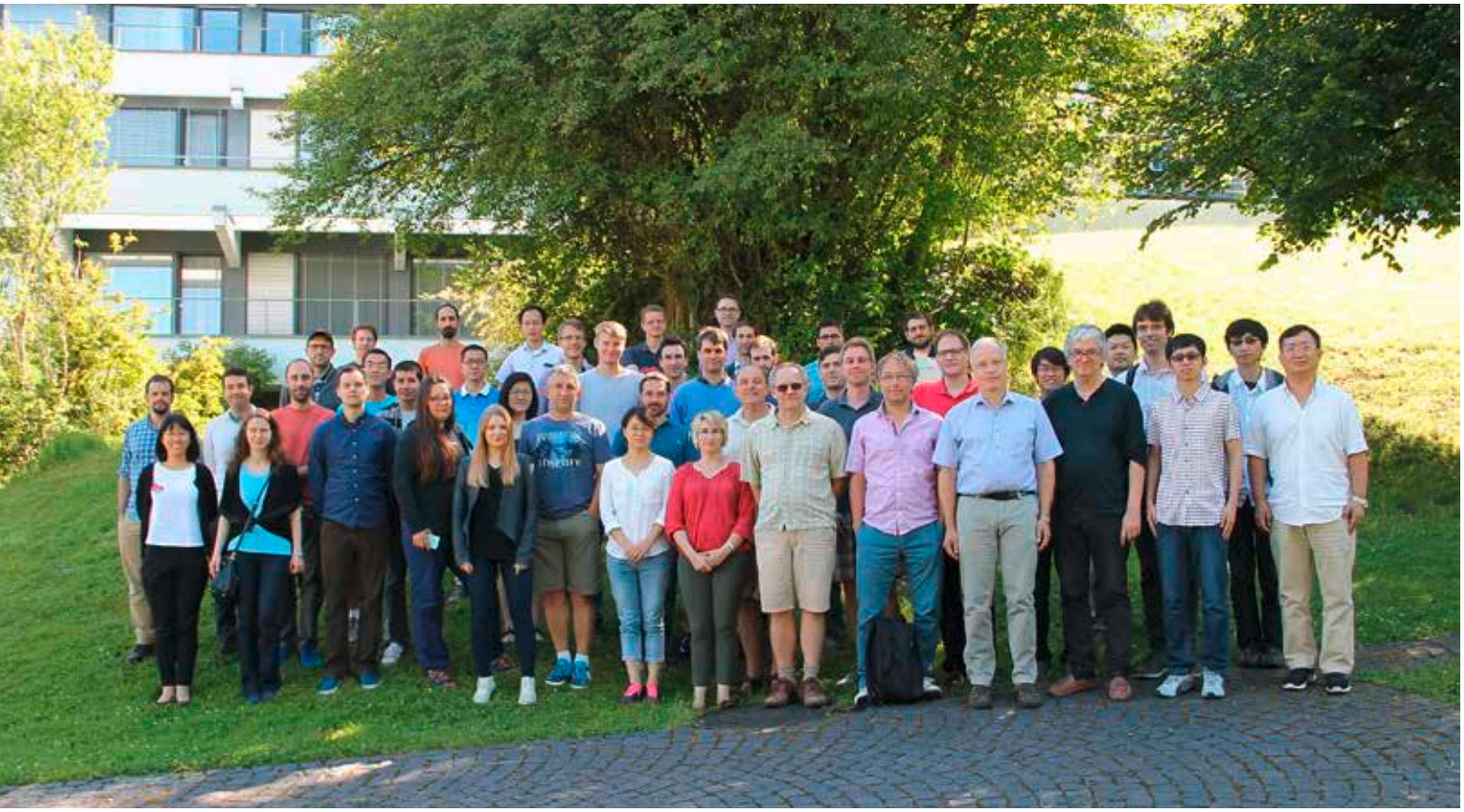
Organizers:
Alice Guionnet, Lyon
Martin Hairer, Warwick
Grégory Miermont, Lyon

Abstract

A common feature shared by many natural objects arising inprobability theory is that they tend to be very "rough", as opposed to the "smooth" objects usually studied in other branches of mathematics. It is however still desirable to understand their geometric properties, be it from a metric, a topological, or a measure-theoretic perspective. In recent years, our understanding of such "random geometries" has seen spectacular advances on a number of fronts.

Participants

Addario-Berry, Louigi (Montreal), Angel, Omer (Vancouver), Aru, Juhan (Zürich), Bailleul, Ismael (Rennes), Beffara, Vincent (Saint-Martin-d'Hères), Ben Arous, Gerard (New York), Berestycki, Nathanael (Cambridge), Bertoin, Jean (Zürich), Bouttier, Jérémie (Gif-sur-Yvette), Curien, Nicolas (Orsay), Ding, Jian (Chicago), Dubedat, Julien (New York), Duminil-Copin, Hugo (Bures-sur-Yvette), Duplantier, Bertrand (Gif-sur-Yvette), Fyodorov, Yan V. (London), Garban, Christophe (Villeurbanne), Goldschmidt, Christina (Oxford), Gorin, Vadim (Cambridge), Guionnet, Alice (Lyon), Gurel-Gurevich, Ori (Jerusalem), Gwynne, Ewain (Cambridge), Haas, Benedicte (Villetaneuse Cedex), Hairer, Martin (Coventry), Holden, Nina (Cambridge), Kassel, Adrien (Lyon), Kenyon, Richard (Providence), Khoshnevisan, Davar (Salt Lake City), Knowles, Antti (Genève), Kortchemski, Igor (Palaiseau), Kupiainen, Antti (Helsinki), Le Gall, Jean-Francois (Orsay), Le Jan, Yves (Orsay), Li, Xue-Mei (Coventry), Louidor, Oren (Haifa), Lupu, Titus (Zürich), Maillard, Pascal (Orsay), Miermont, Grégory (Lyon), Miller, Jason P. (Cambridge), Mourrat, Jean-Christophe (Lyon), Nachmias, Asaf (Vancouver), Powell, Ellen G. (Cambridge), Qian, Wei (Cambridge), Rhodes, Rémi (Marne-la-Vallée), Sepulveda, Avelio (Zürich), Sheffield, Scott (Cambridge), Sly, Allan (Berkeley), Sun, Nike (Berkeley), Toninelli, Fabio (Villeurbanne), Vargas, Vincent (Paris), Werner, Wendelin (Zürich), Wu, Hao (Genève), Zambotti, Lorenzo (Paris)



11.06. – 17.06.2017 **Nonlinear Waves and Dispersive Equations**

Organizers: Herbert Koch, Bonn
Pierre Raphael, Nice
Daniel Tataru, Berkeley
Monica Visan, Los Angeles

Abstract

Nonlinear dispersive equations are models for nonlinear waves in a wide range of physical contexts. Mathematically they display an interplay between linear dispersion and nonlinear interactions, which can result in a wide range of outcomes from finite time blow-up to solitons and scattering. They are linked to many areas of mathematics and physics, ranging from integrable systems and harmonic analysis to fluid dynamics, geometry, general relativity and probability.

Participants

Ai, Albert (Berkeley), Bedrossian, Jacob (College Park), Burq, Nicolas (Orsay), Candy, Timothy (Bielefeld), Collot, Charles (Nice), Dodson, Benjamin (Baltimore), Donninger, Roland (Bonn), Frank, Rupert L. (München), Gavrus, Cristian (Berkeley), Geba, Dan-Andrei (Rochester), Gerard, Patrick (Orsay), Guo, Zihua (Clayton), Hadzic, Mahir (London), Harrop-Griffiths, Benjamin (New York), Herr, Sebastian (Bielefeld), Ifrim, Mihaela (Berkeley), Ionescu, Alexandru D. (Princeton), Ivanovici, Oana (Nice), Jao, Casey (Berkeley), Killip, Rowan (Los Angeles), Koch, Herbert (Bonn), Lawrie, Andrew (Cambridge), Lenzmann, Enno (Basel), Liao, Xian (Bonn), Liu, Baoping (Beijing), Lührmann, Jonas (Baltimore), Marzuola, Jeremy L. (Chapel Hill), Masaki, Satoshi (Osaka), Merle, Frank (Cergy-Pontoise), Miao, Shuang (Lausanne), Munoz, Claudio (Santiago), Murphy, Jason C. (Berkeley), Oh, Sung-Jin (Seoul), Onkes, Lisa (Bonn), Pausader, Benoit (Providence), Planchon, Fabrice (Nice), Pocovnicu, Oana (Edinburgh), Pusateri, Fabio (Princeton), Raphael, Pierre (Nice), Rousset, Frédéric (Orsay), Shahshahani, Sohrab (Ann Arbor), Sohinger, Vedran (Zürich), Tataru, Daniel (Berkeley), Visan, Monica (Los Angeles), Wang, Yuzhao (Edinburgh), Wu, Sijue (Isabel) (Ann Arbor), Zhang, Xiaoyi (Iowa City), Zhao, Lifeng (Hefei)

18.06. – 24.06.2017 **Reaction Networks and Population Dynamics**

Organizers: Ellen Baake, Bielefeld
Tom Kurtz, Madison
Carsten Wiuf, Copenhagen

Abstract

Reaction systems and population dynamics constitute two highly developed areas of research that build on well-defined model classes, both in terms of dynamical systems and stochastic processes. Despite a significant core of common structures, the two fields have largely led separate lives. The workshop brought the communities together and emphasised concepts, methods and results that have, so far, appeared in one area but are potentially useful in the other as well.

Participants

Baake, Ellen (Bielefeld), Baake, Michael (Bielefeld), Bürger, Reinhard (Wien), Cappelletti, Daniele (Madison), Cordero, Fernando (Bielefeld), Craciun, Gheorghe (Madison), Dickenstein, Alicia (Buenos Aires), Doumic-Jauffret, Marie (Paris), Gupta, Ankit (Basel), Herrmann, Carolin (Bielefeld), Hilfinger, Andreas (Boston), Hofbauer, Josef (Wien), Jenkins, Paul (Coventry), Kaihnsa, Nidhi (Leipzig), Kraut, Anna Katharina (Bonn), Kurtz, Tom (Madison), Leman, Hélène (Guanajuato), Möhle, Martin (Tübingen), Pal Majumder, Abhishek (København), Rand, David (Coventry), Rendall, Alan (Mainz), Schreiber, Sebastian (Davis), Wakolbinger, Anton (Frankfurt am Main), Walcher, Sebastian (Aachen), Williams, Ruth J. (La Jolla), Wiuf, Carsten (København)

18.06. – 24.06.2017 **Nonlinear Partial Differential Equations on Graphs**

Organizers: Reika Fukuizumi, Sendai
Jeremy Marzuola, Chapel Hill
Dmitry Pelinovsky, Hamilton
Guido Schneider, Stuttgart

Abstract

One-dimensional metric graphs in two and three-dimensional spaces play an important role in emerging areas of modern science such as nano-technology, quantum physics, and biological networks. The workshop focused on the analysis of nonlinear partial differential equations on metric graphs, especially on the bifurcation and stability of nonlinear waves on complex graphs, on the justification of Kirchhoff boundary conditions, on spectral properties and the validity of amplitude equations for periodic graphs, and the existence of ground states for the NLS equation with and without potential.

Participants

Adami, Riccardo (Torino), Banica, Manuela Valeria (Evry), Berkolaiko, Grigori (College Station), Cacciapuoti, Claudio (Bonn), Chirilus-Bruckner, Martina (Leiden), Comech, Andrew (Moscow), Dovetta, Simone (Torino), Exner, Pavel (Řež), Finco, Domenico (Roma), Fukuizumi, Reika (Sendai), Grecu, Andreea (București), Ignat, I. Liviu (București), Korotyaev, Evgeny (St. Petersburg), Maier, Daniela (Stuttgart), Marzuola, Jeremy L. (Chapel Hill), Matrasulov, Davron (Tashkent), Niikuni, Hiroaki (Maebashi), Noja, Diego (Milano), Osting, Braxton (Salt Lake City), Pelinovsky, Dmitry (Hamilton), Post, Olaf (Trier), Schneider, Guido (Stuttgart), Serra, Enrico (Torino), Tentarelli, Lorenzo (Napoli), Teufel, Stefan (Tübingen)

25.06. – 01.07.2017 **Geometric Structures in Group Theory**

Organizers: Martin Bridson, Oxford
Linus Kramer, Münster
Bertrand Rémy, Palaiseau
Karen Vogtmann, Warwick

Abstract

Geometric group theory has natural connections and rich interfaces with many of the other major fields of modern mathematics. The basic motif of the field is the construction and exploration of actions by infinite groups on spaces that admit further structure, with an emphasis on geometric structures of different sorts: one usually seeks actions in order to illuminate the structure of groups of particular interest, but one also explores actions in order to understand the underlying spaces. The dramatic growth of the field in the late twentieth century was closely associated with the study of generalized forms of non-positive and negative curvature, and classically the spaces at hand were cell complexes with some additional structure. But the scope of the field, the range of groups embraced by its techniques, and the nature of the spaces studied, have expanded enormously in recent years, and they continue to do so.

Participants

Arzhantseva, Goulnara N. (Wien), Bourdon, Marc (Villeneuve-d'Ascq), Bridson, Martin R. (Oxford), Burger, Marc (Zürich), Bux, Kai-Uwe (Bielefeld), Capdeboscq, Inna (Coventry), Caprace, Pierre-Emmanuel (Louvain-la-Neuve), Charney, Ruth (Waltham), Ciobotaru, Corina (Fribourg), Dahmani, Francois (Saint-Martin-d'Hères), Davis, Michael W. (Columbus), Dowdall, Spencer (Nashville), Feighn, Mark E. (Newark), Fujiwara, Koji (Kyoto), Groves, Daniel (Chicago), Hamenstädt, Ursula (Bonn), Hartnick, Tobias (Haifa), Heller, Julia (Karlsruhe), Horbez, Camille (Orsay), Iozzi, Alessandra (Zürich), Januszkiewicz, Tadeusz (Warszawa), Kassabov, Martin (Ithaca), Kochloukova, Dessislava H. (Campinas), Köhl, Ralf (Gießen), Kramer, Linus (Münster), Kropholler, Peter H. (Southampton), Kropholler, Robert (Medford), Lazarovich, Nir (Zürich), Le Boudec, Adrien (Louvain-la-Neuve), Lécureux, Jean (Orsay), Leder, Nils (Münster), Levitt, Gilbert (Caen), Llosa Isenrich, Claudio (Oxford), Loisel, Benoit (Palaiseau), Loose, Robin (Münster), Lubotzky, Alex (Jerusalem), Martin, Alexandre (Wien), Mozes, Shahar (Jerusalem), Osin, Denis (Nashville), Ott, Andreas (Heidelberg), Przytycki, Piotr (Montreal), Radu, Nicolas (Louvain-la-Neuve), Reid, Alan W. (Austin), Remy, Bertrand (Palaiseau), Sauer, Roman (Karlsruhe), Schwer, Petra N. (Karlsruhe), Sisto, Alessandro (Zürich), Thomas, Anne (Sydney), Venkataramana, Tyakal N. (Mumbai), Vogtmann, Karen L. (Coventry), Wade, Richard (Vancouver), Welsch, Cora (Münster), Witzel, Stefan (Bielefeld)

02.07. – 08.07.2017 **Differentialgeometrie im Großen**

Organizers: Gerard Besson, Saint Martin d'Heres
Ursula Hamenstädt, Bonn
Michael Kapovich, Davis
Ben Weinkove, Evanston

Abstract

The topics discussed at the meeting were Kähler geometry, geometric evolution equations, manifolds of nonnegative curvature, metric geometry and geometric representations of groups. The choice of topics reflects current trends in the development of differential geometry. The participants were specialists in differential geometry and its neighboring fields, covering a broad spectrum of subareas which are in the focus of current developments.

Participants

Beitz, Franziska (Münster), Benoist, Yves (Orsay), Besson, Gerard (Giéres), Biquard, Olivier (Paris), Cabezas-Rivas, Esther (Frankfurt am Main), Cerocchi, Filippo (Bonn), Collins, Tristan C. (Cambridge), Conlon, Ronan (Montreal), Deruelle, Alix (Paris), Edwards, Greg (Evanston), Frances, Charles (Strasbourg), Ghomi, Mohammad (Atlanta), Guo, Bin (New York), Hamenstädt, Ursula (Bonn), Haslhofer, Robert (Toronto), Januszkiewicz, Tadeusz (Warszawa), Kapovich, Misha (Davis), Kerin, Martin (Münster), Kleiner, Bruce (New York), Lafuente, Ramiro (Münster), Lange, Christian (Köln), Leeb, Bernhard (München), Lott, John (Berkeley), Lytchak, Alexander (Köln), Macbeth, Heather (Cambridge), Monclair, Daniel (Belvaux), Panov, Dmitri (London), Phong, Duong H. (New York), Porti, Joan (Bellaterra), Rupflin, Melanie (Oxford), Schäfer, Johannes (London), Schlenker, Jean-Marc (Esch-sur-Alzette), Searle, Catherine (Wichita), Siffert, Anna (Bonn), Simon, Miles (Magdeburg), Song, Jian (Piscataway), Spotti, Cristiano (Aarhus), Suvaina, Ioana (Nashville), Swoboda, Jan (München), Tholozan, Nicolas (Paris), Wang, Lu (Madison), Weinkove, Ben (Evanston), Weiss, Hartmut (Kiel), Wilking, Burkhard (Münster), Will, Pierre (Saint-Martin-d'Hères), Wolf, Michael (Houston), Young, Robert (New York), Zedda, Michela (Lecce)

09.07. – 15.07.2017 **Dynamische Systeme**

Organizers:
Hakan Eliasson, Paris
Helmut Hofer, Princeton
Vadim Kaloshin, College Park
Jean-Christophe Yoccoz, Paris

Abstract

The main themes of the workshop were the new results and developments in the area of dynamical systems, in particular in Hamiltonian systems and symplectic geometry. Special emphasis where laid on symplectic methods with applications to dynamics. The workshop was attended by more than 50 participants from 13 countries and displayed a good mixture of young, mid-career and senior people. The workshop was dedicated to the memory of John Mather, Jean-Christophe Yoccoz and Krzysztof Wysocki.

Participants

Abbondandolo, Alberto (Bochum), Albers, Peter (Heidelberg), Alves, Marcelo (Neuchâtel), Arnaud, Marie-Claude (Avignon), Baladi, Viviane (Paris), Bramham, Barney (Bochum), Buhovsky, Lev (Tel Aviv), Craig, Walter (Hamilton), Cristofaro-Gardiner, Daniel (Cambridge), Eliasson, Hakan (Paris), Fish, Joel W. (Boston), Forni, Giovanni (College Park), Franks, John (Evanston), Frauenfelder, Urs Adrian (Augsburg), Gidea, Marian (New York), Ginzburg, Viktor L. (Santa Cruz), Guardia, Marcel (Barcelona), Gurel, Basak Zehra (Orlando), Hein, Doris (Freiburg i. Br.), Hofer, Helmut W. (Princeton), Hohloch, Sonja (Antwerpen), Hryniewicz, Umberto (Rio de Janeiro), Hutchings, Michael (Berkeley), Irie, Kei (Stony Brook), Kaloshin, Vadim Y. (College Park), Klempnauer, Stefan (Bochum), Knieper, Gerhard (Bochum), Krikorian, Raphael (Paris), Kuperberg, Krystyna (Auburn), Long, Yiming (Tianjin), Nelson, Joanna (New York), Ojeda Santana, Juan Salvador (Bochum), Peralta-Salas, Daniel (Madrid), Polterovich, Leonid V. (Ramat Aviv, Tel Aviv), Pomerleano, Daniel (London), Rigolli, Lorenzo (Bochum), Salomão, Pedro A. S. (São Paulo), Saprykina, Maria (Stockholm), Schulz, Benjamin H. (Bochum), Schwarz, Matthias (Leipzig), Seyfaddini, Sobhan (Princeton), Siburg, Karl Friedrich (Dortmund), Siefring, Richard (Bochum), Tabachnikov, Sergei (University Park), Thibaut, Castan (Paris), Trujillo, Frank (Paris), Ulcigrai, Corinna (Bristol), van Koert, Otto (Seoul), Viterbo, Claude (Paris), Zehmisch, Kai (Münster)

16.07. – 22.07.2017
Organizers:

Material Theories
Sergio Conti, Bonn
Antonio DeSimone, Trieste
Stephan Luckhaus, Leipzig
Lev Truskinovsky, Paris

Abstract
This workshop brought together researchers from diverse fields converging toward the interaction between mathematics, mechanics, and material science. The main emphasis was placed on contributions attempting to bridge the gap between discrete and continuum approaches, focusing on the multi-scale nature of physical phenomena, and most importantly requiring new and nontrivial mathematics. The workshop created new possibilities for the synergistic interaction between different disciplines which should potentially lead to new progress in the understanding of material behavior.

Participants
Agostiniani, Virginia (Trieste), Alberti, Giovanni (Pisa), Ambrosi, Davide (Milano), Borja da Rocha, Hudson (Palaiseau), Bouchitté, Guy (La Garde), Braides, Andrea (Roma), Brenier, Yann (Palaiseau), Chambolle, Antonin (Palaiseau), Ciarletta, Pasquale (Milano), Clement, Eric (Paris), Conti, Sergio (Bonn), Dabade, Vivekanand (Minneapolis), DeSimone, Antonio (Trieste), Dondl, Patrick W. (Freiburg i. Br.), Epstein, Marcelo (Calgary), Francfort, Gilles A. (Villetaneuse Cedex), Friesecke, Gero (Garching bei München), Garroni, Adriana (Roma), Giomi, Luca (Leiden), Grabovsky, Yury (Philadelphia), Kamien, Randall D. (Philadelphia), Kupferman, Raz (Jerusalem), Lerner, Edan (Amsterdam), Lewicka, Marta (Pittsburgh), Lucantonio, Alessandro (Trieste), Luckhaus, Stephan (Leipzig), Maor, Cy (Toronto), Mielke, Alexander (Berlin), Müller, Ingo (Wolfshagen), Orlik, Julia (Kaiserslautern), Otto, Felix (Leipzig), Perez-Reche, Francisco-Jose (Aberdeen), Preziosi, Luigi (Torino), Recho, Pierre (Saint-Martin-d'Hères), Redig, Frank (Delft), Roychowdhury, Ayan (Kanpur), Sadik, Souhayl (Leipzig), Salman, Oguz Umut (Palaiseau), Scardia, Lucia (Bath), Schmidt, Bernd (Augsburg), Sharon, Eran (Jerusalem), Smyshlyaev, Valery P. (London), Stefanelli, Ulisse (Wien), Truskinovsky, Lev (Paris Cedex), Vainchtein, Anna (Pittsburgh), Wyart, Matthieu (Lausanne), Yavari, Arash (Atlanta), Zanzotto, Giovanni (Padova), Zeppieri, Caterina (Münster), Zurlo, Giuseppe (Galway H91 TK33)

23.07. – 29.07.2017 **Real Analysis, Harmonic Analysis, and Applications**

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

Abstract

The workshop focused on important developments within the last few years in real and harmonic analysis, including polynomial partitioning and decoupling as well as significant concurrent progress in the application of these for example to number theory and partial differential equations. The meeting took place in a lively and active atmosphere and greatly benefited from the ideal environment at Oberwolfach. It was attended by 53 participants. The program consisted of 28 lectures of 40 minutes.

Participants

Baklouti, Ali (Sfax), Bennett, Jonathan (Birmingham), Bernicot, Frédéric (Nantes), Bombach, Clemens (Chemnitz), Buschenhenke, Stefan (Birmingham), Carbery, Anthony (Edinburgh), Carbonaro, Andrea (Genova), Christ, Michael (Berkeley), Cowling, Michael G. (Sydney), Durcik, Polona (Bonn), Eisner, Tanja (Leipzig), Fraccaroli, Marco (Bonn), Frank, Rupert L. (Pasadena), Frey, Dorothee (Delft), Gressman, Philip (Philadelphia), Guo, Shaoming (Bloomington), Hickman, Jonathan E. (Chicago), Hytönen, Tuomas (University of Helsinki), Ikromov, Isroil A. (Samarkand), Iliopoulou, Marina (Berkeley), Jaye, Benjamin (Kent), Katz, Nets Hawk (Pasadena), Kovac, Vjekoslav (Zagreb), Lee, Sanghyuk (Seoul), Lerner, Andrei (Ramat Gan), Li, Xiaochun (Urbana), Martini, Alessio (Birmingham), Meda, Stefano (Milano), Mirek, Mariusz (Princeton), Müller, Detlef (Kiel), Nagel, Alexander (Madison), Oliveira e Silva, Diogo (Bonn), Pérez Moreno, Carlos (Bilbao, Bizkaia), Petermichl, Stefanie (Toulouse), Ricci, Fulvio (Pisa), Rogers, Keith M. (Madrid), Roos, Joris (Bonn), Seeger, Andreas (Madison), Sikora, Adam B. (NSW), Sommer, Frederic (Kiel), Stein, Elias M. (Princeton), Steinerberger, Stefan (New Haven), Stovall, Betsy (Madison), Tataru, Daniel (Berkeley), Thiele, Christoph (Bonn), Tolsa, Xavier (Bellaterra), Vargas, Ana (Madrid), Volberg, Alex (East Lansing), Wright, Jim R. (Edinburgh), Wrobel, Blazej (Bonn), Yung, Po-Lam (Hong Kong), Zahl, Joshua (Vancouver), Zorin-Kranich, Pavel (Bonn)

30.07. – 05.08.2017 **Partial Differential Equations**

Organizers: Camillo De Lellis, Zürich
Richard M. Schoen, Stanford/Irvine
Peter M. Topping, Warwick

Abstract

The workshop dealt with nonlinear partial differential equations and some applications in geometry, touching several different topics such as minimal surfaces and geometric measure theory, conformal geometry, geometric flows, metric geometry and structure of Riemannian manifolds. The meeting was well attended by 52 participants with broad geographic representation. The program consisted of 21 talks and left sufficient time for discussions.

Participants

Buzano, Reto (London), Cabezas-Rivas, Esther (Frankfurt am Main), Carlotto, Alessandro (Zürich), Cavalletti, Fabio (Pavia), Chang, Sun-Yung Alice (Princeton), Colombo, Maria (Zürich), De Lellis, Camillo (Zürich), De Philippis, Guido (Trieste), De Rosa, Antonio (Zürich), Deruelle, Alix (Paris), Figalli, Alessio (Zürich), Fraser, Ailana M. (Vancouver), Gigli, Nicola (Trieste), Haslhofer, Robert (Toronto), Hershkovits, Or (Stanford), Hirsch, Jonas (Trieste), Hochard, Raphael (Talence), Huisken, Gerhard (Tübingen), Jakobson, Dmitriy (Montreal), Jiang, Wenshuai (Coventry), Kotschwar, Brett (Tempe), Krummel, Brian J. (Berkeley), Kuwert, Ernst (Freiburg i. Br.), Li, Yanyan (New Brunswick), Liokumovich, Yevgeny (Cambridge), Mäder-Baumdicker, Elena (Karlsruhe), Malchiodi, Andrea (Pisa), Menne, Ulrich (Zürich), Micallef, Mario J. (Coventry), Mondino, Andrea (Coventry), Nadirashvili, Nikolai (Marseille), Nguyen, Huy (London), Nguyen, Luc (Oxford), Rupflin, Melanie (Oxford), Schoen, Richard (Irvine), Schulz, Mario B. (Zürich), Schulze, Felix (London), Sesum, Natasa (Piscataway), Sharp, Ben G. (Coventry), Sire, Yannick (Baltimore), Spolaor, Luca (Cambridge), Struwe, Michael (Zürich), Sturm, Karl-Theodor (Bonn), Topping, Peter M. (Coventry), Valtorta, Daniele (Zürich), Wang, Guofang (Freiburg i. Br.), Wang, Lu (Madison), White, Brian (Stanford), Wickramasekera, Neshan (Cambridge), Wilking, Burkhard (Münster), Yang, Paul C. (Princeton), Zhou, Xin (Santa Barbara)

06.08. – 12.08.2017 **Analysis, Geometry and Topology of Positive Scalar Curvature Metrics**

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

Abstract
Riemannian manifolds with positive scalar curvature play an important role in mathematics and general relativity. Obstruction and existence results are connected to index theory, bordism theory and homotopy theory, using methods from partial differential equations and functional analysis. The workshop led to a lively interaction between more than 50 mathematicians from Europe, the US and Japan, working in these areas.

Participants
Akutagawa, Kazuo (Tokyo), Ammann, Bernd (Regensburg), Bär, Christian (Potsdam), Bettiol, Renato G. (Philadelphia), Bohlen, Karsten (Regensburg), Botvinnik, Boris (Eugene), Cabezas-Rivas, Esther (Frankfurt am Main), Carlotto, Alessandro (Zürich), Cederbaum, Carla (Tübingen), Dahl, Mattias (Stockholm), Degeratu, Anda (Stuttgart), Dessai, Anand N. (Fribourg), Dranishnikov, Alexander N. (Gainesville), Engel, Alexander (Regensburg), Galloway, Gregory (Coral Gables), Goette, Sebastian (Freiburg i. Br.), Große, Nadine (Freiburg i. Br.), Gursky, Matthew John (Notre Dame), Hanke, Bernhard (Augsburg), Hebestreit, Fabian (Bonn), Hermann, Andreas (Potsdam), Joachim, Michael (Münster), Kröncke, Klaus (Hamburg), Larsson, Eric (Stockholm), LeBrun, Claude (Stony Brook), Lee, Dan A. (New York), Leistner, Thomas (Adelaide), Luckhardt, Daniel (Göttingen), Madani, Farid (Frankfurt am Main), Meisel, Moritz (Augsburg), Mondello, Ilaria (Créteil), Müller, Olaf (Berlin), Nistor, Victor (Metz), Otoba, Nobuhiko (Regensburg), Perlmutter, Nathan G. (Stanford), Piazza, Paolo (Roma), Pilca, Mihaela V. (Regensburg), Roos, Saskia (Bonn), Rosenberg, Jonathan M. (College Park), Schick, Thomas (Göttingen), Schulze, Felix (London), Semmelmann, Uwe (Stuttgart), Sharp, Ben G. (Coventry), Steimle, Wolfgang (Augsburg), Tuschmann, Wilderich (Karlsruhe), Upmeier, Markus (Augsburg), Weiss, Hartmut (Kiel), Wiemeler, Michael (Augsburg), Wittmann, Johannes (Regensburg), Wraith, David J. (Maynooth, Co. Kildare), Wulff, Christopher (Göttingen), Yamada, Sumio (Tokyo), Zeidler, Rudolf (Münster)

13.08. – 19.08.2017
Organizers:

Proof Complexity and Beyond
Albert Atserias, Barcelona
Jakob Nordström, Stockholm
Toniann Pitassi, Toronto
Alexander Razborov, Chicago/Moscow

Abstract
Proof complexity is a multi-disciplinary intellectual endeavor that addresses questions of the general form "how difficult is it to prove certain mathematical facts?" The current workshop focused on recent advances in our understanding of logic-based proof systems and on connections to algorithms, geometry and combinatorics research, such as the analysis of approximation algorithms, or the size of linear or semidefinite programming formulations of combinatorial optimization problems, to name just two important examples.

Participants
Allen, Sarah R. (Pittsburgh), Atserias, Albert (Barcelona), Beame, Paul (Seattle), Berkholz, Christoph (Berlin), Beyersdorff, Olaf (Leeds), Bonacina, Ilario (Stockholm), Bonet, Maria Luisa (Barcelona), Buss, Samuel R. (La Jolla), Carboni Oliveira, Igor (Oxford), Dantchev, Stefan S. (Durham), Dawar, Anuj (Cambridge), de Rezende, Susanna F. (Stockholm), Filmus, Yuval (Haifa), Fleming, Noah (Toronto), Galesi, Nicola (Roma), Garlik, Michal (Barcelona), Guruswami, Venkatesan (Pittsburgh), Hakoniemi, Tuomas (Barcelona), Håstad, Johan (Stockholm), Hirsch, Edward A. (St. Petersburg), Hopkins, Samuel (Ithaca), Itsykson, Dmitry (St. Petersburg), Johannsen, Jan (München), Kolokolova, Antonina (St. John's), Kothari, Pravesh K. (Princeton), Lauria, Massimo (Roma), Lee, James R. (Seattle), Martin, Barnaby (Durham), Mull, Nathan (Chicago), Nordström, Jakob (Stockholm), Ochremiak, Joanna (Paris), O'Donnell, Ryan (Pittsburgh), Parrilo, Pablo A. (Cambridge), Pitassi, Toniann (Toronto), Potechin, Aaron (Princeton), Pudlak, Pavel (Praha), Raymond, Annie (Seattle), Razborov, Alexander A. (Chicago), Robere, Robert (Toronto), Santhanam, Rahul (Oxford), Schramm, Tselil (Berkeley), Shpilka, Amir (Tel Aviv), Sokolov, Dmitry (St. Petersburg), Steurer, David (Ithaca), Sudan, Madhu (Cambridge), Szeider, Stefan (Wien), Thapen, Neil (Praha), Thomas, Rekha R. (Seattle), Tulsiani, Madhur (Chicago), Tzameret, Iddo (Egham), Urquhart, Alasdair (Toronto), Vinyals, Marc (Stockholm), Williams, Ryan (Cambridge)

20.08. – 26.08.2017 **Low-dimensional Topology and Number Theory**

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

Abstract

The workshop brought together topologists and number theorists with the intent of exploring the many tantalizing connections between these areas. At the moment the topic of most active interaction are quantum invariants of 3-manifolds and their asymptotics. The meeting showed significant progress in the field. There were 26 talks ranging from 30 to 60 minutes intertwined with informal discussions.

Participants

Bergeron, Nicolas (Paris), Bräunling, Oliver (Freiburg i. Br.), Bringmann, Kathrin (Köln), Champanerkar, Abhijit (Staten Island), Chinburg, Ted C. (Philadelphia), Chu, Michelle (Austin), Dasbach, Oliver T. (Baton Rouge), Dimofte, Tudor D. (Davis), Garoufalidis, Stavros (Atlanta), Gilmer, Patrick (Baton Rouge), Gukov, Sergei G. (Pasadena), Gunnells, Paul E. (Amherst), Hajir, Farshid (Amherst), Hikami, Kazuhiro (Fukuoka), Hironaka, Eriko (Tallahassee), Jeon, BoGwang (New York), Kashaev, Rinat M. (Genève), Kellerhals, Ruth (Fribourg), Kofman, Ilya (Staten Island), Kreck, Matthias (Bonn), Lalin, Matilde N. (Montreal), Lawrence, Ruth (Jerusalem), Le, Thang (Atlanta), Lee, Christine (Austin), Masbaum, Gregor (Paris), Mellit, Anton (Klosterneuburg), Mkrtchyan, Ruben L. (Yerevan), Morishita, Masanori (Fukuoka), Murakami, Jun (Tokyo), Nahm, Werner (Dublin), Neumann, Walter David (New York), Osburn, Robert (Dublin), Rodriguez-Villegas, Fernando (Trieste), Schaveling, Sjabbo (Leiden), Schwermer, Joachim (Wien), Sikora, Adam S. (Buffalo), Silver, Dan (Mobile), Stover, Matthew (Philadelphia), Tange, Ryoto (Fukuoka), Ueki, Jun (Tokyo), van der Veen, Roland (Leiden), Vlasenko, Masha (Warszawa), Williams, Susan G. (Mobile), Yokota, Yoshiyuki (Tokyo), Zagier, Don B. (Bonn), Zickert, Christian (College Park), Zwegers, Sander (Köln)

27.08. – 02.09.2017 **Komplexe Analysis**

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

Abstract

Complex Analysis is a very active branch of mathematics. The aim of this workshop was to discuss recent developments in several complex variables and complex geometry. Topics included singular Kähler-Einstein metrics, positivity of higher direct images, cycle spaces and extension theorems. The program featured twenty lectures, and allowed ample time for discussion and interaction. The meeting was attended by over 50 participants from around the world, ranging from young post-doctoral researchers to senior leaders of the field.

Participants

Amerik, Ekaterina (Orsay), Barlet, Daniel (Vandoeuvre-lès-Nancy), Bauer-Catanese, Ingrid (Bayreuth), Berndtsson, Bo (Göteborg), Brotbek, Damian (Strasbourg Cedex), Brunebarbe, Yohan (Zürich), Campana, Frédéric (Vandoeuvre-lès-Nancy), Cao, Junyan (Paris), Catanese, Fabrizio (Bayreuth), Daniel, Jeremy (Paris), de Cataldo, Mark A. (Stony Brook), Delcroix, Thibaut (Saint-Martin-d'Hères), Demailly, Jean-Pierre (Giéres), Deraux, Martin (Saint-Martin-d'Hères), Di Nezza, Eleonora (London), Ein, Lawrence (Chicago), Eyssidieux, Philippe (Saint-Martin-d'Hères), Graf, Patrick (Bayreuth), Greb, Daniel (Essen), Guenancia, Henri (Stony Brook), Höring, Andreas (Nice), Hwang, Jun-Muk (Seoul), Ishii, Shihoko (Tokyo), Javanpeykar, Ariyan (Mainz), Jeong, Yewon (Seoul), Kamenova, Ljudmila (Stony Brook), Kebekus, Stefan (Freiburg i. Br.), Keller, Julien (Marseille), Kirschner, Tim (Essen), Klingler, Bruno (Paris), Lu, Hoang Chinh (Orsay), Möller, Martin (Frankfurt am Main), Mourougane, Christophe (Rennes), Naumann, Philipp (Marburg), Ohsawa, Takeo (Nagoya), Paun, Mihai (Seoul), Pereira, Jorge Vitorio (Rio de Janeiro), Peternell, Thomas (Bayreuth), Popovici, Dan (Toulouse), Rousseau, Erwan (Marseille), Ruppenthal, Jean (Wuppertal), Schumacher, Georg (Marburg), Schwald, Martin (Essen), Sibony, Nessim (Orsay), Takayama, Shigeharu (Tokyo), Toma, Matei (Vandoeuvre-lès-Nancy), Tsuji, Hajime (Tokyo), Verbitsky, Misha (Bruxelles), Witt Nyström, David (Göteborg), Yeung, Sai-Kee (West Lafayette)

03.09. – 09.09.2017 **Automorphic Forms and Arithmetic**

Organizers: Valentin Blomer, Göttingen
Emmanuel Kowalski, Zürich
Philippe Michel, Lausanne

Abstract

The workshop brought together leading experts and young researchers at the interface of automorphic forms and analytic number theory to disseminate, discuss and develop important recent methods and results. A particular focus was on higher rank groups, as well as their arithmetic applications. This includes, for instance, the study of various aspects of *L*-functions, the fine distribution properties of their Fourier coefficients and Hecke eigenvalues, the mass distribution of automorphic forms on general symmetric spaces, and applications of results of algebraic geometry to automorphic forms.

Participants

Alfes-Neumann, Claudia (Köln), Bajpai, Jitendra (Göttingen), Balkanova, Olga (Turku), Blomer, Valentin (Göttingen), Booker, Andrew (Bristol), Brumley, Farrell (Villetaneuse Cedex), Buttcane, Jack (Buffalo), Duke, William (Los Angeles), Florea, Alexandra (Bristol), Fouvry, Etienne (Orsay), Friedlander, John B. (Toronto), Frolenkov, Dmitry (Moscow), Harcos, Gergely (Budapest), Harper, Adam J. (Coventry), Holowinsky, Roman (Columbus), Humphries, Peter (London), Imamoglu, Özlem (Zürich), Kelmer, Dubi (Chestnut Hill), Kiral, Eren Mehmet (College Station), Kontorovich, Alex (Piscataway), Koukoulopoulos, Dimitris (Montreal), Kowalski, Emmanuel (Zürich), Kramer, Jürg (Berlin), Lapid, Erez M. (Rehovot), Lee, Min (Bristol), Lesesvre, Didier (Villetaneuse), Lester, Steve (London), Maga, Peter (Budapest), Marshall, Simon (Madison), Matthiesen, Lilian (Stockholm), Matz, Jasmin (Jerusalem), Michel, Philippe Gabriel (Lausanne), Milićević, Djordje (Bryn Mawr), Milinovich, Micah B. (University), Munshi, Ritabrata (Kolkata), Nelson, Paul David (Zürich), Perret-Gentil, Corentin (Montreal), Pitt, Nigel J.E. (Orono), Pohl, Anke (Jena), Radziwill, Maksym (Montreal), Risager, Morten S. (København), Royer, Emmanuel (Aubière), Rudnick, Zeev (Tel Aviv), Saha, Abhishek (London), Sawin, Will (Zürich), Schulze-Pillot, Rainer (Saarbrücken), Soundararajan, Kannan (Stanford), Toth, Arpad (Budapest), Viazovska, Maryna (Lausanne), von Pippich, Anna (Darmstadt), Young, Matthew P. (College Station), Zacharias, Raphaël P. (Lausanne)

10.09. – 16.09.2017 **Mathematical Questions and Challenges in Quantum Electrodynamics and its Applications**

Organizers: Volker Bach, Braunschweig
Miguel Ballesteros, Mexico
Dirk-André Deckert, München
Israel Michael Sigal, Toronto

Abstract
Quantum field theory (QFT) may be considered one of the most fundamental frameworks of theoretical physics. Quantum Electrodynamics (QED) is the part of QFT that describes the interaction between matter and light. Although it is one of the experimentally best tested theories, it yet faces many open mathematical questions and challenges. The mathematical rigorous framework of QED and the implications deriving from it was the topic of this workshop, bringing together mathematicians and theoretical physicists to discuss topics such as high- and low-energy QED, external field QED, quantum optics, many-boson and many-fermion systems, transport properties in condensed matter.

Participants
Anapolitanos, Ioannis (Karlsruhe), Arnold, Anton (Wien), Bach, Volker (Braunschweig), Bahns, Dorothea (Göttingen), Ballesteros, Miguel (México), Breteaux, Sébastien (Bilbao, Bizkaia), Bru, Jean-Bernard (Bilbao, Bizkaia), Cadamuro, Daniela (Garching bei München), Cenatiempo, Serena (L'Aquila (AQ)), Deckert, Dirk-André (München), Derezinski, Jan (Warszawa), de Roeck, Wojciech (Leuven), Disertori, Margherita (Bonn), Duell, Maximilian (Garching bei München), Dürr, Detlef (München), Faupin, Jeremy (Metz), Finster, Felix (Regensburg), Gottschalk, Fiona (Braunschweig), Griesemer, Marcel (Stuttgart), Hach, Alexander (Braunschweig), Haenle, Felix (München), Hainzl, Christian (Tübingen), Hasler, David (Jena), Helmer, Christoph (Braunschweig), Karimi, Sorour (Braunschweig), Leopold, Nikolai (München), Lewin, Mathieu (Paris), Matte, Oliver (Aalborg), Merkl, Franz (München), Merkli, Marco (St. John's), Mitrouskas, David (Stuttgart), Napiórkowski, Marcin (Warszawa), Nöth, Markus (München), Panati, Annalisa (La Garde), Pedra, Walter (São Paulo), Phan Thanh, Nam (Klosterneuburg), Pickl, Peter (München), Pizzo, Alessandro (Roma), Porta, Marcello (Zürich), Rauch, Robert (Braunschweig), Rejzner, Kasia (Heslington, York), Salmhofer, Manfred (Heidelberg), Schach Møller, Jacob (Aarhus), Schlein, Benjamin (Zürich), Schulz-Baldes, Hermann (Erlangen), Seiringer, Robert (Klosterneuburg), Siebert, Oliver (Jena), Siedentop, Heinz (München), Solovej, Jan Philip (København), Teufel, Stefan (Tübingen), Weder, Ricardo (México)

24.09. – 30.09.2017 **Algebraic Geometry: Birational Classification, Derived Categories, and Moduli Spaces**

Organizers: Christopher Hacon, Salt Lake City
Daniel Huybrechts, Bonn
Bernd Siebert, Hamburg
Chenyang Xu, Beijing

Abstract
The workshop covered a number of active areas of research in algebraic geometry with a focus on derived categories, moduli spaces (of varieties and sheaves) and birational geometry (often in positive characteristic) and their interactions. Special emphasis was put on hyperkähler manifolds and singularity theory. There were 21 talks each 50 minutes. This provided sufficient time for questions and discussions after the talks and for new and ongoing collaborations during the breaks and in the evenings.

Participants
Alexeev, Valery (Athens), Bayer, Arend (Edinburgh), Bertram, Aaron (Salt Lake City), Bhatt, Bhargav (Ann Arbor), Brakkee, Emma (Bonn), Bridgeland, Tom (Sheffield), Casagrande, Cinzia (Torino), Cascini, Paolo (London), Charles, Francois (Orsay), Flapan, Laure (Los Angeles), Floris, Enrica (Basel), Fujino, Osamu (Osaka), Fulger, A. Mihai (Storrs), Gongyo, Yoshinori (Tokyo), Hacon, Christopher D. (Salt Lake City), Hassett, Brendan (Providence), Huybrechts, Daniel (Bonn), Kaloghiros, Anne-Sophie (Uxbridge), Kawamata, Yujiro (Tokyo), Kovács, Sándor J. (Seattle), Kuznetsov, Alexander (Moscow), Lazić, Vladimir (Saarbrücken), Lehmann, Brian (Chestnut Hill), Lesieutre, John (Chicago), Liese, Carsten (Hannover), Macri, Emanuele (Boston), Markman, Eyal (Amherst), McKernan, James (La Jolla), Moonen, Ben J. J. (Nijmegen), O'Grady, Kieran (Roma), Oguiso, Keiji (Tokyo), Ottem, John Christian (Oslo), Pacienza, Gianluca (Vandoeuvre-lès-Nancy), Patakfalvi, Zsolt (Lausanne), Perry, Alexander (New York), Popa, Mihnea (Evanston), Rieß, Ulrike (Zürich), Saccà, Giulia (Cambridge), Sarti, Alessandra (Futuroscope Chasseneuil), Schwede, Karl (Salt Lake City), Siebert, Bernd (Hamburg), Stellari, Paolo (Milano), Takagi, Shunsuke (Tokyo), Thomas, Richard P. W. (London), Thompson, Alan (Cambridge), Totaro, Burt (Los Angeles), Tucker, Kevin F. (Chicago), Verbitsky, Misha (Bruxelles), Wang, Xiaowei (Newark), Witaszek, Jakub (London), Xu, Chenyang (Beijing), Yasuda, Takehiko (Osaka), Yuan, Yao (Beijing)

01.10. – 07.10.2017 **Spectral Structures and Topological Methods in Mathematical Quasicrystals**

Organizers: Michael Baake, Bielefeld
David Damanik, Houston
Johannes Kellendonk, Villeurbanne
Daniel Lenz, Jena

Abstract
The mathematical theory of aperiodic order grew out of various predecessors in discrete geometry, harmonic analysis and mathematical physics, and developed rapidly after the discovery of real world quasicrystals in 1982 by Shechtman. Many mathematical disciplines have contributed to the development of this field. In this meeting, the goal was to bring leading researchers from several of them together to exchange the state of affairs, with special focus on spectral aspects, dynamics and topology.

Participants
Akiyama, Shigeki (Tsukuba), Akkerman, Eric (Haifa), Baake, Michael (Bielefeld), Bartlett, Alan (Tacoma), Beckus, Siegfried (Haifa), Clark, Alex D. (Leicester), Cortez, Maria Isabel (Santiago), Damanik, David (Houston), Durand, Fabien (Amiens), Eisner, Tanja (Leipzig), Embree, Mark (Blacksburg), Fillman, Jake (Blacksburg), Gähler, Franz (Bielefeld), Garcia-Ramos, Felipe (San Luis Potosí), Gerbuz, Vitalii (Houston), Ghosh, Subhroshekhar (Singapore), Glasner, Eli (Ramat Aviv, Tel Aviv), Godoy Mesquita, Jaqueline (Brasilia), Gorodetski, Anton (Irvine), Grimm, Uwe (Milton Keynes), Hartnick, Tobias (Haifa), Haynes, Alan (Houston), Huck, Christian (Bielefeld), Hunton, John (Durham), Julien, Antoine (Trondheim), Kellendonk, Johannes (Villeurbanne), Keller, Gerhard (Erlangen), Koivusalo, Henna (Wien), Kösters, Holger (Rostock), Lagarias, Jeffrey C. (Ann Arbor), Lemanczyk, Marius (Torun), Lenz, Daniel (Jena), Lev, Nir (Ramat Gan), Liu, Qing-Hui (Beijing), Maass, Alejandro (Santiago de Chile), Manibo, Neil (Bielefeld), Marklof, Jens (Bristol), Mei, May (Granville), Mihai, Alexandru (Okinawa), Mosbach, Arne (Bremen), Moutot, Etienne (Lyon), Oertel-Jaeger, Tobias (Jena), Ong, Darren C. (Sepang), Pasquinelli, Irene (Durham), Petite, Samuel (Amiens), Pogorzelski, Felix (Leipzig), Prodan, Emil (New York), Puzynina, Svetlana (St. Petersburg), Qu, Yan-Hui (Beijing), Rajendran, Mabel Lizzy (Coimbatore), Rao, Michael (Lyon), Richard, Christoph (Erlangen), Robinson Jr., E. Arthur (Washington), Rust, Daniel (Bielefeld), Sadun, Lorenzo A. (Austin), Strungaru, Nicolae (Edmonton), van Enter, Aernout C.D. (Groningen), Yassawi, Reem (Villeurbanne)

29.10. – 04.11.2017

Interplay between Number Theory and Analysis for Dirichlet Series

Organizers: Frédéric Bayart, Aubière
Kaisa Matomäki, Turku
Eero Saksman, Helsinki
Kristian Seip, Trondheim

Abstract
In recent years a number of challenging research problems have crystallized in the analytic theory of Dirichlet series and its interaction with function theory in polydiscs. Their solutions appear to require unconventional combinations of expertise from harmonic, functional, and complex analysis, and especially from analytic number theory. This workshop provided an ideal arena for the exchange of ideas needed to nurture further progress and to solve important problems.

Participants
Aistleitner, Christoph (Graz), Balazard, Michel (Marseille), Bayart, Frederic (Aubière), Bondarenko, Andriy V. (Trondheim), Burnol, Jean-Francois (Villeneuve-d'Ascq), de la Bretèche, Régis (Paris), Harper, Adam J. (Coventry), Hedenmalm, Hakan (Stockholm), Hilberdink, Titus (Reading), Hughes, Christopher (Heslington, York), Lindqvist, Sofia (Oxford), Mahatab, Kamalakshya (Trondheim), Matomäki, Kaisa (Turku), Montgomery, Hugh L. (Ann Arbor), Olsen, Jan-Fredrik (Lund), Pérez Hernández, Antonio (Espinardo, Murcia), Perfekt, Karl-Mikael (Reading), Queffélec, Hervé (Villeneuve-d'Ascq), Radziwill, Maksym (Montreal), Saksman, Eero (University of Helsinki), Sargent, Meredith (St. Louis), Schoolmann, Ingo (Oldenburg), Seip, Kristian (Trondheim), Teräväinen, Joni (Turku)

29.10. – 04.11.2017
Organizers:

Copositivity and Complete Positivity
Abraham Berman, Haifa
Immanuel M. Bomze, Vienna
Mirjam Dür, Trier
Naomi Shaked-Monderer, Yezreel Valley

Abstract
The concept of copositivity can be traced back to Theodore Motzkin in 1952, and that of complete positivity to Marshal Hall Jr. in 1958. The two classes are related, and both have received considerable attention in the linear algebra community and in the last two decades also in the mathematical optimization community. These matrix classes have important applications in various fields, in which they arise naturally, including mathematical modeling, optimization, dynamical systems and statistics. More applications constantly arise. The workshop brought together people working in various disciplines related to copositivity and complete positivity, in order to discuss these concepts from different viewpoints and to join forces to better understand these difficult but fascinating classes of matrices.

Participants
Anstreicher, Kurt M. (Iowa City), Berman, Avi (Haifa), Bomze, Immanuel M. (Wien), Dickinson, Peter (Enschede), Dür, Mirjam (Augsburg), Eichfelder, Gabriele (Ilmenau), Fallat, Shaun M. (Regina), Farber, Miriam (Cambridge), Gabl, Markus (Wien), Groetzner, Patrick (Trier), Hildebrand, Roland (Grenoble), Hogben, Leslie (Ames), Jarre, Florian (Düsseldorf), Kahr, Michael (Wien), Kirkland, Steve (Winnipeg), Kuryatnikova, Olga (Tilburg), Laffey, Thomas J. (Dublin), Loewy, Raphael (Haifa), Puerto Albandoz, Justo (Sevilla), Shaked-Monderer, Naomi (Yezreel Valley), Smigoc, Helena (Dublin), Vera Lizcano, Juan C. (Tilburg), Yildirim, Emre Alper (Ortaköy, Istanbul), Zhang, Xiao-Dong (Shanghai), Zuluaga, Luis F. (Bethlehem)

05.11. – 11.11.2017 **Mathematical Logic: Proof Theory, Constructive Mathematics**

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

Abstract
The workshop was centered around proof-theoretic aspects of core mathematics and theoretical computer science as well as homotopy type theory and logical aspects of computational complexity. The program included 5 talks of 50 minutes as well as 26 talks of 40 minutes. The purposes of the workshop were to promote the interaction of proof theory and computability theory with core areas of mathematics as well as computer science and philosophical logic via the use of proof interpretations and other proof-theoretic methods, to explore connections between proof theory and computer science, to further develop proof-theoretic and constructive aspects of homotopy type theory, and to investigate further the connections between logic and computational complexity.

Participants
Aczel, Peter (Manchester), Afshari, Bahareh (Göteborg), Arai, Toshiyasu (Chiba), Artemov, Sergei N. (New York), Awodey, Steve (Pittsburgh), Baaz, Matthias (Wien), Beckmann, Arnold (Swansea), Beklemishev, Lev D. (Moscow), Berardi, Stefano (Torino), Berger, Ulrich (Swansea), Brattka, Vasco (Neubiberg), Buchholtz, Ulrik Torben (Darmstadt), Buss, Samuel R. (La Jolla), Coquand, Thierry (Göteborg), Ferreira, Fernando (Lisboa), Freund, Anton (Leeds), Gambino, Nicola (Leeds), Grabmayr, Balthasar (Berlin), Hetzl, Stefan (Wien), Hyland, J. Martin E. (Cambridge), Iemhoff, Rosalie (Utrecht), Ishihara, Hajime (Ishikawa), Jäger, Gerhard (Bern), Jerabek, Emil (Praha), Joosten, Joost (Barcelona), Kihara, Takayuki (Nagoya), Kohlenbach, Ulrich (Darmstadt), Kolodziejczyk, Leszek (Warszawa), Kolokolova, Antonina (St. John's), Krombholz, Martin (Leeds), Leigh, Graham E. (Göteborg), Leustean, Laurentiu (București), Lombardi, Henri (Besançon), MacIntyre, Angus John (Edinburgh), Martin-Löf, Per (Stockholm), Miquel, Alexandre (Montevideo), Negri, Sara (Helsinki), Nicolae, Adriana-Maria (Sevilla), Oliva, Paulo (London), Pakhomov, Fedor (Moscow), Powell, Thomas (Darmstadt), Pudlak, Pavel (Praha), Rathjen, Michael (Leeds), Sanders, Sam (München), Schuster, Peter M. (Verona), Schwichtenberg, Helmut (München), Seisenberger, Monika (Swansea), Sipos, Andrei (Darmstadt), Streicher, Thomas (Darmstadt), Thapen, Neil (Praha), Towsner, Henry (Philadelphia), Visser, Albert (Utrecht), Weiermann, Andreas (Gent), Yokoyama, Keita (Ishikawa)

12.11. – 18.11.2017 **Variational Methods for Evolution**

Organizers: Alexander Mielke, Berlin
Mark Peletier, Eindhoven
Dejan Slepcev, Pittsburgh

Abstract

Many evolutionary systems, as for example gradient flows or Hamiltonian systems, can be formulated in terms of variational principles or can be approximated using time-incremental minimization. Hence they can be studied using the mathematical techniques of the field of calculus of variations. This viewpoint has led to many discoveries and rapid expansion of the field over the last two decades. Relevant applications arise in mechanics of fluids and solids, in reaction-diffusion systems, in biology, in many-particle models, as well as in emerging uses in data science. This workshop brought together a broad spectrum of researchers from calculus of variations, partial differential equations, metric geometry, and stochastics, as well as applied and computational scientists. It focused on variational tools such as minimizing movement schemes, Gamma convergence, optimal transport, gradient flows, and largedeviation principles for time-continuous Markov processes.

Participants

Benamou, Jean-David (Paris), Brenier, Yann (Paris), Cancès, Clément (Villeneuve-d'Ascq), Carrillo de la Plata, Jose Antonio (London), Chambolle, Antonin (Palaiseau), Dal Maso, Gianni (Trieste), Demaerel, Thibaut (Leuven), Di Francesco, Marco (Coppito, L'Aquila (AQ)), Erbar, Matthias (Bonn), Feng, Jin (Lawrence), Fischer, Julian (Klosterneuburg), Frenzel, Thomas (Berlin), Garcia-Trillos, Nicolas (Providence), Garroni, Adriana (Roma), Gigli, Nicola (Trieste), Herrmann, Michael (Braunschweig), Jüngel, Ansgar (Wien), Knees, Dorothee (Kassel), Laschos, Vaios (Berlin), Léonard, Christian (Nanterre), Liero, Matthias (Berlin), Maas, Jan (Klosterneuburg), Maes, Christian (Leuven), Matthes, Daniel (Garching bei München), Melchionna, Stefano (Wien), Mielke, Alexander (Berlin), Mittnenzweig, Markus (Berlin), Monsaingeon, Leonard (Vandoeuvre-lès-Nancy), Mugnolo, Delio (Hagen), Niethammer, Barbara (Bonn), Öttinger, Hans Christian (Zürich), Otto, Felix (Leipzig), Patacchini, Francesco S. (Pittsburgh), Peletier, Mark A. (Eindhoven), Renger, Michiel (Berlin), Rossi, Riccarda (Brescia), Roubicek, Tomas (Praha), Rumpf, Martin (Bonn), Santambrogio, Filippo (Orsay), Savare, Giuseppe (Pavia), Sharma, Upanshu (Marne-la-Vallée), Slepcev, Dejan (Pittsburgh), Stefanelli, Ulisse (Wien), Stephan, Artur (Berlin), Thomas, Marita (Berlin), Tse, Oliver (Eindhoven), von Renesse, Max (Leipzig), Watson, Stephen J. (Glasgow), Westdickenberg, Michael (Aachen), Zimmer, Johannes (Bath), Zwicknagl, Barbara (Würzburg)

26.11. – 02.12.2017 **Reflection Positivity**

Organizers: Arthur Jaffe, Harvard
Karl-Hermann Neeb, Erlangen
Gestur Olafsson, Baton Rouge
Benjamin Schlein, Zürich

Abstract

The main theme of the workshop was reflection positivity and its occurences in various areas of mathematics and physics, such as Representation Theory, Quantum Field Theory, Noncommutative Geometry, Dynamical Systems, Analysis and Statistical Mechanics. Accordingly, the program was intrinsically interdisciplinary and included talks covering different aspects of reflection positivity. The meeting was attended by 53 participants from all over the world. It was organized around 24 lectures each of 50 minutes duration.

Participants

Albeverio, Sergio (Bonn), Alldridge, Alexander (Berkeley), Bahns, Dorothea (Göttingen), Bischoff, Marcel (Athens), Blobel, Burkhard (Göttingen), Cadamuro, Daniela (Garching bei München), Dawson, Matthew (Mérida), Derezinski, Jan (Warszawa), Disertori, Margherita (Bonn), Duell, Maximilian (Garching bei München), Frahm, Jan (Erlangen), Frank, Rupert L. (München), Fröhlich, Jürg M. (Zürich), Gerard, Christian (Orsay), Giuliani, Alessandro (Roma), Gordina, Masha (Storrs), Grenier, Joseph (Baton Rouge), Grosse, Harald (Wien), Herbst, Manuel (Erlangen), Hilgert, Joachim (Paderborn), Infusino, Maria (Konstanz), Jaekel, Christian D. (São Paulo), Jaffe, Arthur (Cambridge), Janssens, Bas (Utrecht), Jorgensen, Palle E. T. (Iowa City), Kawahigashi, Yasuyuki (Tokyo), Klimek, Slawomir (Indianapolis), Lang, Thorsten (Erlangen), Lechner, Gandalf (Cardiff), Liegener, Klaus (Erlangen), Longo, Roberto (Roma), Miyao, Tadahiro (Sapporo), Mourao, José M. (Lisboa), Neeb, Karl-Hermann (Erlangen), Oeh, Daniel (Erlangen), Olafsson, Gestur (Baton Rouge), Orsted, Bent (Aarhus), Pohl, Anke (Jena), Rejzner, Kasia (Heslington, York), Schlein, Benjamin (Zürich), Seiringer, Robert (Klosterneuburg), Shakirov, Shamil (Cambridge), Speicher, Roland (Saarbrücken), Starr, Shannon L. (Birmingham), Tanimoto, Yoh (Roma), Thiemann, Thomas (Erlangen), van den Ban, Erik P. (Utrecht), Verch, Rainer (Leipzig), Wang, Zhituo (Harbin), Weiske, Clemens (Erlangen), Wozniakowski, Alex (Singapore), Wulkenhaar, Raimar (Münster), Yngvason, Jakob (Wien)

03.12. – 09.12.2017

Classical and Quantum Mechanical Models of Many-Particle Systems

Organizers: Anton Arnold, Wien
Eric Carlen, Piscataway
Laurent Desvillettes, Paris

Abstract

This workshop was dedicated to the presentation of recent results in the field of the mathematical study of kinetic theory and its natural extensions (statistical physics and fluid mechanics). The main models are the Vlasov(-Poisson) equation and the Boltzmann equation, which are obtained as limits of many-body equations (Newton's equations in the classical case and Schrödinger's equation in the quantum case) thanks to the mean-field and Boltzmann-Grad scalings. Numerical aspects and applications to mechanics, physics, engineering and biology were also discussed.

Participants

Alonso, Ricardo J. (Rio de Janeiro), Aoki, Kazuo (Taipei), Arnold, Anton (Wien), Arsenio, Diogo (Paris), Bardos, Claude (Paris), Bobylev, Alexander V. (Moscow), Breden, Maxime (Garching bei München), Brenier, Yann (Paris), Briant, Marc (Paris), Canizo, José Alfredo (Granada), Carlen, Eric A. (Piscataway), Carrapatoso, Kleber (Montpellier), Carrillo de la Plata, Jose Antonio (London), Carvalho, Maria C. (Lisboa), Daus, Esther (Wien), Degond, Pierre (London), Desvillettes, Laurent (Paris), Dietert, Helge (Paris), Dolbeault, Jean (Paris), Dolera, Emanuele (Pavia), Dolmaire, Théophile (Paris), Escobedo, Miguel (Lejona), Fellner, Klemens (Graz), Filbet, Francis (Toulouse), Fischer, Julian (Klosterneuburg), Gamba, Irene M. (Austin), Golse, Francois (Palaiseau), He, Lingbing (Beijing), Hoffmann, Franca (Pasadena), Jabin, Pierre Emmanuel (College Park), Jüngel, Ansgar (Wien), Kim, Chanwoo (Madison), Liu, Tai-Ping (Taipei), Lods, Bertrand (Torino), Matthes, Daniel (Garching bei München), Merino-Aceituno, Sara (London), Mokhtar-Kharroubi, Mustapha (Besançon), Mouhot, Clément (Cambridge), Negulescu, Claudia (Toulouse), Nota, Alessia (Bonn), Nouri, Anne (Marseille), Otto, Felix (Leipzig), Pareschi, Lorenzo (Ferrara), Saffirio, Chiara (Zürich), Salvarani, Francesco (Pavia), Schlein, Benjamin (Zürich), Schmeiser, Christian (Wien), Simonella, Sergio (Garching bei München), Trescases, Ariane (Cambridge), Tristani, Isabelle (Paris), Wennberg, Bernt (Göteborg), Yu, Shih-Hsien (Singapore)

10.12. – 16.12.2017 **Network Models: Structure and Function**

Organizers: Louigi Addario-Berry, Montreal
Shankar Bhamidi, Chapel Hill
Remco van der Hofstad, Eindhoven
Frank den Hollander, Leiden

Abstract

The focus of the meeting was on the mathematical analysis of complex networks, both on how networks emerge through microscopic interaction rules as well as on dynamic processes and optimization problems on networks, including random walks, interacting particle systems and search algorithms. Topics that were addressed included: percolation on graphs and critical regimes for the emergence of a giant component; graph limits and graphons; epidemics, propagation and competition; trees and forests; dynamic random graphs; local versus global algorithms; statistical learning on networks.

Participants

Addario-Berry, Louigi (Montreal), Agazzi, Andrea (Genève), Aldous, David (Berkeley), Avena, Luca (Leiden), Berestycki, Julien (Oxford), Borgs, Christian (Cambridge), Broutin, Nicolas (Le Chesnay), Cerny, Jiri (Wien), Chakraborty, Suman (Chapel Hill), Chayes, Jennifer (Cambridge), Coja-Oghlan, Amin (Frankfurt am Main), Deijfen, Maria (Stockholm), den Hollander, Frank (Leiden), Dhara, Souvik (Eindhoven), Eslava, Laura (Atlanta), Federico, Lorenzo (Eindhoven), Fitzner, Robert J. (Eindhoven), Fraiman, Nicolas (Chapel Hill), Fribergh, Alexander (Montreal), Gamarnik, David (Cambridge), Garavaglia, Alessandro (Eindhoven), Goldschmidt, Christina (Oxford), Goodman, Jesse (Auckland), Güldas, Hakan (Leiden), Heydenreich, Markus (München), Hulshof, Tim (Eindhoven), Janson, Svante (Uppsala), Komjathy, Julia (Eindhoven), Limic, Vlada (Strasbourg Cedex), Miermont, Grégory (Lyon), Molontay, Roland (Budapest), Montanari, Andrea (Stanford), Mossel, Elchanan (Cambridge), Mukherjee, Debankur (Eindhoven), Oomen, Margriet (Leiden), Penington, Sarah (Oxford), Salez, Justin (Paris), Sen, Sanchayan (Montreal), Sfragara, Matteo (Leiden), Stegehuis, Clara (Eindhoven), Teixeira, Augusto (Rio de Janeiro), van der Hofstad, Remco (Eindhoven), Veber, Amandine (Palaiseau), Völlering, Florian (Münster), Warnke, Lutz (Atlanta), Yeo, Dominic (Haifa), Zadik, Ilias (Cambridge)

17.12. – 23.12.2017

Mathematical Instruments between Material Artifacts and Ideal Machines: Their Scientific and Social Role before 1950

Organizers:
Samuel Gessner, Lisboa
Ulf Hashagen, München
Jeanne Peiffer, Paris
Dominique Tournès, Sainte-Clotilde

Abstract
Since 1950, mathematicians have become increasingly familiar with the digital computer in their professional practice. Previously, many other instruments were commonly used to compute numerical solutions, generate geometrical objects, investigate mathematical problems, derive new results, and apply mathematics in a variety of scientific contexts. The problem of characterizing the mathematical objects that can be constructed with a given set of instruments frequently prompted deep theoretical investigations. Beyond mathematical considerations, instruments should also be viewed as social objects of a given time period and cultural tradition. In this sense, they are an important part of the mathematical cultural heritage. This workshop brought together mathematicians, historians, philosophers, collection curators, and scholars of education to address the various approaches to the history of mathematical instruments.

Participants
Alberts, Gerard (Amsterdam), Barrow-Green, June E. (Milton Keynes), Bartolini, Maria Giuseppina (Reggio Emilia), Bennett, James Arthur (Oxford), Blanco Abellan, Monica (Castelldefels), Borrelli, Arianna (Berlin), Charette, Francois (Gärtringen), Crippa, Davide (Praha), Danisan Polat, Gaye (Ortaköy, Istanbul), Daval, Nathalie (Saint-Denis), Durand-Richard, Marie-Jose (Paris), Eagleton, Catherine (Washington), Falk, Seb (Cambridge), Fischer, Joachim (Garching bei München), Gessner, Samuel (Lisboa), Horst, Thomas (Lisboa), Jeddi, Ahmed (Nancy), Kidwell, Peggy A. (Washington), Korey, Michael (Dresden), Kremer, Richard L. (Hanover), Malet, Antoni (Barcelona), Maronne, Sebastien (Toulouse), Maschietto, Michela (Reggio Emilia), Mattmüller, Martin (Basel), Milici, Pietro (Agrate Brianza), Morel, Thomas (Lens), Moyon, Marc (Limoges), Nabonnand, Philippe (Nancy), Peiffer, Jeanne (Paris Cedex), Petitgirard, Loic (Paris), Polat, Atilla (Ortaköy, Istanbul), Preller, Katharina (München), Reich, Karin (Hamburg), Remmert, Volker (Wuppertal), Rowe, David E. (Mainz), Royle, Tony (Milton Keynes), Schiavon, Martina (Nancy), Schmidl, Petra (Frankfurt am Main), Siegmund-Schultze, Reinhard (Kristiansand), Sorrenson, Richard (Auckland), Thomas, Marc (Nantes), Tobies, Renate (Jena), Tournès, Dominique (Sainte-Clotilde (La Réunion)), Weiss, Martin (Bremerhaven)

2.4. Miniworkshops

Miniworkshop 1702a

08.01. – 14.01.2017 **Women in Mathematics: Historical and Modern Perspectives**

Organizers: Tinne Hoff Kjeldsen, Copenhagen
Nicola Oswald, Wuppertal
Renate Tobies, Jena

Abstract
The aim of the workshop was to build a bridge between research on the situation of women in mathematics at the beginning of coeducative studies and the current circumstances in academia. The issue of women in mathematics has been a recent political and social hot topic in the mathematical community. As thematic foci we placed a double comparison: besides shedding light on differences and similarities in several European countries, we completed this investigation by comparing the developments of women studies from the beginnings. This shall lead to new results on tradition and suggest improvements on the present situation.

Participants
Becvárová, Martina (Praha), Blunck, Andrea (Hamburg), Boucard, Jenny (Nantes), Ciesielska, Danuta (Warszawa), Faghihi, Sima (Mainz), Fajstrup, Lisbeth (Aalborg), Gosztonyi, Katalin (Budapest), Govoni, Paola (Bologna), Hoff Kjeldsen, Tinne (København), Kaufholz-Soldat, Eva (Wiesbaden), Koreuber, Mechthild (Berlin), Lémonon, Isabelle (Paris), Mühlhausen, Elisabeth (Krebeck), Oswald, Nicola (Wuppertal), Siegmund-Schultze, Reinhard (Kristiansand), Spieß, Katharina (Würzburg), Tobies, Renate (Jena), Vogt, Annette (Berlin)

08.01. – 14.01.2017
Organizers:

Spaces and Moduli Spaces of Riemannian Metrics
F. Thomas Farrell, Beijing
Wilderich Tuschmann, Karlsruhe

Abstract
The Mini-Workshop focused on central questions and new results concerning spaces and moduli spaces of Riemannian metrics with lower or upper curvature bounds on open and closed manifolds and, moreover, related themes from Anosov geometry. These are all described in detail below. The event brought together young and senior researchers working about (moduli) spaces of negative and nonnegative sectional, nonnegative Ricci and positive scalar curvature as well as Anosov metrics, and the talks and discussions brought about many new and inspiring research problems to pursue.

Participants
Belegradek, Igor (Atlanta), Botvinnik, Boris (Eugene), Bustamante, Mauricio (Beijing), Dessai, Anand N. (Fribourg), Farrell, F. Thomas (Beijing), Garcia, Ana Karla (México), Gogolev, Andrey (Binghamton), Guijarro, Luis (Madrid), Hanke, Bernhard (Augsburg), Jiang, Yi (Beijing), Kordaß, Jan-Bernhard (Karlsruhe), Schick, Thomas (Göttingen), Su, Yang (Beijing), Tuschmann, Wilderich (Karlsruhe), Walsh, Mark (Wichita), Wraith, David J. (Maynooth, Co. Kildare)

08.01. – 14.01.2017

Adaptive Methods for Control Problems Constrained by Time-Dependent PDEs

Organizers: Max Gunzburger, Tallahassee
Karl Kunisch, Graz
Angela Kunoth, Köln

Abstract
Optimization problems constrained by time-dependent PDEs (Partial Differential Equations) are challenging from a computational point of view: even in the simplest case, one needs to solve a system of PDEs coupled globally in time and space for the unknown solutions (the state, the costate and the control of the system). Typical and practically relevant examples are the control of nonlinear heat equations as they appear in laser hardening or the thermic control of flow problems (Boussinesq equations). Specifically for PDEs with a long time horizon, conventional time-stepping methods require an enormous storage of the respective other variables. In contrast, adaptive methods aim at distributing the available degrees of freedom in an a-posteriori-fashion to capture singularities and are, therefore, most promising.

Participants
Boschert, Sandra (Köln), Breiten, Tobias (Graz), Dahlke, Stephan (Marburg), Gunzburger, Max D. (Tallahassee), Harbrecht, Helmut (Basel), Herzog, Roland (Chemnitz), Jando, Dörte (Heidelberg), Kanschat, Guido (Heidelberg), Kreuzer, Christian (Bochum), Kunoth, Angela (Köln), Münch, Arnaud Diego (Aubière), Neitzel, Ira (Bonn), Rösch, Arnd (Essen), Steinbach, Olaf (Graz), Tröltzsch, Fredi (Berlin), Verfürth, Rüdiger (Bochum), Vexler, Boris (Garching bei München)

05.02. – 11.02.2017 **Cluster Expansions: From Combinatorics to Analysis through Probability**

Organizers: Roberto Fernández, Utrecht
Sabine Jansen, Brighton
Dimitrios Tsagkarogiannis, Brighton

Abstract
The workshop addressed the interplay between theory and applications of cluster expansions. These expansions, historically geared towards the study of systems in statistical mechanics, thermodynamics, and physical chemistry, have recently found applications in different areas of current mathematical research, such as point processes, random graphs, coloring issues, logics and inverse problems in numerical analysis. The workshop developed both directions of the theory-application interplay. On the one hand, speakers presented advances in the theoretical foundations of the abstract polymer model and improved tree-graph inequalities, and explored their consequences for the theory of liquids and other applied issues. On the other hand, researchers in stochastic modelisation exposed needs and challenges brought by concrete models of liquids and liquid crystal to the theory of cluster expansions. In addition other complementary methods were discussed, such as disagrement percolation – an expansion-free approach to uniqueness and decay of correlations – and lace expansions – an expansion technique popular for its applications to random walks and percolation problems.

Participants
Brydges, David C. (Vancouver), Fernandez, Roberto (Utrecht), Fitzner, Robert J. (Eindhoven), Hanke-Bourgeois, Martin (Mainz), Helmuth, Tyler (Berkeley), Hofer-Temmel, Christoph (Den Helder), Jansen, Sabine C. (Brighton), Kotecký, Roman (Coventry), Kuna, Tobias (Reading), Last, Günter (Karlsruhe), Lue, Leo (Glasgow), Procacci, Aldo (Belo Horizonte), Pulvirenti, Elena (Leiden), Tsagkarogiannis, Dimitrios (Brighton), Ueltschi, Daniel (Coventry), Virga, Epifanio G. (Pavia), Yin, Mei (Denver)

05.02. – 11.02.2017

Stochastic Differential Equations: Regularity and Numerical Analysis in Finite and Infinite Dimensions

Organizers: Martin Hutzenthaler, Essen
Annika Lang, Göteborg
Lukasz Szpruch, Edinburgh
Larisa Yaroslavtseva, Passau

Abstract
This Mini-Workshop was devoted to regularity and numerical analysis of stochastic ordinary and partial differential equations (SDEs for both). The standard assumption in the literature on SDEs is global Lipschitz continuity of the coefficient functions. However, many SDEs arising from applications fail to have globally Lipschitz continuous coefficients. Recent years have seen a prosper growth of the literature on regularity and numerical approximations for SDEs with non-globally Lipschitz coefficients. Some surprising results have been obtained – e.g., the Euler–Maruyama method diverges for a large class of SDEs with super-linearly growing coefficients, and the limiting equation of a spatial discretization of the stochastic Burgers equation depends on whether the discretization is symmetric or not. Several positive results have been obtained. However the regularity of numerous important SDEs and the closely related question of convergence and convergence rates of numerical approximations remain open. The aim of this workshop was to bring together the main contributers in this direction and to foster significant progress.

Participants
Barth, Andrea (Stuttgart), Beck, Lisa (Augsburg), Blömker, Dirk (Augsburg), Cohen, David (Umeå), Cox, Sonja G. (Amsterdam), Hefter, Mario (Kaiserslautern), Hutzenthaler, Martin (Essen), Jentzen, Arnulf (Zürich), Kruse, Raphael (Berlin), Lang, Annika (Göteborg), Larsson, Stig (Göteborg), Millet, Annie (Paris), Neuenkirch, Andreas (Mannheim), Szpruch, Lukasz (Edinburgh), Talay, Denis (Sophia-Antipolis), Yaroslavtseva, Larisa (Passau)

05.02. – 11.02.2017 **Perspectives in High-dimensional Probability and Convexity**

Organizers: Joscha Prochno, Hull
Christoph Thäle, Bochum
Elisabeth Werner, Cleveland

Abstract
Understanding the geometric structure of systems involving a huge amount of parameters is a central problem in mathematics and applied sciences today. Here, geometric and analytical ideas meet in a non-trivial way and powerful probabilistic tools play a key role in many discoveries. Two essentially independent areas of mathematics concerned with high-dimensional problems are asymptotic geometric analysis and information-based complexity. In this Mini-Workshop we brought together researchers from both fields to explore the connections and form synergies to develop new perspectives.

Participants
Alonso-Gutierrez, David (Zaragoza), Besau, Florian (Frankfurt am Main), Grote, Julian (Bochum), Guédon, Olivier (Marne-la-Vallée), Hinrichs, Aicke (Linz), Kabluchko, Zakhar (Münster), Litvak, Alexander (Edmonton), Novak, Erich (Jena), Prochno, Joscha (Hull), Reitzner, Matthias (Osnabrück), Schütt, Carsten (Kiel), Thäle, Christoph (Bochum), Ullrich, Mario (Linz), Vritsiou, Beatrice-Helen (Ann Arbor), Vybiral, Jan (Praha), Werner, Elisabeth (Cleveland)

17.09. – 23.09.2017 **MASAs and Automorphisms of C*-Algebras**

Organizers:
Selcuk Barlak, Odense
Wojciech Szymanski, Odense
Wilhelm Winter, Münster

Abstract

The main aim of this workshop was to study maximal abelian *-subalgebras of C*-algebras from various points of view. A chief motivation is the UCT problem, which asks whether all separable nuclear C*-algebras satisfy the universal coefficient theorem of Rosenberg and Schochet. The connection, in terms of existence of invariant Cartan MASAs for certain *-automorphisms of the Cuntz algebra, has been brought up only very recently; it opens up a line of new perspectives on pressing questions in the structure and classification theory of simple nuclear C*-algebras and their automorphism groups, which has made giant leaps forward in the past five years. Connections to other areas, in particular von Neumann algebras and coarse geometry, have been explored as well.

Participants

Barlak, Selcuk (Odense), Courtney, Kristin (Charlottesville), Cuntz, Joachim (Münster), Elliott, George A. (Toronto), Kerr, David (College Station), Li, Xin (London), Mikkelsen, Sophie Emma (Odense), Orloff Clark, Lisa (Wellington), Phillips, N. Christopher (Eugene), Szabó, Gábor (København), Szymanski, Wojciech (Odense), Tikuisis, Aaron (Ottawa), Vaes, Stefaan (Leuven), White, Stuart (Glasgow), Willett, Rufus E. (Honolulu), Winter, Wilhelm (Münster), Wu, Jianchao (University Park), Zacharias, Joachim (Glasgow)

17.09. – 23.09.2017

Positivity in Higher-dimensional Geometry: Higher-codimensional Cycles and Newton-Okounkov Bodies

Organizers: Mihai Fulger, Lausanne
Alex Küronya, Frankfurt
Brian Lehmann, Chestnut Hill

Abstract
There are several flavors of positivity in Algebraic Geometry. They range from conditions that determine vanishing of cohomology, to intersection theoretic properties, and to convex geometry. They offer excellent invariants that have been shown to govern the classification and the parameterization programs in Algebraic Geometry, and are finer than the classical topological ones. This Mini-Workshop aimed to facilitate research collaboration in the area, strengthening the relationship between various positivity notions, beyond the now classical case of divisors/line bundles.

Participants
Castravet, Ana-Maria (Boston), Dang, Nguyen-Bac (Palaiseau), Fulger, A. Mihai (Storrs), Gounelas, Frank (Berlin), Küronya, Alex (Frankfurt am Main), Laterveer, Robert (Strasbourg Cedex), Lau, Chung-Ching (Salt Lake City), Lehmann, Brian (Chestnut Hill), Lopez, Angelo Felice (Roma), Lozovanu, Victor (Hannover), Maclagan, Diane (Coventry), Maclean, Catriona (Saint-Martin-d'Hères), Nickel, Matthias (Frankfurt am Main), Ottem, John Christian (Oslo), Urbinati, Stefano (Milano), Xiao, Jian (Evanston)

17.09. – 23.09.2017
Organizers:

Lattice Polytopes: Methods, Advances, Applications
Takayuki Hibi, Osaka
Akihiro Higashitani, Kyoto
Katharina Jochemko, Stockholm
Benjamin Nill, Magdeburg

Abstract
Lattice polytopes arise naturally in many different branches of pure and applied mathematics such as number theory, commutative algebra, combinatorics, toric geometry, optimization, and mirror symmetry. The Mini-Workshop on "Lattice polytopes: methods, advances, applications" focused on two current hot topics: the classification of lattice polytopes with few lattice points and unimodality questions for Ehrhart polynomials. The workshop consisted of morning talks on recent breakthroughs and new methods, and afternoon discussion groups where participants from a variety of different backgrounds explored further applications, identified open questions and future research directions, discussed specific examples and conjectures, and collaboratively tackled open research problems.

Participants
Averkov, Gennadiy (Magdeburg), Balletti, Gabriele (Stockholm), Beck, Matthias (San Francisco), Blanco, Monica (Santander), Haase, Christian (Berlin), Higashitani, Akihiro (Kyoto), Hofscheier, Johannes (Hamilton), Jochemko, Katharina (Stockholm), Kasprzyk, Alexander M. (Nottingham), Katthän, Lukas (Minneapolis), Liu, Fu (Davis), Michalek, Mateusz (Leipzig), Nill, Benjamin (Magdeburg), Sanyal, Raman (Frankfurt am Main), Solus, Liam T. (Stockholm), Soprunov, Ivan (Cleveland), Tsuchiya, Akiyoshi (Osaka)

22.10. – 28.10.2017 **PDE Models of Motility and Invasion in Active Biosystems**

Organizers: Leonid Berlyand, State College
Jan Fuhrmann, State College
Anna Marciniak-Czochra, Heidelberg
Christina Surulescu, Kaiserslautern

Abstract

Cell motility is a highly complex phenomenon involving a plethora of biophysical and biochemical events occuring on several time and space scales. For decades, partial differential equations have been used to model the motility of single cells as well as the collective motion of cell assemblies like tumors. Mathematical models for both individual motile cells and invading tumors have major features in common. The active nature of cells leads to very similar nonlinear systems of coupled equations, the solutions of which often determine the position and shape of the objects of interest. Recently, several types of models attracted particular attention in the description of these systems: free boundary problems, phase field models, reaction-diffusion-taxis and kinetic transport equations. Both tumor growth/invasion and cell motility can be described by parabolic, hyperbolic, or elliptic equations; in case of free boundary problems, the boundary conditions are very similar. Thereby, the involved free boundaries can describe cell membranes, tumor margins, or interfaces between different tissues. In this Mini-Workshop applied mathematicians and biophysicists came together and identified commonalities and differences in their approaches. Moreover, they discussed possible model extensions and their application to different, but related problems, along with the innovative utilization of certain mathematical tools to the analysis of the resulting systems.

Participants

Aronson, Igor (Argonne), Berlyand, Leonid (University Park), Chi, Hai (University Park), Elliott, Charles M. (Coventry), Fuhrmann, Jan (State College), Gorb, Yulia (Houston), Keren, Kinneret (Haifa), Marciniak-Czochra, Anna (Heidelberg), Mogilner, Alex (New York), Sfakianakis, Nikolaos (Mainz), Stevens, Angela (Münster), Stinner, Christian (Darmstadt), Surulescu, Christina (Kaiserslautern), Verkhovsky, Alexander (Lausanne), Winkler, Michael (Paderborn), Zhigun, Anna (Kaiserslautern), Ziebert, Falko (Heidelberg)

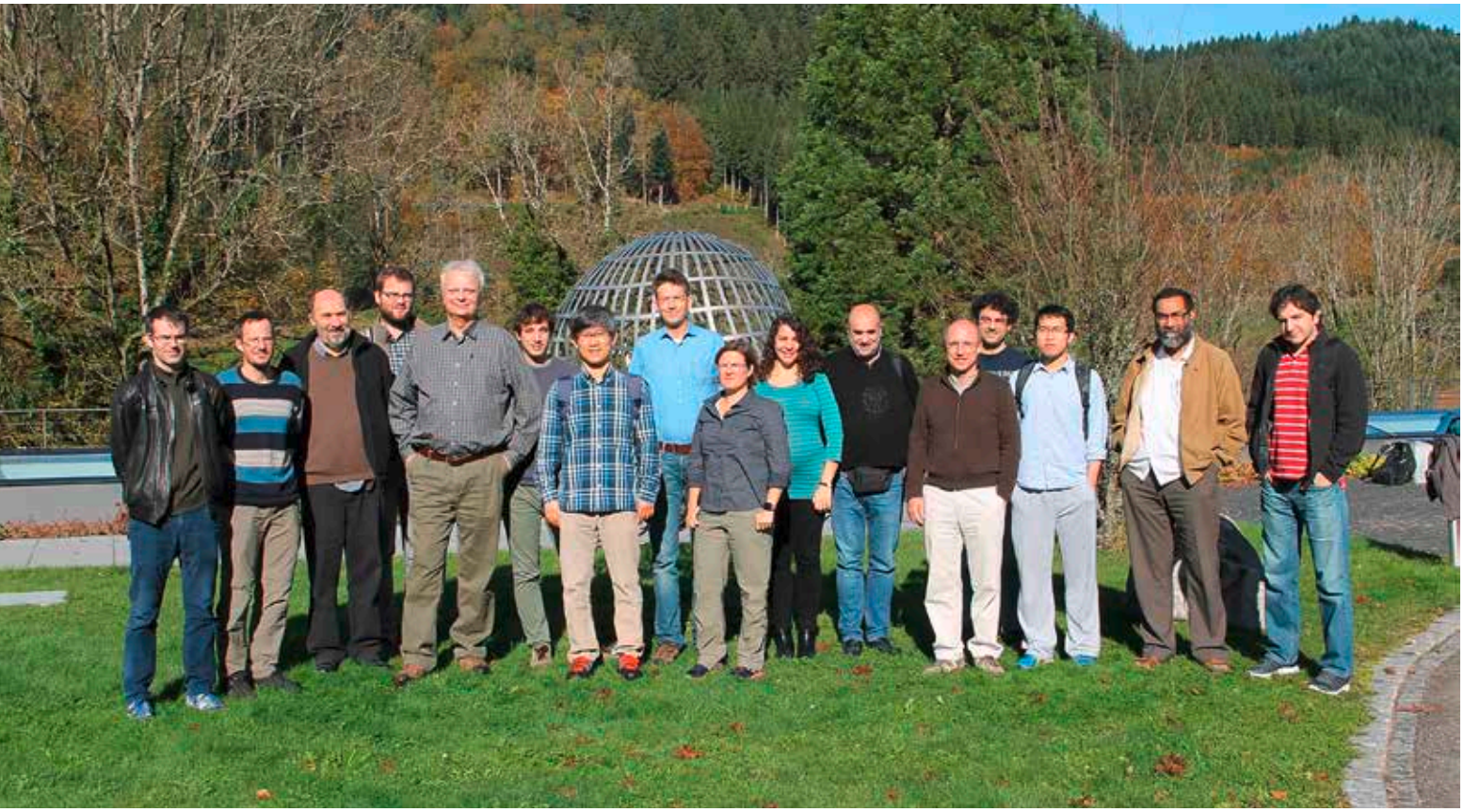
22.10. – 28.10.2017

Reflectionless Operators: The Deift and Simon Conjectures

Organizers: David Damanik, Houston
Fritz Gesztesy, Waco
Peter Yuditskii, Linz

Abstract
Reflectionless operators in one dimension are particularly amenable to inverse scattering and are intimately related to integrable systems like KdV and Toda. Recent work has indicated a strong (but not equivalent) relationship between reflectionless operators and almost periodic potentials with absolutely continuous spectrum. This makes the realm of reflectionless operators a natural place to begin addressing Deift's conjecture on integrable flows with almost periodic initial conditions and Simon's conjecture on gems of spectral theory establishing correspondences between certain coefficient and spectral properties.

Participants
Binder, Ilia (Toronto), Damanik, David (Houston), Deift, Percy Alec (New York), Egorova, Iryna (Kharkiv), Eichinger, Benjamin (Linz), Fillman, Jake (Blacksburg), Goldstein, Michael (Toronto), Kriecherbauer, Thomas (Bayreuth), Leguil, Martin (Paris), Lukic, Milivoje (Houston), Michor, Johanna (Wien), Stordal Christiansen, Jacob (Lund), Teschl, Gerald (Wien), VandenBoom, Tom (Houston), Yuditskii, Peter (Linz), Zinchenko, Maxim (Albuquerque)



22.10. – 28.10.2017

Interactions between Low-dimensional Topology and Complex Algebraic Geometry

Organizers: Stefan Friedl, Regensburg
Laurentiu Maxim, Madison
Alexander Suciu, Boston

Abstract
Recent developments exhibit a strong connection between low-dimensional topology and complex algebraic geometry. A common theme is provided by the Alexander polynomial and its many avatars. The Mini-Workshop brought together at Oberwolfach groups of researchers working inmostly separate areas, but sharing common interests in a vibrant, emerging field at the crossroads of Topology, Group Theory, and Geometry.

Participants
Artal Bartolo, Enrique Manuel (Zaragoza), Biswas, Indranil (Mumbai), Borodzik, Maciej (Warszawa), Cha, Jae Choon (Pohang), Cogolludo-Agustin, Jose Ignacio (Zaragoza), Denham, Graham (London), Flapan, Laure (Boston), Friedl, Stefan (Regensburg), Harvey, Shelly (Houston), Koberda, Thomas Michael (Charlottesville), Liu, Yongqiang (Leuven), Maxim, Laurentiu-G. (Madison), Mj, Mahan (Mumbai), Némethi, András (Budapest), Py, Pierre (Strasbourg Cedex), Suciu, Alexander I. (Boston), Toffoli, Enrico (Regensburg)

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.

Ricardo H. Nochetto, College Park
Workshop 1704: Emerging Developments in Interfaces and Free Boundaries
Host 1: Sören Bartels, Freiburg
Host 2: Michael Hinze, Hamburg

David C. Brydges, Vancouver
Mini-Workshop 1706a: Cluster Expansions: From Combinatorics to Analysis
Host: Sabine C. Jansen, Brighton

Aldo Procacci, Belo Horizonte
Mini-Workshop 1706a: Cluster Expansions: From Combinatorics to Analysis
Host: Benedetto Scoppola, Roma

Ralf Schiffler, Storrs
Workshop 1708: Representation Theory of Quivers and Finite Dimensional Algebras
Host: Henning Krause, Bielefeld

Johannes Muhle-Karbe, Ann Arbor
Workshop 1709: Mathematics of Quantitative Finance
Host: Josef Teichmann, Zürich

Raul E. Curto, Iowa City
Workshop 1710: Real Algebraic Geometry With a View Toward Moment Problems and Optimization
Host: Salma Kuhlmann, Konstanz

Ken Dykema, College Station
Workshop 1710: Real Algebraic Geometry With a View Toward Moment Problems and Optimization
Host: Roland Speicher, Saarbrücken

Igor Klep, Auckland
Workshop 1710: Real Algebraic Geometry With a View Toward Moment Problems and Optimization
Host: Victor Vinnikov, Konstanz

Peter G. Binev, Columbia
Workshop 1713: Multiscale and High-Dimensional Problems
Host: Albert Cohen, Paris

Seth Sullivant, Raleigh
Workshop 1716: Algebraic Statistics
Host: Thomas Kahle, Magdeburg

Ta Le Loi, Dalat, Lamdong
Workshop 1718: O-Minimality and its Applications to Number Theory and Analysis
Host: Tobias Kaiser, Passau

Chris Miller, Columbus
Workshop 1718: O-Minimality and its Applications to Number Theory and Analysis
Host 1: Patrick Speissegger, Konstanz
Host 2: Georges Comte, Le Bourget-du-Lac

Jinkai Li, Shatin, Hong Kong
Workshop 1719: Geophysical Fluid Dynamics
Host: Matthias Hieber, Darmstadt

Thieu-Huy Nguyen, Hanoi
Workshop 1719: Geophysical Fluid Dynamics
Host: Matthias Hieber, Darmstadt

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.

Adrianna Gillman, Houston
Workshop 1720: Computational Inverse Problems for Partial Differential Equations
Host: Per-Gunnar Martinsson, Oxford

Xuhua He, College Park
Workshop 1721: Harmonic Analysis and the Trace Formula
Host: Benoit Stroh, Villetaneuse Cedex

Sebastian Schreiber, Davis
Workshop 1725a: Reaction Networks and Population Dynamics
Host 1: Reinhard Bürger, Wien
Host 2: Josef Hofbauer, Wien

Davron Matrasulov, Tashkent
Workshop 1725b: Nonlinear Partial Differential Equations on Graphs
Host: Thomas Riedl, Wuppertal

Pedro A. S. Salomão, São Paulo
Workshop 1728: Dynamische Systeme
Host 1: Alberto Abbondandolo, Bochum
Host 2: Barney Bramham, Bochum

Randall D. Kamien, Philadelphia
Workshop 1729: Material Theories
Host: Selim Jochim, Heidelberg

Isroil A. Ikromov, Samarkand
Workshop 1730: Real Analysis, Harmonic Analysis, and Applications
Host: Detlef Müller, Kiel

Yannick Sire, Baltimore
Workshop 1731: Partial Differential Equations
Host: Juan-Luis Vazquez, Madrid

Dan A. Lee, New York
Workshop 1732: Analysis, Geometry and Topology of Positive Scalar Curvature Metrics
Host 1: Bernd Ammann, Regensburg
Host 2: Michael Eichmair, Wien

Nathan G. Perlmutter, Stanford
Workshop 1732: Analysis, Geometry and Topology of Positive Scalar Curvature Metrics
Host: Bernhard Hanke, Augsburg

Stavros Garoufalidis, Atlanta
Workshop 1734: Low-dimensional Topology and Number Theory
Host: Don B. Zagier, Bonn

Mark A. de Cataldo, Stony Brook
Workshop 1735: Komplexe Analysis
Host: Stefan Kebekus, Freiburg

William Duke, Los Angeles
Workshop 1736: Automorphic Forms and Arithmetic
Host: Özlem Imamoglu, Zürich

Maksym Radziwill, Montreal
Workshop 1736: Automorphic Forms and Arithmetic
Host: Valentin Blomer, Göttingen

Lisa Orloff Clark, Wellington
Mini-Workshop 1738a: MASAs and Automorphisms of C*-Algebras
Host: Wojciech Szymanski, Odense

Mihnea Popa, Evanston
Workshop 1739: Algebraic Geometry: Birational Classification, Derived Categories, and Moduli Spaces
Host: Stefan Kebekus, Freiburg

Anton Gorodetski, Irvine
Workshop 1740: Spectral Structures and Topological Methods in Mathematical Quasicrystals
Host: Victor Kleptsyn, Rennes

Nicolae Strungaru, Edmonton
Workshop 1740: Spectral Structures and Topological Methods in Mathematical Quasicrystals
Host: Michael Baake, Bielefeld

Jin Feng, Lawrence
Workshop 1746: Variational Methods for Evolution
Host: Mark A. Peletier, Eindhoven

Shamil Shakirov, Cambridge US
Workshop 1748: Reflection Positivity
Host: Maxim Zabzine, Uppsala

Christian D. Jaekel, São Paulo
Workshop 1748: Reflection Positivity
Host: Karl-Hermann Neeb, Erlangen

Franca Hoffmann, Pasadena
Workshop 1749: Classical and Quantum Mechanical Models of Many-Particle Systems
Host: Jean Dolbeault, Paris


A. Procacci


R. Schiffler

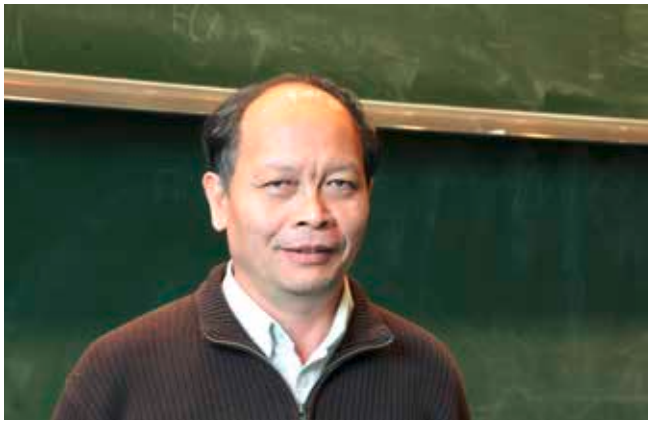

R.H. Nochetto


J. Muhle-Karbe


D. C. Brydges


R. E. Curto

K. Dykema



T. L. Loi

I. Klep

C. Miller

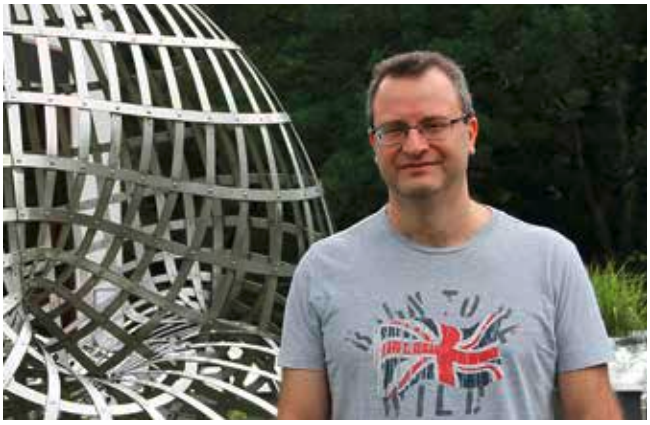
P. G. Binev

J. Li

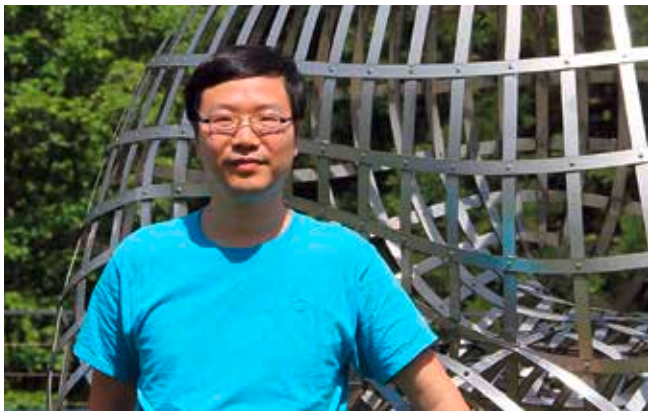
S. Sullivant

T.-H. Nguyen

A. Gillman



P. A. S. Salomão



X. He

R. D. Kamien

S. Schreiber

I. A. Ikromov

D. Matrasulov

Y. Sire

D. A. Lee

W. Duke

N. G. Perlmutter

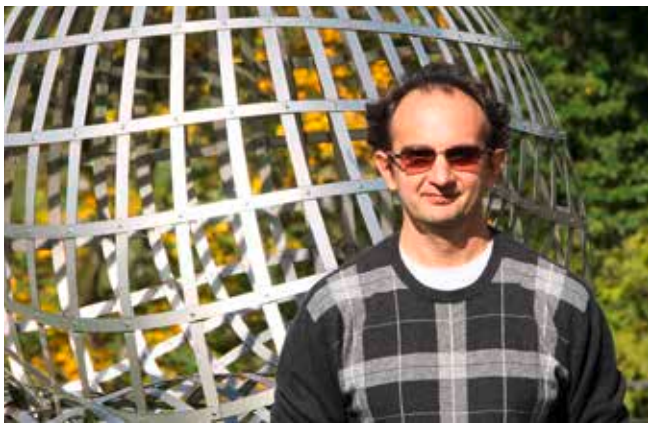
M. Radziwill

S. Garoufalidis

L. Orloff Clark

M. A. de Cataldo

M. Popa



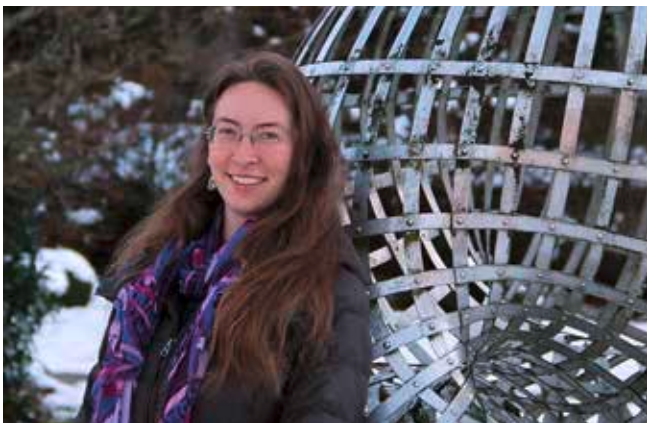
A. Gorodetski

S. Shakirov

N. Strungaru

C. D. Jaekel

J. Feng



F. Hoffmann

2.6. Arbeitsgemeinschaften

Arbeitsgemeinschaft 1714

02.04. – 08.04.2017 **Higher Gross Zagier Formulas**

Organizers: Zhiwei Yun, Stanford
Wei Zhang, New York

Abstract

The aim of this Arbeitsgemeinschaft was to go over the proof of the higher Gross–Zagier formula established in the paper of Yun and Zhang on "Shtukas and the Taylor expansion of L-functions". The formula relates arbitrary order central derivative of the base change L-function of an unramifed automorphic representation of PGL_2 over a function field to the self-intersection number of a certain algebraic cycle on the moduli stack of Shtukas.

Participants

Ai, Xiaohua (Paris), Burungale, Ashay A. (Villetaneuse Cedex), Cai, Li (Beijing), Caraiani, Ana (Princeton), Chang, Huai-Liang (Kowloon), Dao Van, Thinh (Singapore), Deninger, Christopher (Münster), Dhillon, Gurbir (Stanford), Disegni, Daniel (Montreal), Fargues, Laurent (Paris), Feng, Tony (Menlo Park), Haines, Thomas (College Park), Hartl, Urs (Münster), Heinloth, Jochen (Essen), Hsu, Chi-Yun (Cambridge), Hwang, Brian (Ithaca), Jiang, Yunfeng (Lawrence), Kala, Vitezslav (Göttingen), Khayutin, Ilya (Princeton), Klingler, Bruno (Paris), Le Bras, Arthur-César (Paris), Li, Chao (New York), Li, Huajie (Paris), Li, Qirui (New York), Li, Shizhang (New York), Li, Yingkun (Darmstadt), Maulik, Davesh (Cambridge), Mocz, Lucia (Princeton), Nekrasov, Ilia (St. Petersburg), Pal, Vivek (Eugene), Pan, Xuanyu (Bonn), Rapoport, Michael (Bonn), Richarz, Timo (Essen), Saha, Jyoti Prakash (Oberwolfach-Walke), Shnidman, Ariel (Chestnut Hill), Smithling, Brian (Baltimore), Su, Changjian (New York), Tamiozzo, Matteo (Essen), Tang, Yunqing (Princeton), Tian, Ye (Beijing), Ulmer, Douglas (Atlanta), Varshavsky, Yakov (Jerusalem), Xiao, Jingwei (New York), Xiao, Liang (Storrs), Xue, Cong (Orsay), Yao, Zijian (Cambridge), Ye, Lizao (Vandoeuvre-lès-Nancy), Yu, Hongjie (Paris), Yun, Zhiwei (New Haven), Zhang, Jianru (Philadelphia), Zhang, Wei (New York), Zhu, Yihang (Cambridge)

08.10. – 13.10.2017 **Additive Combinatorics, Entropy, and Fractal Geometry**

Organizers: Emmanuel Breuillard, Münster
Mike Hochman, Jerusalem
Pablo Shmerkin, Buenos Aires

Abstract

The aim of the meeting was to survey recent developments in fractal geometry, specifically those related to projections and slices of planar self-similar sets, and dimension and absolute continuity of self-similar measures on the line, in particular Bernoulli convolutions. The methods combine ergodic theory, additive combinatorics, and algebraic number theory. Talks were high-level descriptions of the results, aimed at a mixed audience with minimal background in real analysis, ergodic theory and dimension theory.

Participants

Algom, Amir (Jerusalem), Allen, Demi (Heslington, York), Almarza, Javier Ignacio (New York), Baker, Simon (Coventry), Barral, Julien (Villetaneuse Cedex), Biggs, Kirsti (Bristol), Bloom, Thomas (Bristol), Bruce, Catherine (Manchester), Bugeaud, Yann (Strasbourg Cedex), Chow, Sam (Heslington, York), Csóka, Endre (Budapest), de Saxcé, Nicolas (Villetaneuse Cedex), Dufloux, Laurent (Oulu), Ekström, Frederik (Oulu), Faltings, Gerd (Bonn), Filip, Simion (Cambridge), Fraczyk, Mikolaj (Orsay), Gafni, Ayla (Rochester), Glasscock, Daniel G. (Boston), Gorodetski, Anton (Irvine), Hanson, Brandon (University Park), He, Weikun (Jerusalem), Héra, Kornélia (Budapest), Hochman, Michael (Jerusalem), Howroyd, Douglas Charles (St. Andrews), Iosevich, Alexander (Rochester), Käenmäki, Antti (Helsinki), Kempton, Tom M. W. (Manchester), Kolossvary, Istvan (Budapest), Kong, Derong (Leiden), Landesberg, Or (Jerusalem), Li, Junxian (Urbana), Liao, Lingmin (Créteil), Luo, Jun (Jena), Marchese, Luca (Villetaneuse Cedex), Mathe, Andras (Coventry), Murphy, Brendan (Bristol), Petridis, Georgis (Athens), Pham, Lam (New Haven), Pikhurko, Oleg (Coventry), Pollicott, Mark (Coventry), Rapaport, Ariel (Jerusalem), Rossi, Eino (Buenos Aires), Rühr, Rene (Ramat Aviv, Tel Aviv), Shmerkin, Pablo (Buenos Aires), Simon, Károly (Budapest), Stevens, Sophie (Bristol), Takahashi, Yuki (Ramat Gan), Taylor, Krystal (Columbus), Velani, Sanju (Heslington, York), Wu, Meng (Jerusalem), Yu, Han (St. Andrews), Zafeiropoulos, Agamemnon (Heslington, York)

2.7. Oberwolfach Seminare

Oberwolfach Seminar 1723a

04.06. – 10.06.2017

Compressible and Incompressible Multiphase Flows: Modelling, Analysis, Numerics

Organizers:
Dieter Bothe, Darmstadt
Stéphane Popinet, Paris
Christian Rohde, Stuttgart
Richard Saurel, Marseille

Abstract

The seminar provided an introduction into the fundamental modelling techniques for multiphase flows and related flow problems. Basic analytical tools were presented, major numerical discretization methods including scientific computing aspects were explained. Sharp-interface/diffuse-interface models and homogenized mixture models for dilute flows provided basic modelling approaches. Special applications like e.g. multicomponent flows, interfacial multiphysics or reactive flows were addressed. The role of entropy in compressible flow as well as novel Riemann solvers and front-tracking strategies were discussed. The numerics-oriented lectures provided an overview on a wide range of methods: level-set methods, volume-of-fluid algorithms, ghost-fluid methods, moving-mesh (ALE) methods, heterogeneous multiscale algorithms, parametric finite-element methods. An important issue was the coupling of the interface tracking to efficient bulk solvers that can be used in high performance computing.

Participants

Bacigaluppi, Paola (Zürich), Berny, Alexis (Paris), Bothe, Dieter (Darmstadt), Druet, Pierre-Etienne (Berlin), Fricke, Mathis (Darmstadt), Gründing, Dirk (Darmstadt), Hitz, Timon (Stuttgart), Magiera, Jim (Stuttgart), Marić, Tomislav (Darmstadt), Marschall, Holger (Darmstadt), Massa, Francesco Carlo (Bergamo-BG), Matern, Christoph (Magdeburg), Müller, Christoph (Stuttgart), Ostrowski, Lukas (Stuttgart), Parker-Lamptey, George (Kumasi), Popinet, Stéphane (Paris), Rohde, Christian (Stuttgart), Saurel, Richard (Marseille), Schulte, Kathrin (Stuttgart), She, Bangwei (Praha), Thein, Ferdinand (Magdeburg), Wiebe, Maria (Stuttgart), Zacharenakis, Dimitrios (Stuttgart), Zakerzadeh, Hamed (Aachen)

04.06. – 10.06.2017 **Discontinuous Petrov-Galerkin Methods**

Organizers: Carsten Carstensen, Berlin
Leszek F. Demkowicz, Austin
Norbert Heuer, Santiago

Abstract

The seminar included a number of introductory lectures covering the basics plus a number of presentations on current research topics. The preliminary lectures were: Petrov-Galerkin method with optimal test functions vs. minimum residual method vs. mixed formulation; various variational formulations (Closed Range Theorem at work); formulations with broken test spaces; robust DPG methods; new developments.

Participants

Cantin, Pierre (Santiago), Carstensen, Carsten (Berlin), Demkowicz, Leszek F. (Austin), Dong, Zhaonan (Leicester), Ernesti, Johannes (Karlsruhe), Fuentes Caycedo, Federico (Austin), Hellwig, Friederike (Berlin), Heuer, Norbert (Santiago), Keith, Brendan (Austin), Khristenko, Ustim (Palaiseau), Lepe, Felipe (Concepcion), Maier, Roland (Augsburg), Millar Vasquez, Felipe (Valparaiso), Mitsov, Georgi (Berlin), Petrides, Socratis (Austin), Pfeiler, Carl-Martin (Wien), Puttkammer, Sophie (Berlin), Roggendorf, Sarah (Nottingham), Ruggeri, Michele (Wien), Schaeffer, Julia (Berlin), Storn, Johannes (Berlin), Tran, Ngoc Tien (Berlin), Trunschke, Philipp (Berlin), Zakerzadeh, Mohammad (Aachen)

15.10. – 21.10.2017 **Scaling Limits of Random Planar Maps and Liouville Quantum Gravity**

Organizers: Jason Miller, Cambridge UK
Scott Sheffield, Cambridge MA

Abstract
This seminar explored random planar maps and their continuum scaling limits. The scaling limits are given by several canonical continuum objects: the Gaussian free field (GFF), the continuum random tree (CRT), Liouville quantum gravity (LQG), Schramm-Loewner evolution (SLE), conformal loop ensembles (CLE), quantum Loewner evolution (QLE), and the Brownian map. We also highlighted several of the major open problems in the subject, including those involving conformal embeddings of planar maps, metric space structure for LQG surfaces, higher dimensional surface integrals such as those that arise in gauge theory, and diffusion limited aggregation.

Participants
Aru, Juhan (Zürich), Baverez, Guillaume (Cambridge), Bettinelli, Jeremie (Palaiseau), Biamonte, Mason (Cambridge), Boikii, Roman (Genève), Charbonnier, Séverin (Gif-sur-Yvette), Falconet, Hugo Pierre (New York), Goswami, Subhajit (Bures-sur-Yvette), Gu, Chenlin (Palaiseau), Gwynne, Ewain (Cambridge), Holden, Nina (Cambridge), Karrila, Alex Mikael (Aalto), Lehéricy, Thomas (Orsay), Lin, Peter (Seattle), Maazoun, Mickael (Lyon), McEnteggart, Oliver (Cambridge), Miller, Jason P. (Cambridge), Park, Minjae (Cambridge), Pfeffer, Joshua (Cambridge), Powell, Ellen G. (Zürich), Schoug, Lukas (Stockholm), Sepulveda, Avelio (Lyon), Sheffield, Scott (Cambridge), Wang, Yilin (Zürich), Zhu, Tunan (Paris)

15.10. – 21.10.2017 **Algebraic K- and L-Theory and Geometric Group Theory**

Organizers:
Arthur Bartels, Münster
Wolfgang Lück, Bonn
Karen Vogtmann, Warwick

Abstract

The idea of this seminar was to bring together ideas and results from two different branches of mathematics, namely, geometric group theory and algebraic K- and L-theory. There has been a great deal of activity in both areas during the last decades and an introduction to both of them is of great value for any PhD-student or Postdoc. We covered the following topics: Algebraic K- and L-theory of group rings, in particular the Farrell-Jones Conjecture; applications to manifold theory, geometry and algebra, discussion of proofs of known cases of the Farrell-Jones Conjecture; geometric group theory, hyperbolic groups, CAT(0)-groups, mapping class groups and Out (F_n), and their actions on interesting spaces.

Participants

Bartels, Arthur (Münster), Boyd, Rachael Jane (Aberdeen), Campagnolo, Caterina (Karlsruhe), Caputi, Luigi (Regensburg), Chung, Yeong Chyuan (Warszawa), Claußnitzer, Anton (Dresden), Henneke, Fabian (Bonn), Herrmann, Gerrit (Regensburg), Heuer, Nicolaus (Oxford), Hoekzema, Renee (Oxford), Kielak, Dawid (Bielefeld), Kudryashov, Alexei (Augsburg), Lackmann, Malte (Bonn), Liu, Hongzhi (Shanghai), Lück, Wolfgang (Bonn), Nishikawa, Shintaro (University Park), Patchkoria, Irakli (Bonn), Prigge, Nils (Cambridge), Prytula, Tomasz (Southampton), Rovi, Carmen (Bloomington), Sawicki, Damian (Warszawa), Semikina, Iuliia (Bonn), Suchla, Engelbert Peter (Göttingen), Vogtmann, Karen L. (Coventry), Xie, Heng (Coventry)

19.11. – 25.11.2017 **Mathematical Modeling in Systems Biology**

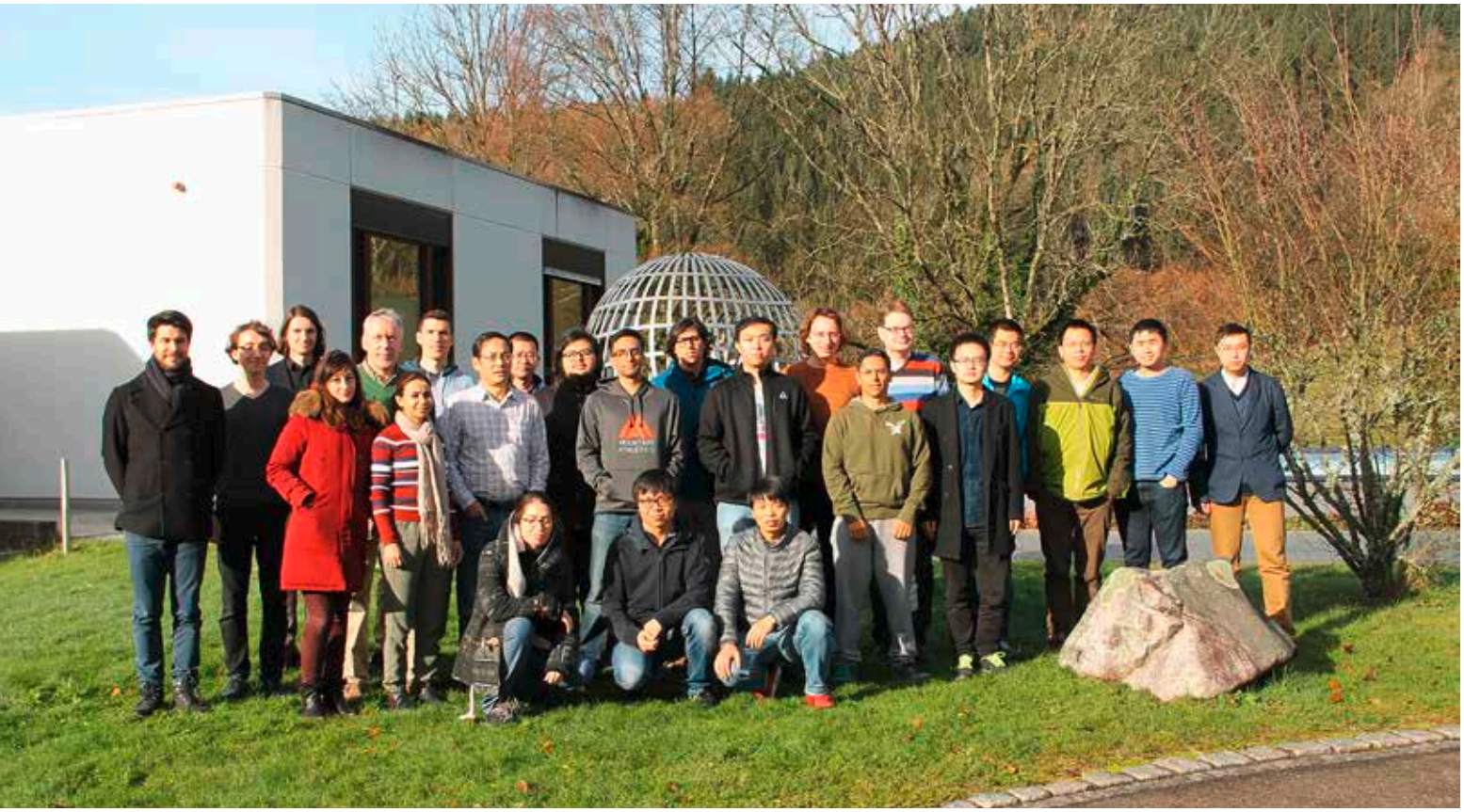
Organizers: Jan Hasenauer, Neuherberg
Susanna Röblitz, Berlin
Heike Siebert, Berlin
Steffen Waldherr, Leuven

Abstract

The seminar on mathematical modeling in systems biology included tutorial courses and modeling exercises focusing on the following topics: different modeling paradigms (ODEs, discrete dynamical systems, stochastic models), their advantages and disadvantages, challenges, and potential applications; property conservation across formalisms; parameter estimation and uncertainty quantification.

Participants

De Becker, Kobe (Leuven), Di Ponzio, Chiara (Heidelberg), Domenzain del Castillo Cerecer, Iván (Göteborg), Firippi, Elena (Sophia-Antipolis), Fischer, Lisa (Berlin), Gutiérrez, Joaquin (Basel), Hasenauer, Jan (Neuherberg), Kraut, Anna Katharina (Bonn), Larripa, Kamila (Arcata), Mahler, Barbara (Oxford), Martins Conde, Patricia (Belvaux), Mathias, Sonja (Uppsala), Refisch, Lukas (Freiburg i. Br.), Reisch, Cordula (Braunschweig), Röblitz, Susanna (Berlin), Ryu, Hwayeon (West Hartford), Sanchez, Benjamin (Göteborg), Schälte, Yannik (Neuherberg), Schulze, Moritz (Braunschweig), Schwieger, Robert (Berlin), Siebert, Heike (Berlin), Taghvafard, Hadi (Groningen), Waldherr, Steffen (Leuven), Woolley, Thomas (Cardiff), Yu, Polly (Madison)



19.11. – 25.11.2017 **Lower Curvature Bounds and Topology**

Organizers: Fuquan Fang, Beijing
Wilderich Tuschmann, Karlsruhe

Abstract

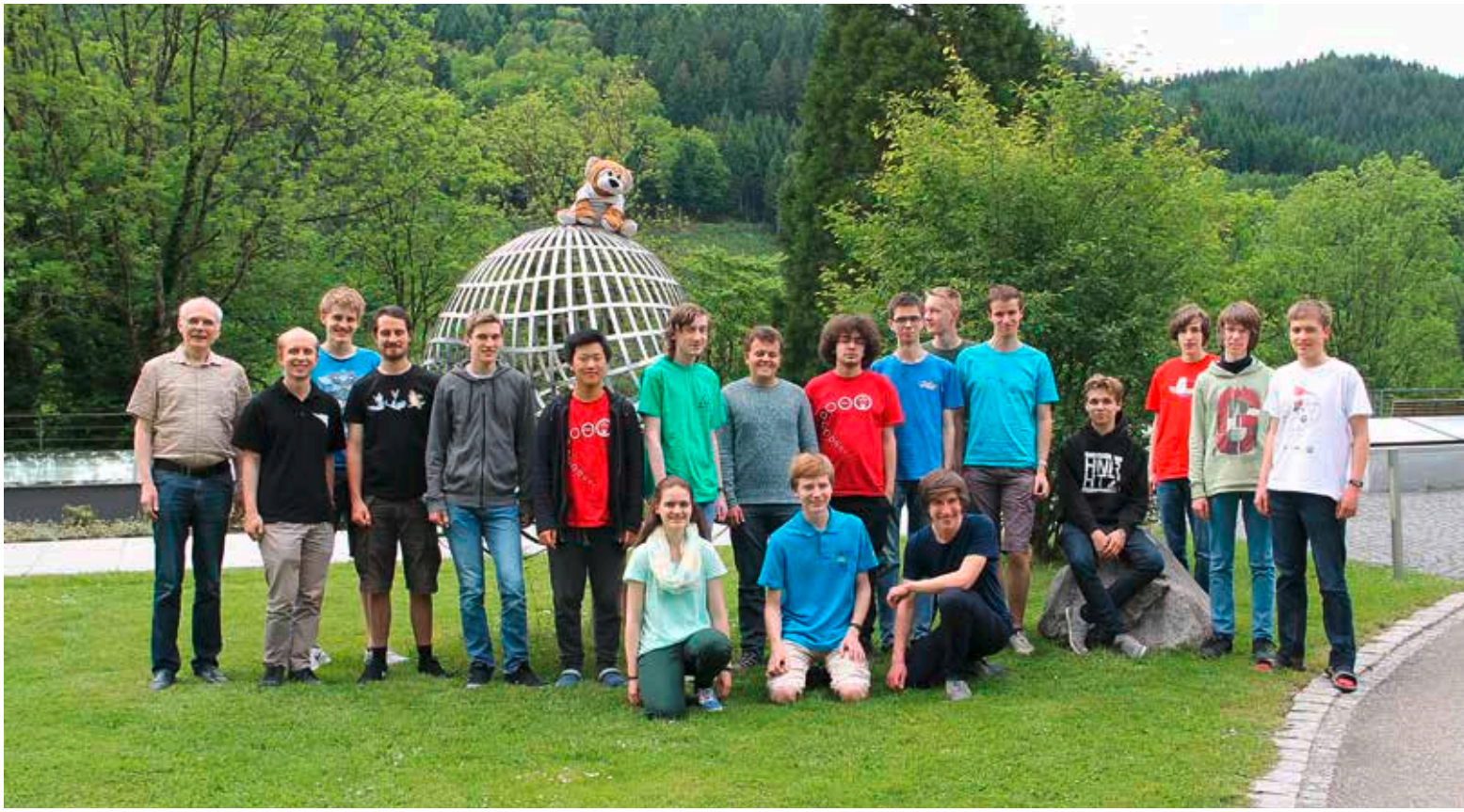
The existence, construction and classification of Riemannian metrics with certain prescribed curvature characteristics constitute basic questions and tasks in Riemannian geometry and are strongly related to the global shape and topology of the underlying manifolds. This Oberwolfach Seminar focussed on central results and open problems in the global Riemannian geometry of lower curvature bounds.

Participants

Basurto, Efrain (Dortmund), Corro Tapia, Diego (Karlsruhe), Deng, Jialong (Göttingen), Fang, Fuquan (Beijing), Garcia Perez, Ana Karla (Karlsruhe), González Alvaro, David (Fribourg), Günther, Martin (Karlsruhe), Hertl, Thorsten (Göttingen), Huang, Hongzhi (Beijing), Jiang, Huihong (Shanghai), Jiang, Zuohai (Beijing), Kordaß, Jan-Bernhard (Karlsruhe), Liu, Yongtao (Beijing), Pieroni, Erika (Roma), Santos Rodriguez, Jaime (Madrid), Torres-Orozco, Jonatán (Michoacan), Tuschmann, Wilderich (Karlsruhe), Wermelinger, Jonathan (Fribourg), Wiemeler, Michael (Münster), Wulff, Christopher (Göttingen), Xu, Shicheng (Beijing), Yao, Xuchao (Beijing), Zarei, Masoumeh (Beijing), Zhang, Ruobing (Stony Brook), Zhang, Zhenlei (Beijing)

2.8. Fortbildungsveranstaltungen/Training weeks

Trainings- und Abschluss-Seminar für die Internationale Mathematik-Olympiade 1721a



21.05. – 26.05.2017 **Trainings- und Abschluss-Seminar für die Internationale Mathematik-Olympiade**

Organizer: Jürgen Prestin, Lübeck

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

Participants
Armbruster, Alexander (Unterhaching), Bielser, Kern (Hamburg), Börger, Christoph (Hamburg), Chen, Raymond (Geisenheim), Drees, Martin (Nürnberg), Gehring, Lukas (Nördlingen), Hellig, Karl (Dresden), Holstermann, Jan (Warendorf), Juran, Branko (Berlin), Mayer, Elbrus (Bonn), Meyer, Sebastian (Dresden), Paul, Manfred (Würzburg), Randig, Marvin (Wusterhausen), Rathke, Silas (Neumünster), Walter, Jonas (Rostock), Wohlschlager, Alois (Raubling)

2.9. Research in Pairs

Die folgenden Forscherinnen und Forscher nahmen 2017 am Research in Pairs Programm teil:

Robert Luce (Lausanne) Olivier Sète (Oxford)	01.01. – 14.01.2017
Martin Mayer (Gießen) Cheik Birahim Ndiaye (Tübingen)	08.01. – 21.01.2017
Gabriele Ciaramella (Geneva) Martin J. Gander (Geneva) Laurence Halpern (Villetaneuse) Julien Salomon (Paris)	08.01. – 21.01.2017
Erik Koelink (Nijmegen) Pablo Manuel Román (Córdoba) Maarten van Pruijssen (Paderborn)	22.01. – 04.02.2017
David Barnes (Belfast) John Greenlees (Sheffield) Magdalena Kedziorek (Lausanne)	22.01. – 04.02.2017
Simone Di Marino (Orsay) Augusto Gerolin (Jyväskylä) Luca Nenna (Paris)	22.01. – 04.02.2017
Karl Heinrich Hofmann (Darmstadt) Linus Kramer (Münster)	05.02. – 18.02.2017
Andreas Defant (Oldenburg) Pablo Sevilla-Peris (Valencia)	05.02. – 18.02.2017
Yoav Moriah (Haifa) Jennifer Schultens (Davis)	05.02. – 18.02.2017
Alexandra Cipriani (Berlin) Rajat Subhra Hazra (Calcutta)	05.02. – 18.02.2017
Robert P. Gilbert (Newark) Klaus Hackl (Bochum)	19.02. – 11.03.2017
Torsten Hoge (Hannover) Gerhard Röhrle (Bochum) Christian Stump (Berlin)	19.02. – 04.03.2017
Christof Geiß (Mexico City) Bernard Leclerc (Caen) Jan Schröer (Bonn)	26.02. – 04.03.2017
J. William Helton (La Jolla) Igor Klep (Auckland) Scott McCullough (Gainesville)	12.03. – 25.03.2017
Mats Boij (Stockholm) Juan Migliore (Indiana) Rosa M. Miró-Roig (Barcelona) Uwe Nagel (Kentucky)	26.03. – 08.04.2017
Jim Ritter (Paris) Annette Imhausen (Frankfurt am Main) Paul Warner (Frankfurt am Main)	26.03. – 08.04.2017
Gunter Malle (Kaiserslautern) Donna Testerman (Lausanne)	16.04. – 22.04.2017
Pierre Fima (Chennai) Francois Le Maitre (Paris) Kunal Krishna Mukherjee (Chennai) Issan Patri (Chennai)	16.04. – 29.04.2017

The following researchers attended the Research in Pairs program in 2017:

Paul Biran (Zürich) Octav Cornea (Montreal)	30.04. – 13.05.2017
Julia Chuzhoy (Chicago) Sanjeev Khanna (Philadelphia)	07.05. – 20.05.2017
Claudia Chaio (Mar del Plata) Piotr Malicki (Torun)	14.05. – 27.05.2017
Ragnar-Olaf Buchweitz (Toronto) Bernd Ulrich (West Lafayette)	21.05. – 03.06.2017
Dmitry Fuchs (Davis) Alexandre A. Kirillov (Philadelphia) Sophie Morier-Genoud (Paris) Valentin Ovsienko (Reims)	04.06. – 17.06.2017
Luz Roncal (Logrono) Sundaram Thangavelu (Bangalore)	04.06. – 17.06.2017
Alla Detinko (St. Andrews) Dane Flannery (Galway) Alexander Hulpke (Fort Collins)	04.06. – 24.06.2017
Sergey Finashin (Ankara) Viatcheslav Kharlamov (Strasbourg)	18.06. – 08.07.2017
Laurentiu Paunescu (Sydney) Mihai Tibar (Villeneuve d'Ascq)	18.06. – 01.07.2017
Carsten Jentsch (Mannheim) Rafal Kulik (Ottawa)	25.06. – 08.07.2017
Tobias Hartnick (Haifa) Andreas Ott (Heidelberg)	02.07. – 08.07.2017
Michael Farber (London) Mark Grant (Aberdeen) Gregory Lupton (Cleveland) John Oprea (Cleveland)	09.07. – 22.07.2017
Louis H. Kauffman (Chicago) Sofia Lambropoulou (Athens)	09.07. – 22.07.2017
Lenny Fukshansky (Claremont) Nikolay G. Moshchevitin (Moscow)	23.07. – 05.08.2017
Jürgen Scheurle (Garching) Sebastian Walcher (Aachen)	30.07. – 12.08.2017
Toshiyuki Kobayashi (Tokyo) Birgit Speh (Ithaca)	30.07. – 12.08.2017
Antonio Gaudiello (Cassino) Taras Mel'nyk (Kiev)	30.07. – 12.08.2017
David Colton (Newark) Rainer Kress (Göttingen)	13.08. – 26.08.2017
Walter Hayman (London) Eleanor Lingham (Sheffield)	20.08. – 02.09.2017
Patrick Gilmer (Baton Rouge) Gregor Masbaum (Paris)	27.08. – 09.09.2017
Alberto Paganini (Oxford) Kevin Sturm (Linz)	10.09. – 23.09.2017

Dirk Siersma (Utrecht) Mihai Tibar (Villeneuve d'Ascq)	10.09. – 23.09.2017
László Györfi (Budapest) Harro Walk (Stuttgart)	17.09. – 30.09.2017
Gabriel Fuhrmann (Jena) Maik Gröger (Jena) Dominik Kwietniak (Krakow)	15.10. – 28.10.2017
Paola D'Aquino (Caserta) Andrew MacIntyre (Edinburgh)	29.10. – 04.11.2017
William Jaco (Stillwater) Joachim Hyam Rubinstein (Parkville) Stephan Tillmann (Sydney) Jonathan Spreer (Berlin)	05.11. – 18.11.2017
Elisa Davoli (Wien) Carolin Kreisbeck (Utrecht)	05.11. – 18.11.2017
Yan Brenier (Palaiseau) Dmitry A. Vorotnikov (Coimbra)	19.11. – 02.12.2017
Victor Guerassimov (Belo Horizonte) Leonid D. Potyagailo (Villeneuve d'Ascq)	03.12. – 22.12.2017

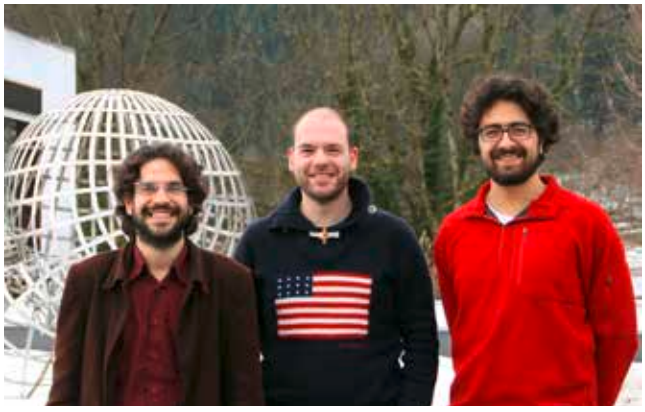
G. Ciaramella, L. Halpern, M. Gander, J. Salomon

P. M. Román, E. Koelink, M. van Pruijssen

R. Luce, O. Sète

M. Kedziorek, J. Greenless, D.J. Barnes

M. Mayer, C. B. Ndiaye

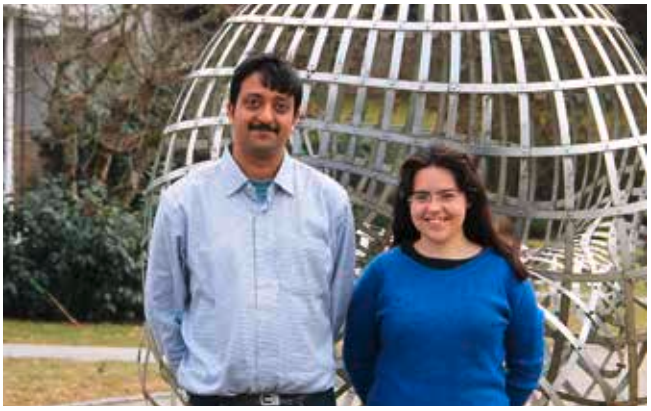


A. Gerolin, L. Nenna, S. Di Marino

K. H. Hofmann, L. Kramer

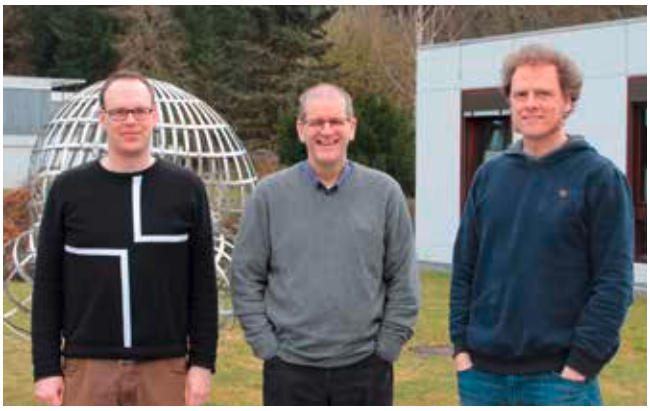
P. Sevilla-Peris, A. Defant

J. Schultens, Y. Moriah

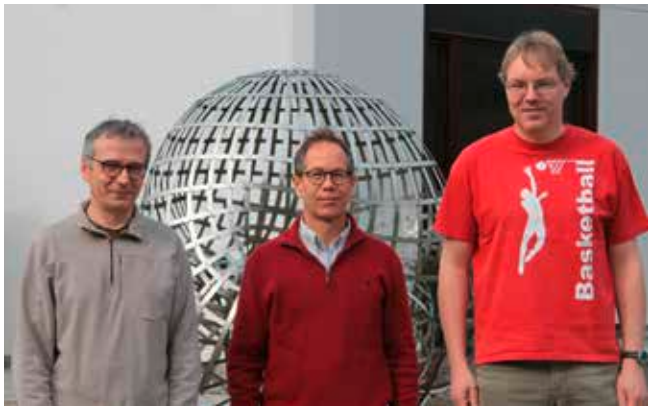


R. S. Hazra, A. Cipriani

R. P. Gilbert, K. Hackl



T. Hoge, G. Röhrle, C. Stump



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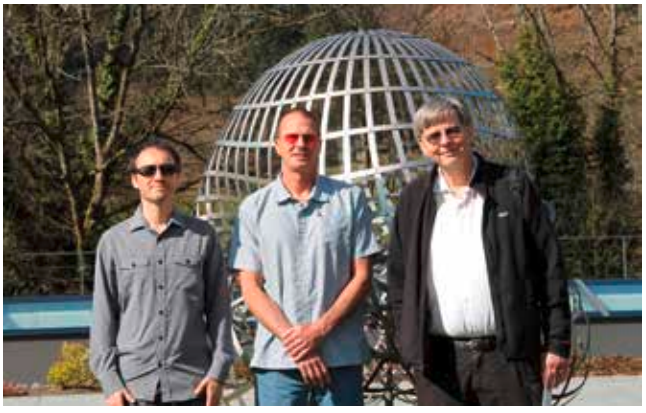

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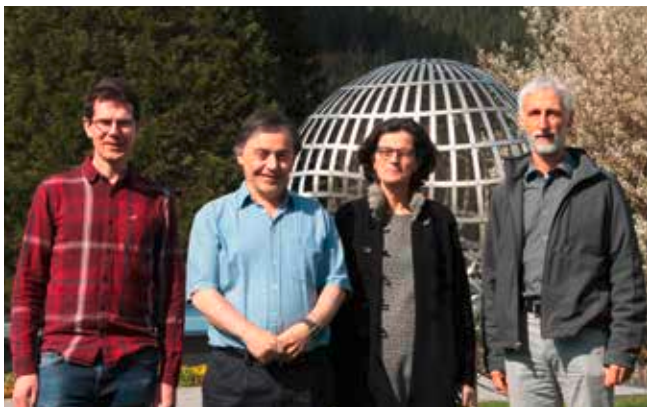

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A. Imhausen, J. Ritter, P. Warner

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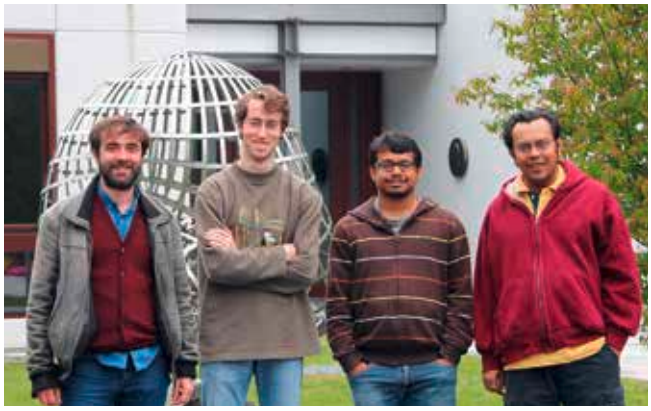

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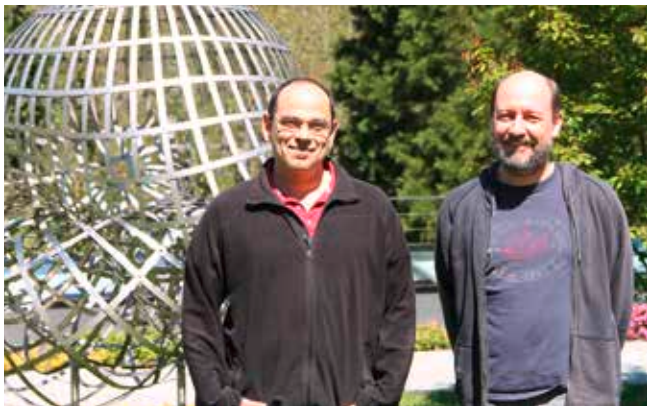

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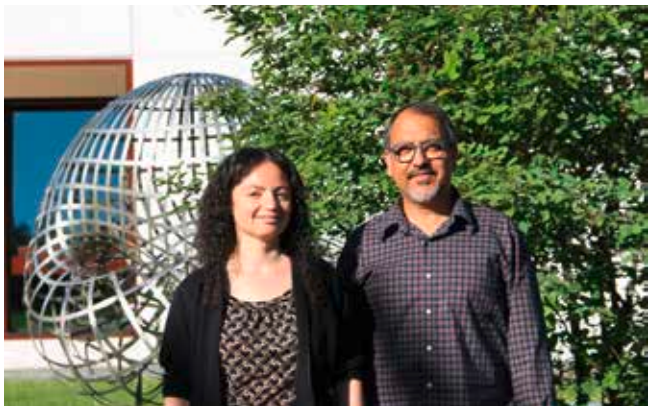

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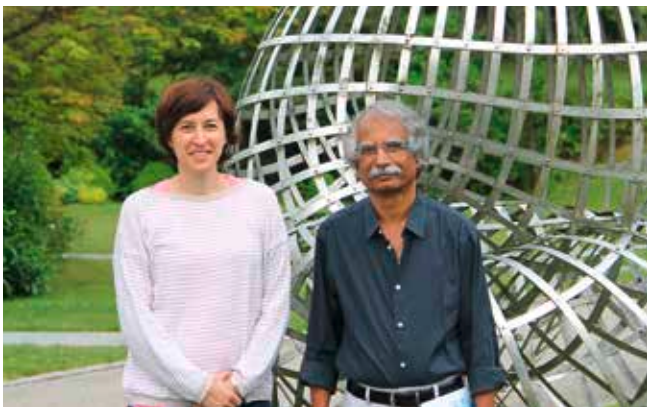

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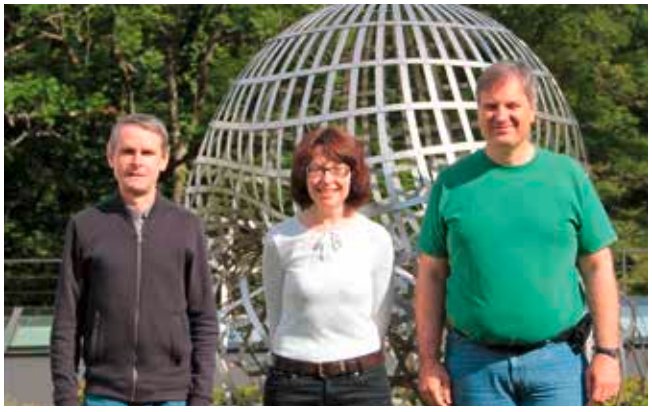


D. Flannery, A. Detinko, A. Hulpke

S. Finashin, V. Kharlamov

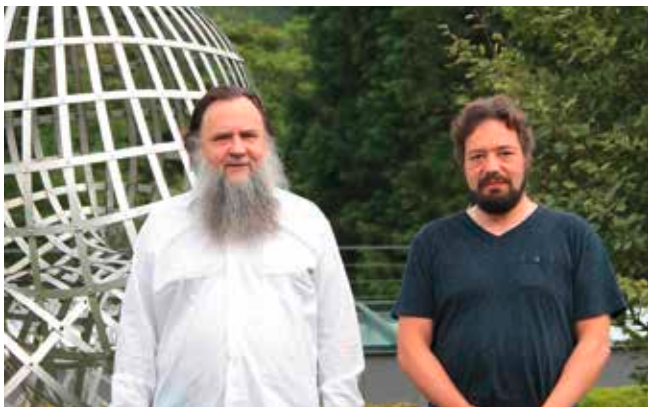
M. Tibar, L. Paunescu

C. Jentsch, R. Kulik

T. Hartnick

M. Grant, G. Lupton, M. Farber, J. Oprea

L. H. Kauffman, S. Lambropoulou



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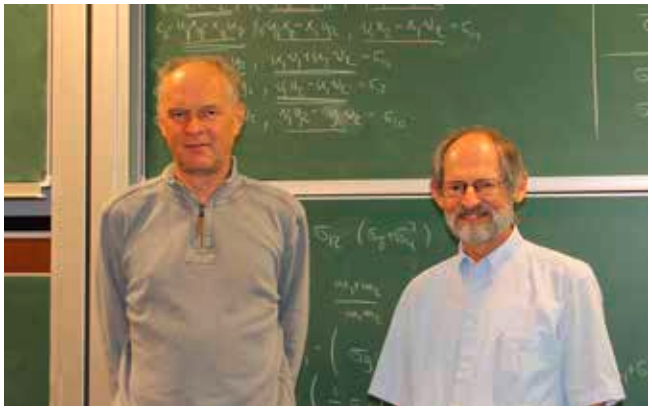

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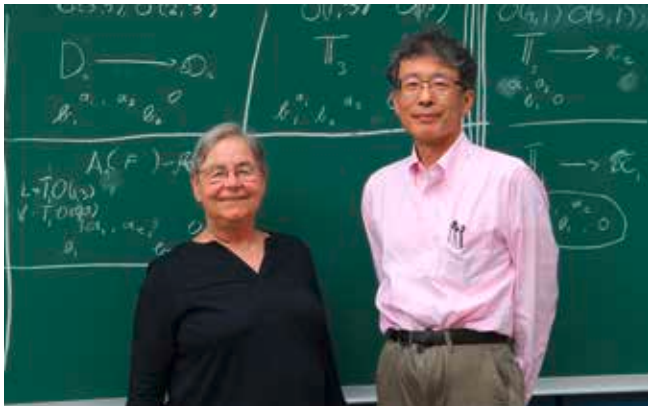

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A. Gaudiello, T. Mel'nyk

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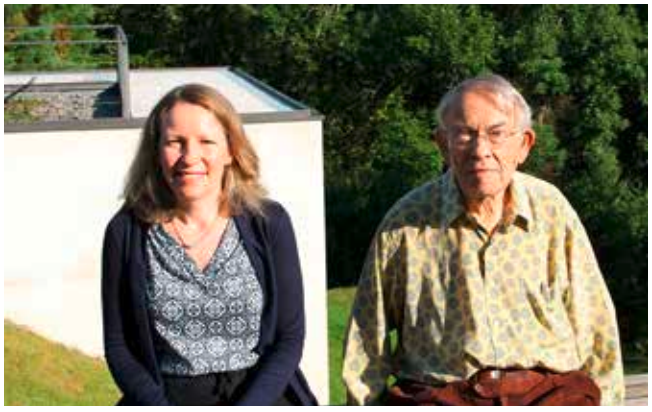

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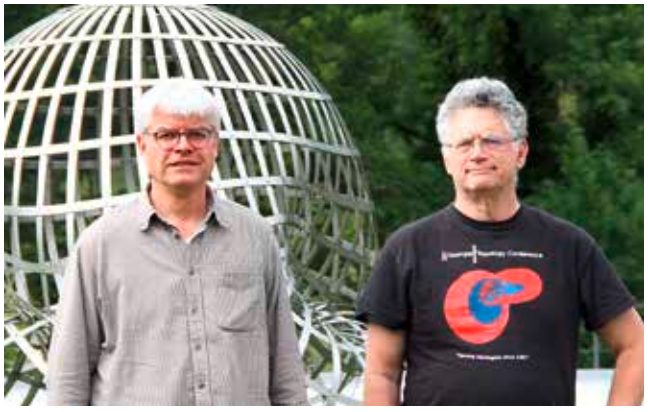

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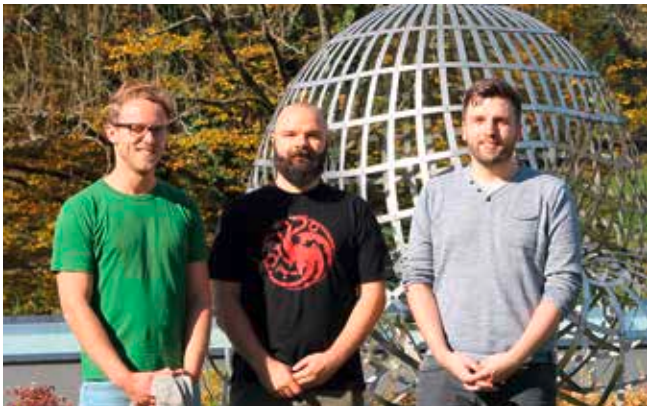
K. Sturm, A. Paganini

D. Siersma, M. Tibar

L. Györfi, H. Walk

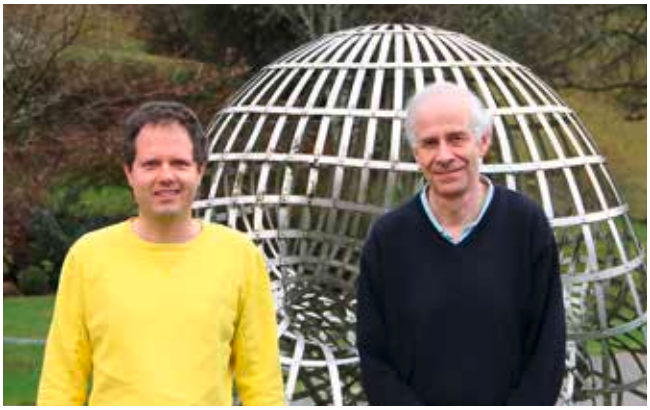


G. Fuhrmann, D. Kwietniak, M. Gröger

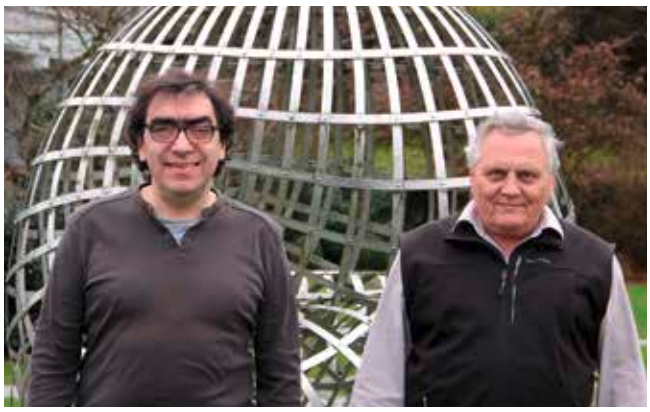
P. D'Aquino. A. MacIntyre

S. Tillman, J. Spreer, J. H. Rubinstein, W. Jaco

C. Kreisbeck, E. Davoli



D. A. Vorotnikov, Y. Brenier



L. D. Potyagailo, V. Guerassimov

2.10. Oberwolfach Leibniz Fellows

Im Rahmen des Nachwuchsförderprogramms Oberwolfach Leibniz Fellows verbrachten die folgenden Personen im Jahr 2017 einen Forschungsaufenthalt in Oberwolfach:

Jyoti Prakash Saha (Bonn)	01.01. – 31.03.2017
external guest researcher:	
Jitrenda Bajpai (Göttingen)	19.02. – 25.02.2017
Madhusudan Manjunath (London)	01.01. – 31.03.2017
external guest researchers:	
Goran Malic (Manchester)	05.02. – 11.02.2017
Spencer Backman (Bonn)	19.02. – 25.02.2017
Justin Chen (Berkeley)	05.03. – 11.03.2017
Cordian Riener (Tromso)	26.02. – 25.03.2017
external guest researchers:	
Frank Vallentin (Köln)	12.03. – 15.03.2017
Raman Sanyal (Frankfurt am Main)	14.03. – 18.03.2017
Thorsten Theobald (Frankfurt am Main)	20.03. – 24.03.2017
Yara Elias (Bonn)	01.04. – 30.06.2017
without external researchers	
Christiane Görgen (Coventry)	09.04. – 10.05.2017
external guest researcher:	
Piotr Wiktor Zwiernik (Barcelona)	22.04. – 26.04.2017
Tian An Wong (Bonn)	30.04. – 20.06.2017
without external researchers	
Marat Aukhadiev (Münster)	01.05. – 29.07.2017
without external researchers	
Sari Ghanem (Potsdam)	09.05. – 01.06.2017
without external researchers	
Francesco Fanelli (Villeurbanne)	04.06. – 01.07.2017
without external researchers	
Eleonore Faber (Ann Arbor)	18.06. – 29.07.2017
external guest researchers:	
Angélica Benito (Madrid)	18.06. – 01.07.2017
Colin Ingalls (Fredericton)	02.07. – 12.07.2017
Ragnar-Olaf Buchweitz (Toronto)	08.07. – 22.07.2017
Arindam Biswas (Cambridge)	07.07. – 07.10.2017
without external researchers	

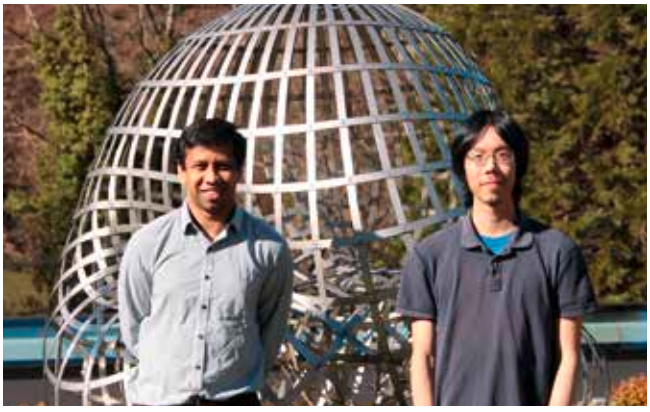
Within the program for junior researchers, Oberwolfach Leibniz Fellows, the following persons spent a research stay in Oberwolfach in the year 2017:

Pavlo Yatsyna (Surrey)	23.07. – 21.10.2017
without external researchers	
Magdalena Boos (Bochum)	30.07. – 26.08.2017
without external researchers	
Hans Franzen (Bochum)	30.07. – 26.08.2017
without external researchers	
Christiane Görgen (Coventry)	19.08. – 16.09.2017
external guest researcher:	
Manuele Leonelli (Glasgow)	20.08. – 26.08.2017
Sari Ghanem (Potsdam)	28.08. – 05.10.2017
without external researchers	
Hery Randriamaro (Antananarivo, Madagascar)	03.09. – 02.12.2017
external guest researchers:	
Götz Pfeiffer (Galway)	29.10. – 04.11.2017
Gerhard Röhrle (Bochum)	29.10. – 04.11.2017
Anne Schauenburg (Bochum)	19.11. – 25.11.2017
Giacomo Cherubini (Bonn)	03.09. – 04.11.2017
without external researchers	
Ibrahim Nonkane (Ouagadougou)	03.09. – 02.12.2017
without external researchers	
Tony Mack Robert Ezome Mintsa (Franceville)	29.10. – 02.12.2017
without external researchers	
Armin Eftekhari (London)	26.11. – 23.12.2017
without external researchers	
Hery Randriamaro (Antananarivo, Madagascar)	03.12. – 17.03.2018
without external researchers	

J. Bajpai, J. P. Saha

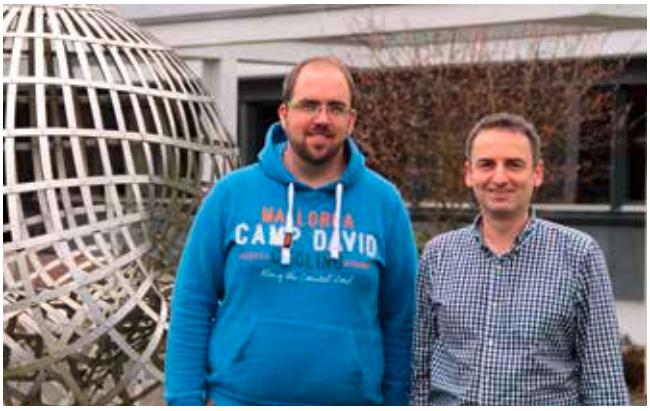
G. Malic, M. Manjunath

M. Manjunath, S. Backman



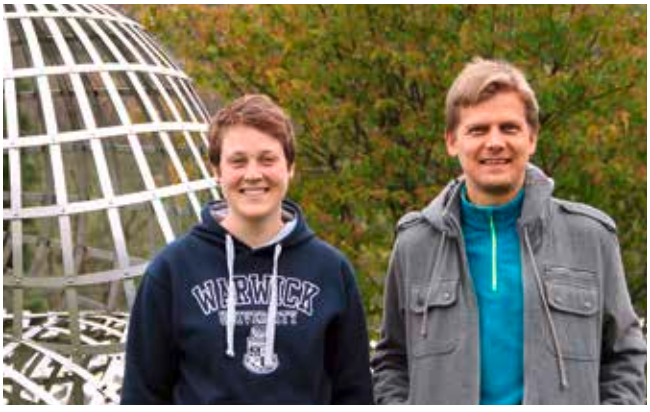
M. Manjunath, J. Chen

R. Sanyal, C. Riener, F. Vallentin

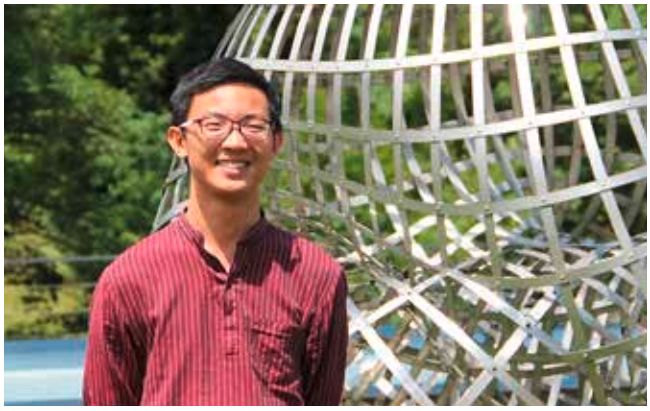


C. Riener, T. THeobald

Y. Elias



C. Görgen, P. W. Zwiernik



T. A. Wong

M. Aukhadiev

S. Ghanem

F. Fanelli

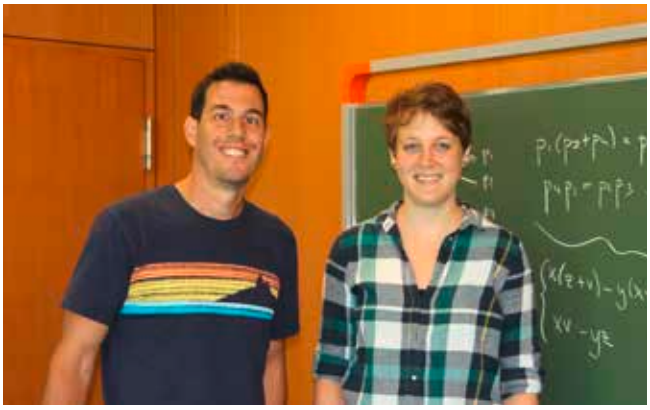
E. Faber, A. Benito

C. Ingalls, E. Faber, R.-O. Buchweitz

A. Biswas

P. Yatsyna

H. Franzen, M. Boos



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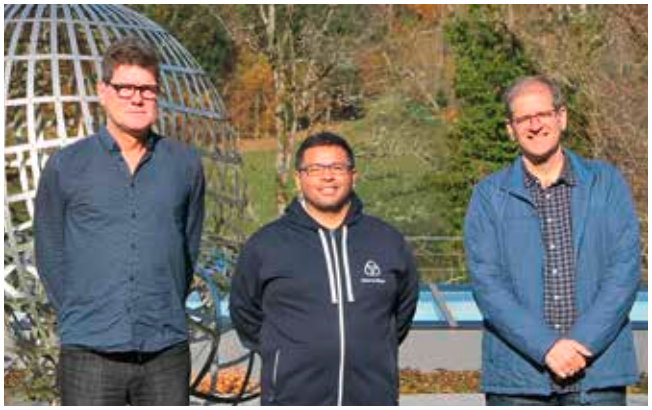
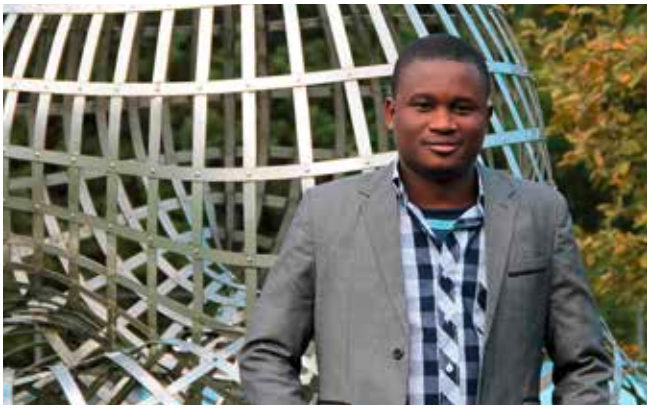


G. Pfeiffer, H. Randriamaro, G. Röhrle

A. Schauenburg, H. Randriamaro

G. Cherubini



I. Nonkane

T. M. R. Ezome Mintsa

A. Eftekhari

2.11. Publikationen 2017

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

Oberwolfach Reports (OWR)

OWR wird in Zusammenarbeit mit dem Publishing House der EMS veröffentlicht und enthält die Ergebnisse der Workshops, Miniworkshops und Arbeitsgemeinschaften in Form von erweiterten Abstracts der Vorträge. 2017 sind die Bände OWR 14.1 bis 14.4 mit mehr als 3.600 Seiten erschienen.

Oberwolfach Preprints (OWP)

In OWP werden Resultate von längerfristigen Forschungsaufenthalten (RiP und OWLF) publiziert, aber auch von mathematischen Vorträgen am MFO im Rahmen von besonderen Veranstaltungen, z.B. der Oberwolfach Vorlesung. 2017 sind die folgenden Preprints erschienen:

2.11. Publications 2017

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

Oberwolfach Reports (OWR)

OWR is published in cooperation with the EMS publishing house and contains extended abstracts of the talks in the Workshops, Mini-Workshops, and Arbeitsgemeinschaften. In 2017, the issues OWR 14.1 to 14.4 were published with more than 3,600 pages in total.

Oberwolfach Preprints (OWP)

OWP mainly contains research results related to a longer stay in Oberwolfach (RiP and OWLF), but this can also include an Oberwolfach Lecture, for example. The following Preprints were published in 2017:

- OWP-2017-01: Cocycle Superrigidity and Group Actions on Stably Finite C*-Algebras
  Gardella, Eusebio; Lupini, Martino
- OWP-2017-02: Numerical Invariants and Moduli Spaces for Line Arrangements
  Dimca, Alexandru; Ibadula, Denis; Măcinic, Daniela Anca
- OWP-2017-03: The Index of Singular Zeros of Harmonic Mappings of Anti-Analytic Degree One
  Luce, Robert; Sète, Olivier
- OWP-2017-04: Abstract Bivariant Cuntz Semigroups
  Antoine, Ramon; Perera, Francesc; Thiel, Hannes
- OWP-2017-05: On the Markov inequality in the L_2-norm with the Gegenbauer weight
  Nikolov, Geno P.; Shadrin, Alexei
- OWP-2017-06: Locally Compact Abelian p-Groups Revisited
  Herfort, Wolfgang; Hofmann, Karl Heinrich; Kramer, Linus

- OWP-2017-07: Holonomy Groups of G_2*-Manifolds
  Fino, Anna; Kath, Ines
- OWP-2017-08: Analysis and Simulation of a New Multi-Component Two-Phase Flow Model with Phase Transitions and Chemical Reactions
  Hantke, Maren; Müller, Siegfried
- OWP-2017-09: Some Results on Reducibility of Parabolic Induction for Classical Groups
  Lapid, Erez; Tadić, Marko
- OWP-2017-10: Freeness of Multi-Reflection Arrangements via Primitive Vector Fields
  Hoge, Torsten; Mano, Toshiyuki; Röhrle, Gerhard; Stump, Christian
- OWP-2017-11: On Vietoris-Rips Complexes of Ellipses
  Adamaszek, Michal; Adams, Henry; Reddy, Samadwara
- OWP-2017-12: On Unipotent Radicals of Pseudo-Reductive Groups
  Bate, Michael; Martin, Benjamin; Röhrle, Gerhard; Stewart, David I.
- OWP-2017-13: Overlap Synchronisation in Multipartite Random Energy Models
  Genovese, Giuseppe; Tantari, Daniele
- OWP-2017-14: Inductive Freeness of Ziegler's Canonical Multiderivations for Reflection Arrangements Hoge, Torsten; Röhrle, Gerhard
- OWP-2017-15: Linear Syzygies, Hyperbolic Coxeter Groups and Regularity
  Constantinescu, Alexandru; Kahle, Thomas; Varbaro, Matteo
- OWP-2017-16: Matrix Elements of Irreducible Representations of SU(n+1) x SU(n+1) and Multivariable Matrix-Valued Orthogonal Polynomials
  Koelink, Erik; van Pruijssen, Maarten; Román, Pablo Manuel
- OWP-2017-17: The Pseudo-Hyperresolution and Applications
  Nguyen, The Cuong
- OWP-2017-18: Counting Curves on Toric Surfaces Tropical Geometry & the Fock Space
  Cavalieri, Renzo; Johnson, Paul; Markwig, Hannah; Ranganathan, Dhruv
- OWP-2017-19: Reducing sub-modules of the Bergman module $A^{(\lambda)}$ (D^n) under the action of the symmetric group
  Biswas, Shibananda; Ghosh, Gargi; Misra, Gadadhar; Roy, Subrata Shyam
- OWP-2017-20: An Extension Problem and Trace Hardy Inequality for the Sublaplacian on H-Type Groups
  Roncal, Luz; Thangavelu, Sundaram
- OWP-2017-21: The Minimal Resolution Conjecture on a general quartic surface in P^3
  Boij, Mats; Migliore, Juan; Miró-Roig, Rosa M.; Nagel, Uwe
- OWP-2017-22: GAP Functionality for Zariski Dense Groups
  Detinko, Alla; Flannery, Dane; Hulpke, Alexander
- OWP-2017-23: Geometry of Free Loci and Factorization of Noncommutative Polynomials
  Helton, J. William; Klep, Igor; Volčič, Jurij; Helton, J. William
- OWP-2017-24: Looking Back on Inverse Scattering Theory
  Colton, David; Kress, Rainer
- OWP-2017-25: Exact Rate of Convergence of k-Nearest-Neighbor Classification Rule
  Györfi, László; Döring, Maik; Walk, Harro
- OWP-2017-26: Detecting Ineffective Features for Pattern Recognition
  Györfi, László; Walk, Harro
- OWP-2017-27: Review of the Methods of Reflections
  Ciaramella, Gabriele; Gander, Martin J.; Halpern, Laurence; Salomon, Julien

- OWP-2017-28: On an Effective Variation of Kronecker's Approximation Theorem Avoiding Algebraic Sets
  Fukshansky, Lenny; German, Oleg; Moshchevitin, Nikolay
- OWP-2017-29: The Colored Jones Polynomial and Kontsevich-Zagier Series for Double Twist Knots
  Lovejoy, Jeremy; Osburn, Robert
- OWP-2017-30: Non-Extendability of Holomorphic Functions with Bounded or Continuously Extendable Derivatives
  Moschonas, Dionysios; Nestoridis, Vassili
- OWP-2017-31: Experimenting with Zariski Dense Subgroups
  Detinko, Alla; Flannery, Dane; Hulpke, Alexander
- OWP-2017-32: Composition of Irreducible Morphisms in Coils
  Chaio, Claudia; Malicki, Piotr
- OWP-2017-33: The Varchenko Determinant of a Coxeter Arrangement
  Pfeiffer, Götz; Randriamaro, Hery
- OWP-2017-34: Bredon Cohomology and Robot Motion Planning
  Farber, Michael; Grant, Mark; Lupton, Gregory; Oprea, John
- OWP-2017-35: Gradient Canyons, Concentration of Curvature, and Lipschitz Invariants
  Paunescu, Laurentiu; Tibăr, Mihai-Marius
- OWP-2017-36: Z2-Thurston Norm and Complexity of 3-Manifolds, II
  Jaco, William; Rubinstein, J. Hyam; Spreer, Jonathan; Tillmann, Stephan

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 2017 sind insgesamt 12 Schnappschüsse aus unterschiedlichen mathematischen Gebieten erschienen.

- No. 1/2017: Winkeltreue zahlt sich aus
  Günther, Felix
- No. 2/2017: News on quadratic polynomials
  Pottmeyer, Lukas
- No. 3/2017: Aperiodic Order and Spectral Properties
  Baake, Michael; Damanik, David; Grimm, Uwe
- No. 4/2017: Mathematische Modellierung von Krebswachstum
  Engwer, Christian; Knappitsch, Markus
- No. 5/2017: Closed geodesics on surfaces and Riemannian manifolds
  Radeschi, Marco
- No. 6/2017: Molecular Quantum Dynamics
  Hagedorn, George A.; Lasser, Caroline
- No. 7/2017: A few shades of interpolation
  Szpond, Justyna
- No. 8/2017: Computational Optimal Transport
  Solomon, Justin

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. 12 snapshots from distinct mathematical areas have been published in 2017:

- No. 9/2017: Computing the long term evolution of the solar system with geometric numerical integrators
  Fiorelli Vilmart, Shaula; Vilmart, Gilles
- No. 10/2017: Spaces of Riemannian metrics
  Bustamante, Mauricio; Kordaß, Jan-Bernhard
- No. 11/2017: Mathematics plays a key role in scientific computing
  Shu, Chi-Wang
- No. 12/2017: Solving quadratic equations in many variables
  Tignol, Jean-Pierre

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 Forschenden 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 25 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 Mathematiker 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 (e-mail, internet, and information services).

For the planning and realization of the scientific program approximately 25 positions in various divisions, such as scientific and administration management, library, IT-service, 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 Möllegaard-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 gehören in 2017 ca. 62.000 gedruckte Bücher, davon 42.000 Monographien und mehr als 8.000 Kongressberichte. Die Zahl der E-Books konnte durch Zukauf eigener Lizenzen auf fast 20.000 gesteigert werden. Vor allem durch DFG-Nationallizenzen und weitere Allianzlizenzen stehen am MFO fast 6.000

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 sytematically 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 2017, the stock of the library contains about 62,000 printed books, in particular 42,000 monographs and more than 8,000 conference proceedings. The number of e-books has increased to almost 20,000 by purchase of own licenses. Including the national and alliance licenses, the MFO can offer access to almost

E-Journals zur Verfügung. Die Zahl der zusätzlich vom MFO abbonnierten Zeitschriften in 2017 beträgt fast 700, die meisten davon werden nur noch als E-Journal bezogen. In den Kompaktregalen befinden sich weiterhin ca. 31.000 gedruckte Zeitschriftenbände, nicht alles davon ist digital erhältlich.

6,000 e-journals, where the MFO has subscribed to about 700 additional journals in 2017, most of them in the e-only version. Additionally, the compact shelves of the library contain about 31,000 bound journal volumes, where not all of them are also electronically available.

Zugriff auf Datenbanken, E-Journals und E-Books

Schon seit langem bietet die Bibliothek des MFO den Forschungsgästen den kostenfreien Zugriff auf die beiden Review-Dienste zbMATH sowie MathSciNet an. Mittels eines Link-Resolvers besteht die Möglichkeit, direkt aus zbMATH oder MathSciNet heraus auf die Volltexte zuzugreifen bzw. den Bibliothekskatalog des MFO zu durchsuchen, um festzustellen, ob der Titel am Institut vorhanden ist. Der Zugriff auf MathSciNet wird im Rahmen einer Allianzlizenz durch die DFG finanziell unterstützt.

Access to databases, e-journals and e-books

For a long time now, the MFO library has offered research guests free access to the reviewing services zbMATH and MathSciNet. Using a link resolver, it is possible to access full-texts directly from within zbMATH or MathSciNet or to launch a search in the library catalog, to ascertain if the title is available at the Institute. Access to MathSciNet is financially supported by the DFG as part of an Alliance License.

Elektronische Ausgaben der am MFO vorhandenen mathematischen Zeitschriften werden ca. seit dem Jahr 2000 angeboten – zunächst nur für einzelne Titel, inzwischen für den gesamten Bestand. Größtenteils können, je nach Verlagspolitik, der aktuelle Jahrgang sowie einige zurückliegende Jahrgänge angeboten werden. Für einzelne Verlage gibt es individuelle Lizenzverträge oder Konsortialverträge, die weitergehende Zugriffsrechte einräumen. Darüberhinaus können die durch die DFG geförderten Nationallizenzen genutzt werden.

Electronic editions of journals available at the MFO are provided since around the year 2000 – initially for a few titles, now for the entire inventory. In most cases, depending on the policy of the publisher, the current volume as well as some preceding volumes can be made available. There are individual license agreements or consortium agreements with single publishers, which grant even further access rights. In addition, the national licenses sponsored by the DFG are available.

Das Angebot an E-Books wurde vor allem in den Jahren 2016 und 2017 stark ausgebaut. 2017 wurden insbesondere E-Books der Society for Industrial and Applied Mathematics (SIAM) sowie der American Mathematical Society (AMS) erworben. Alle am MFO verfügbaren E-Books können innerhalb der Bibliothek ohne Einschränkung, jedoch unter Beachtung der Allgemeinen Nutzungsbedingungen der Verlage, verwendet werden.

The range of e-books was greatly expanded, especially in the years 2016 and 2017. In 2017, e-books published by the Society for Industrial and Applied Mathematics (SIAM) and the American Mathematical Society (AMS) were purchased in particular. All e-books can be used within the library without restriction, but in compliance with the general terms of use of the publishers.

Oberwolfach Repository

Schon länger im Aufbau befindlich, steht seit 2017 das Oberwolfach Repository als zentraler Publikationsserver frei zur Verfügung (https://publications.mfo.de). Insbesondere die Oberwolfach Preprints sowie die Snapshots of Modern Mathematics from Oberwolfach können hier besser und übersichtlicher verwaltet und präsentiert werden. Eine Recherche in den Volltexten ist ebenfalls möglich.

Oberwolfach Repository

After a long development period, the Oberwolfach Repository has been available since 2017 (https://publications.mfo.de). In particular the Oberwolfach Preprints and the snapshots of modern mathematics from Oberwolfach can be better and more clearly managed and presented here. Full-text search is also possible.

Oberwolfach Leibniz Archive for Mathematics (OLAM)

Gemeinsam mit der Technischen Informationsbibliothek Hannover (TIB) bereiten wir den Aufbau eines „Dark Archive" für die Langzeitarchivierung von mathematischen Zeitschriften vor. Archiviert werden sollen Zeitschriften von Verlagen, die bisher nicht an großen internationalen Portalen wie Portico oder CLOCKSS teilnehmen. Damit soll sichergestellt werden, dass die Inhalte dieser Zeitschriften dauerhaft elektronisch verfügbar bleiben, auch über die Existenz der Verlage hinaus. Die Verlage International Press sowie IMPAN (Institute of Mathematics, Polish Academy of Sciences) konnten bereits als Projektpartner gewonnen werden.

Das MFO ist außerdem seit Anfang 2017 Mitglied bei Portico sowie CLOCKSS. Portico (www.portico.org) ist ein zentral organisierter Dienst, der seit 2006 im Auftrag von Verlagen eJournals, eBooks und sogenannte „D-Collections" (digitalisierte historische Sammlungen) archiviert und teilnehmenden Bibliotheken in definierten Fällen den Zugriff darauf ermöglicht. Portico ist Teil von Ithaka, einer Non-Profit-Organisation, die auch JSTOR betreibt.

CLOCKSS (www.clockss.org) bietet einen ähnlichen Service wie Portico, jedoch sind die Inhalte, sofern sie nur noch über CLOCKSS zugänglich sind, im Internet frei verfügbar, d.h. sie stehen nicht nur den teilnehmenden Institutionen zur Verfügung.

Projekt DEAL

Das Projekt DEAL (www.projekt-deal.de) wurde von der Allianz der Wissenschaftsorganisationen ins Leben gerufen. Im Rahmen des Projekts sollen bundesweite Lizenzverträge für das gesamte Portfolio elektronischer Zeitschriften großer Wissenschaftsverlage abgeschlossen werden. Derzeit verhandelt DEAL mit den Verlagen Elsevier, SpringerNature sowie Wiley. Die Verhandlungen mit Elsevier wurden im Juli 2018 wegen grundlegender Divergenzen unterbrochen.

Das MFO unterstützt das Projekt DEAL. Seit Anfang 2016 können wir daher nur eingeschränkten Zugriff auf aktuelle Zeitschriftenausgaben von Elsevier gewährleisten.

Oberwolfach Leibniz Archive for Mathematics (OLAM)

Together with the Technische Informationsbibliothek Hannover (TIB) – German National Library of Science and Technology we are preparing the development of a "Dark Archive" for the long-term archiving of mathematical journals. Journals of publishers who not yet participate in one of the major international portals such as Portico or CLOCKSS are to be archived. This is to ensure that the contents of these journals remain permanently available electronically, even beyond the existence of the publishers. The publishers International Press and IMPAN (Institute of Mathematics, Polish Academy of Sciences) have already been acquired as project partners.

The MFO has also been a member of Portico and CLOCKSS since the beginning of 2017. Portico (www.portico.org) is a centrally-organized service that has been archiving e-journals, e-books and so-called "d-collections" (digitized historical collections) since 2006 on behalf of publishers. In defined cases Portico grants access to these to participating libraries. Portico is part of Ithaca, a non-profit organization that also runs JSTOR.

CLOCKSS (www.clockss.org) offers a service similar to that of Portico, however, contents which are only accessible via CLOCKSS, are made freely available on the internet, i.e. they are not only available to the participating institutions.

Project DEAL

The project DEAL (www.projekt-deal.de) was launched by the Alliance of Science Organisations in Germany. The goal of the project is to conclude nationwide license agreements for the entire portfolio of electronic journals from major academic publishers. DEAL is currently negotiating with the publishers Elsevier, SpringerNature and Wiley. The negotiations with Elsevier have been suspended in July 2018 due to fundamental divergences.

The MFO supports the project DEAL. Therefore, since the beginning of 2016, we can only grant limited access to current issues of Elsevier's journals.

Teilbereich der Bibliothek/part of the library

Buchausstellung/book exhibition

Buchaustellung

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. 2017 gingen insgesamt 675 Bücher im Rahmen der Buchausstellung in den Bibliotheksbestand ein. Wir danken den folgenden Verlagen für ihre Unterstützung und ihr Mitwirken in unserem Buchausstellungsprogramm:

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 2017 the library received a total of 675 books this way. We wish to thank the following publishers for taking part in our book exhibition program:

- American Mathematical Society (AMS)
- Birkhäuser Science
- Cambridge University Press
- De Gruyter GmbH & Co. KG
- De Gruyter Oldenbourg
- Edition am Gutenbergplatz Leipzig EAG.LE
- European Mathematical Society Publishing House
- Heldermann Verlag
- International Press of Boston, Inc.
- Iwanami Shoten Publishers
- Mathematical Society of Japan
- Matrix Editions
- 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 Mathematiker-Porträts, zusammengetragen durch Herrn Prof. Dr. Konrad Jacobs, Erlangen. Diese Sammlung ist im Jahr 2004 mit Hilfe des Springer Verlags Heidelberg digitalisiert worden; sie steht im Internet mit verschiedenen Recherche-Funktionen frei zur Verfügung. Die zugrunde liegende Datenbank ist eine Eigenentwicklung des MFO. Die Sammlung wird laufend ergänzt durch institutseigene Aufnahmen sowie durch Beiträge von Mathematikern weltweit. 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 2017 waren ca. 20.100 Fotos in der Datenbank enthalten.

Ausbildung zum Fachangestellten für Medien- und Informationsdienste (FaMI)/ Fachrichtung Bibliothek

Seit März 2017 besteht die Möglichkeit, am MFO eine dreijährige Ausbildung zum Fachangestellten für Medien- und Informationsdienste (FaMI)/Fachrichtung Bibliothek zu absolvieren. Die praktische Ausbildung erfolgt in der Bibliothek des MFO sowie in verschiedenen Kurzpraktika in anderen Bibliotheken. Die theoretische Ausbildung findet an der Berufsschule Medien- und Informationsdienste in Calw statt. Der erste Auszubildende trat am 1. September 2017 seine Stelle bei uns an.

3.3. IT

Das MFO stellt dem Personal, den Gremien und den Gästen eine effiziente IT-Infrastruktur zur Verfügung. Die Webangebote richten sich darüber hinaus an die mathematische Community.

Tagungsverwaltungssoftware

Die am MFO entwickelte datenbankgestützte Software „owconf" vereinigt Anforderungen der wissenschaftlichen Verwaltung, der Tagungsverwaltung und der Hauswirtschaft. Die Wissenschaftliche Kommission und der Direktor begutachten die eingehenden wissenschaftlichen Anträge mit Hilfe einer geschützten Weboberfläche. Unsere Forschungsgäste können ebenfalls über eine geschützte Weboberfläche vertrauliche Informationen zu ihren jeweiligen Veranstaltungen (Workshops, Mini-Workshops, etc.) erhalten. Die Software wird zur Optimierung der

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 2017 the database contained approximately 20,100 photos.

Specialist for Media and Information Services (Trainee in the Library)

Since March 2017 it is possible to complete a three-year apprenticeship to become a Specialist for Media and Information Services in Librarianship. The practical training takes place in the library of the MFO as well as in various short internships in other libraries. The theoretical training takes place at the Berufsschule Medien- und Informationsdienste (vocational school for media and information services) in Calw. The first trainee joined us on September 1, 2017.

3.3. IT

The MFO provides an efficient IT infrastructure for the employees, the Scientific Committee and the visiting scientists as well as web services for the mathematical community.

Conference management software

The databased software "owconf", developed in-house, handles all tasks arising from scientific management, conference management and guesthouse administration. This includes a protected web interface for the evaluation of scientific proposals through the members of the Scientific Committee and the Director. A protected web interface for the individual activities (Workshops, Mini-Workshops, etc.) offers additional information to the respective organizers and participants. Increasing demands for workflow optimization and for reporting of statistical

internen Arbeitsabläufe und zur Erfüllung der steigenden Ansprüche bei der statistischen Auswertung laufend weiterentwickelt.

Maildienste

Eine zuverlässige E-Mail-Kommunikation ist insbesondere für die Tagungsvorbereitung unverzichtbar. Das MFO betreibt daher eigene Maildienste. Besonderes Augenmerk gilt der hohen Verfügbarkeit, der Sicherung der E-Mails und der Spam- und Virenfilterung. Letzteres leistet der Dienst DFNMailSupport des Deutschen Forschungsnetzes.

Arbeitsumgebung des Personals

Der Belegschaft stehen 16 Windows-Terminal-Server-Arbeitsplätze und eine Reihe von Laptops für den mobilen Einsatz zur Verfügung. Kommerzielle Software mit Serviceverträgen werden in den Bereichen Finanzbuchhaltung, Personalverwaltung, sowie bei Bibliothekskatalog und Literaturrecherche eingesetzt.

Arbeitsumgebung der Gäste

Die Gäste erhalten persönliche Nutzerkonten, drahtlosen und kabelgebundenen Internetzugang, SMTP-Server-Zugang sowie Scan- und Druckmöglichkeiten. Zehn Windows- und Linux-Terminal-Server-Arbeitsplätze bieten neben den üblichen Office-Anwendungen Zugriff auf einen Compute-Server mit Maple, Mathematica, Magma sowie einer Vielzahl freier mathematischer Software. Wegen der relativ kurzen Aufenthalte der Gäste sind die IT-Angebote so intuitiv wie möglich gestaltet. Alle Vortragsräume enthalten moderne Präsentationstechnik; den Gästen steht außerdem ein Videokonferenzsystem zur Verfügung. Die IT Abteilung unterstützt die Forscherinnen und Forscher in allen technischen Fragen.

Webdienste

Die Webdienste für die Gäste und die weitere mathematische Community bieten Informationen über die Angebote des MFO, künftige und vergangene Forschungsprogramme und – in Zusammenarbeit mit der Bibliothek – freien Zugang zu den 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

data require continuous developement of the software.

Mail services

As a reliable e-mail communication is crucial especially for the prearrangement of the workshops, the MFO runs its own mail services. Special care is taken of high availability, e-mail backup and spam and virus filtering, the latter being provided by the DFNMailSupport service of the Internet provider "Deutsches Forschungsnetz".

MFO staff working environment

The administrative staff has access to a total of 16 Windows Terminal Server workplaces and a number of laptops for mobile tasks. Commercial software with service contracts is used for financial accounting and human resources, for the library catalog and the literature search portal.

Guest scientists' working environment

Guest scientists are provided with personal accounts, wifi and cable-bound ethernet connection, SMTP server access and scan/print facilities. Ten Windows and Linux 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. Due to the relatively short stays of the guest scientists, the services are designed as easy to use as possible. The IT section maintains modern presentation equipment in all lecture rooms, a video conference system, and offers technical support to guest researchers on all technical issues.

Web services

Web services for the guest scientists and the wider mathematical community include information about MFO facilities, future and past research programs at the MFO and open access to the publications of the Institute in collaboration with the MFO library. The special web services Oberwolfach Photo Collection and Oberwolfach References on Mathematical Software have been developed in-house.

Support of outreach activities

The IT section supports the outreach activities of the MFO, in particular it supplies the infrastructure for producing the "snapshots of modern mathematics from Oberwolfach". Moreover,

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). Für mathematische und mineralogische Vorträge sowie kulturelle Veranstaltungen bietet das MiMa eine fest installierte Vortragsausstattung.

Entwicklung und Support

Die IT-Abteilung leistet zu allen Diensten umfangreichen Support. Der technische Fortschritt mit kurzen Lebenszyklen und auf 3 bis 5 Jahre begrenzten Wartungsverträgen erzeugt einen hohen Modernisierungsdruck. Dies erfordert einen vollständigen Austausch der Hardware (Server, PCs, Peripheriegeräte, aktive Netzwerkkomponenten) und der Software (Betriebssysteme, Anwendungen) innerhalb von 6 bis 8 Jahren. Darüber hinaus unterliegen Funktionsweise und -umfang der genannten Dienste aufgrund zunehmender Anforderungen einer ständigen Weiterentwicklung. 2017 wurden z. B. die Firewall ausgetauscht und die PCs von Windows 7 nach Windows 10 migriert.

Sicherheit und Datenschutz

Informationssicherheit und Datenschutz sind wichtige Aufgaben der IT, die bei allen Arbeiten mit bedacht werden. Zu den Kernpunkten gehören:

- Firewall, Softwareupdates, Virenscanner
- redundanter Netzwerkaufbau mit zwei separat funktionsfähigen Serverräumen
- mehrstufiges, räumlich verteiltes Backup
- Serviceverträge für unternehmenskritische Hard- und Software
- Bezug der einschlägigen Sicherheitsnachrichten
- Sensibilisierung der Nutzer und Fortbildung des IT-Personals

2017 gab es wie in den Vorjahren keine nennenswerten Sicherheitsvorfälle.

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). For mathematical and mineralogical lectures as well as cultural events the MiMa is equipped with permanently installed audio and video facilities.

Development and support

Extensive support for the above-mentioned services is understood. Technical progress with short life cycles and service contracts for at most 3 to 5 years result in a constant need for modernization. Hardware (servers, PCs, peripheral and network devices) and software (operating systems, applications) is being completely replaced within a period of 6 to 8 years. Due to increasing demands regarding functionality and scope the above-mentioned services are subject to continuous development. For instance, in 2017, the firewall was substituted and the personal computers were updated from Windows 7 to Windows 10.

Security and data protection

Data security and data protection are important tasks, taken into account throughout. Central points are:

- firewall, software updates, virus scanners
- redundant network setup with two server rooms each of which can be dispensed
- multi-step backup system with distributed storage
- service contracts for critical hard- and software
- subscription of relevant security news
- awareness raising of users, advanced training of IT personnel

There were no relevant security breaches in 2017 as well as in the preceeding years.

Ressourcen

Die IT-Abteilung ist personell mit zwei Vollzeitstellen ausgestattet. Wesentliche Merkmale der Hardwareausstattung sind:

- 2 Serverräume mit 4 physikalischen Servern, 2 Storages und 25 virtuellen Servern
- Gigabit-LAN und 10-Gigabit-LAN, verteilt über 3 Gebäude mit 170 Anschlüssen und 26 WLAN Access Points
- redundante Internetanbindung mit zwei 100-Mbis/s-Standleitungen des Deutschen Forschungsnetzes (DFN)

Die Verwendung freier und kommerzieller Software steht sowohl bei den Betriebssystemen als auch bei den Anwendungen in einem ausgewogenen Verhältnis. Während die kommerzielle Software bei den PCs und Anwendungen überwiegt, wird auf Serverseite Open-Source-Software wegen ihrer Flexibilität und besseren Handhabbarkeit vorgezogen.

Größere Arbeiten im Jahr 2017

Die Telefonie des Instituts wurde von ISDN auf Voice over IP umgestellt. Dies war notwendig, weil der Hersteller für die alte Telefonanlage keinen Support mehr anbot und die Telefonanbieter in absehbarer Zeit keine ISDN-Unterstützung mehr anbieten werden. Die Wahl fiel auf VoIP-Centrex, eine gehostete VoIP-Lösung aus dem Angebot des DFN. Diese Lösung ist für das MFO kostengünstig und hat gleichzeitig den Vorteil, dass durch die Auslagerung der Betreiber für Aktualität, Rendundanz und Backup des Systems zuständig ist. Die Umstellung erforderte neue Telefone, eine Erweiterung des LANs und ein Upgrade der Firewall. Technisch aufwändig war die Einbindung des Aufzugnotrufs in Voice over IP. Mit der Umstellung wurde die Telefonie technisch und organisatorisch in die IT-Infrastruktur eingegliedert. Gegenüber der ISDN-Anlage hat sich unsere Flexibilität hinsichtlich Aufstellungsort und Konfiguration der Telefone deutlich erhöht.

Die Publikationen des MFO werden jetzt auf einem zentralen Publikationsserver angeboten (s. Abschnitt 3.2.: Bibliothek). Dies verbessert die Präsentation, die bibliographischen Beschreibungsmöglichkeiten und vereinfacht die Arbeitsabläufe.

Während der jährlichen Schließungsperiode des MiMa hat die IMAGINARY gGmbH gemeinsam mit der IT des MFO drei der interaktiven mathematischen Exponate durch neue ersetzt: Eine

Resources

Two fulltime positions are assigned to the IT section. The hardware resources include:

- 2 server rooms comprising 4 physical servers, 2 storages and 25 virtual servers
- Local Area Network on Gigabit Ethernet and 10 Gigabit Ethernet basis distributed over 3 buildings with 170 data links and 26 wifi access points
- redundant Internet connection via the Deutsches Forschungsnetz (DFN) with two 100 Mbit/s leased lines

The use of free and commercial software is balanced at the level of both operating systems and applications. While commerical software is dominant at the PCs and user applications, open source software is preferred on the server side for its flexibility and manageability.

Major activities in 2017

The telephony of the Institute was changed from ISDN to Voice over IP. This was necessary because the manufacturer of the old telephone system no longer offered support and the telephone service providers will no longer offer support for ISDN in the near future. VoIP Centrex, a hosted VoIP solution from the DFN provision of services, was chosen. This solution is cost-efficient for the MFO, and at the same time outsourcing has the advantage that the provider is responsible for up-to-dateness, redundancy and backup of the system. The migration required new phones, an extension of the LAN and an upgrade of the firewall. The integration of the elevator emergency call in Voice over IP was technically complex. With the migration, the telephony was technically and organizationally included into the IT infrastructure. Compared to the ISDN system, our flexibility in terms of installation and configuration of the phones has increased significantly.

The publications of the MFO are now available on a central publication server (see section 3.2.: Library). This improves the presentation as well as the bibliographic description possibilities and simplifies the work processes.

During the annual closing of the MiMa, the IMAGINARY gGmbH, together with the IT of the MFO, has replaced three of the interactive mathematical exhibits with new ones: a new exhibit

Station mit Anwendungen zu Geometrie und Dynamik, eine zur Mathematik des Planeten Erde und eine Station zur Visualisierung algebraischer Flächen. Dies war im mathematischen Bereich die umfassendste inhaltliche und technische Erneuerung seit Eröffnung des MiMa im Januar 2010.

Die Funktion aller dauerhaft laufenden Server und Dienste wird jetzt mithilfe von zwei Nagios-Servern systematisch überwacht. Die Nagios-Server stehen an verschiedenen Standorten und überwachen sich gegenseitig. Meldungen und Eskalationsregeln sorgen für eine wirksame Benachrichtigung des IT-Personals. Dadurch können Fehlfunktionen und Ausfälle früher erkannt und behoben werden, idealerweise bevor die Nutzer die Ausfälle bemerken.

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. Außerdem sendet das Institut mehrmals im Jahr Poster und Flyer mit Informationen über Veranstaltungen und Programme an etwa 400 verschiedene Institutionen (Universitäten, Forschungsinstitute etc.). Eine weitere wichtige Informationsquelle für potenzielle und tatsächliche Teilnehmende der wissenschaftlichen Programme am MFO ist die Website des Instituts. Diese wurde 2017 in Teilen überarbeitet, um Informationen besser zugänglich zu machen.

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 Hauptziel bei diesen Zielgruppen 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. Diese drei Aktivitäten mit ihren Schwerpunkten im Jahr 2017 werden in den folgenden Abschnitten genauer erläutert.

with applications on geometry and dynamics, one on the "Mathematics of the Planet Earth" and one exhibit on the visualization of algebraic surfaces. This was the most extensive renewal of mathematical content and technical equipment since the opening of the MiMa in January 2010.

The performance of all permanently running servers and services is now systematically monitored using two Nagios servers. The Nagios servers are located at different sites and monitor each other. Alerts and escalation rules provide effective notification of the IT staff. This allows for malfunctions and failures to be detected and resolved earlier, ideally before users notice the failures.

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. In addition, several times a year, the MFO sends posters and flyers with information on events and programs to around 400 institutions around the world (universities, research institutes, etc.). A further important source of information for potential and actual participants in the scientific programs at the MFO is the website of the Institute. It was partially revised in 2017 in order to make information more accessible (see the following pages).

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. These three activities, with their main focus in 2017, are explained in more detail in the following sections.

Überarbeitung der Instituts-Webseite

Zu Beginn des Jahres 2017 wurde das Erscheinungsbild der Webseite überarbeitet sowie einige strukturelle Änderungen daran vorgenommen. Die Ziele waren

- Informationen für verschiedene Interessengruppen stärker zu bündeln und schnelleren Zugriff darauf zu ermöglichen,
- die Seite an das Corporate Design des MFO anzupassen.

Optisch veränderte sich vor allem der Kopfbereich der Seite, der jetzt vor einem schlichten weißen Hintergrund erscheint. Das Logo der Leibniz-Gemeinschaft rückte ganz nach rechts und erhielt dadurch einen prominenteren Platz, sowie durch den weißen Hintergrund eine bessere Sichtbarkeit. Auf der Startseite wird statt des bisher dreispaltigen nun ein zweispaltiges Layout verwendet, wodurch die Seite optisch klarer gegliedert wirkt.

Revision of the Institute's website

At the beginning of 2017, we redesigned and partly restructured the website. The aims of these changes were

- to bundle information for different stakeholders and to provide faster access,
- to adapt the page to the corporate design of the MFO.

The most apparent visual change was made to the head area of the page, which now appears in front of a plain white background. The logo of the Leibniz Association moved to the right and thus gained a more prominent place, as well as a better visibility due to the white background. On the start page instead of the previously three-column layout now a two-column layout is used, whereby the page appears visually structured more clearly.

Die Startseite bietet nun gebündelte Informationen für verschiedene Interessengruppen mit direkten Einstiegspunkten zu weiterführenden Informationen. Wer sich beispielsweise für einen Gastaufenthalt am MFO bewerben möchte, erhält in der Rubrik „Propose & Apply" einen Überblick über die möglichen Programme. Der Bereich „For Junior Researchers" enthält Informationen über spezielle Programme, Angebote und Fördermöglichkeiten des MFO für den wissenschaftlichen Nachwuchs. In der Rubrik „Oberwolfach Services" wird Zugang zu den

The home page now provides bundled information for various stakeholders with direct entry points to more detailed information. For example, if you would like to apply for a research stay at the MFO, you will be given an overview of the possible programs in the section "Propose & Apply". The section "For Junior Researchers" contains information about special programs, offers and funding possibilities of the MFO for junior scientists. In the section "Oberwolfach Services" access to the publications of the MFO, the library catalog and the photo database is

Veröffentlichungen des MFO, dem Bibliothekskatalog und der Fotodatenbank angeboten. Die meisten dieser Informationen waren auch schon vor der Umgestaltung auf der Webseite verfügbar, jedoch aus sachlogischen Gründen auf verschiedene Untermenüs verteilt und dadurch zum Teil schwerer auffindbar. Mit der Bündelung auf der Startseite mit Blick auf unterschiedliche Zielgruppen soll nun der Zugang erleichtert werden.

offered. Most of this information was available even before the redesign of the website, but due to different structuring criteria it was distributed on different submenus and thus sometimes harder to find. The bundling on the start page with regard to different stakeholders should now facilitate access.

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.

Die Ausstellung der Mineralien konzentriert sich bewusst auf die Fundstellen des Schwarzwalds, um die mineralogische Vielfalt dieser Region möglichst umfassend darstellen zu können. Ein Schwerpunkt liegt auf den Mineralien der heute noch aktiven Grube „Clara" in Oberwolfach.

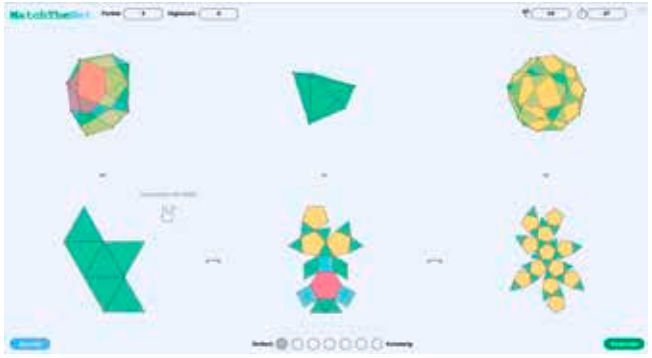
Der mathematische Teil der Ausstellung bietet kunstvolle Einblicke in die Mathematik und lädt dazu ein, mathematische Phänomene spielerisch zu erforschen. Sowohl Konzepte der angewandten als auch der reinen Mathematik werden in interaktiven Programmen, Hands-on-Exponaten und Bildern dargestellt. Ein 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.

Mathematics at the MiMa

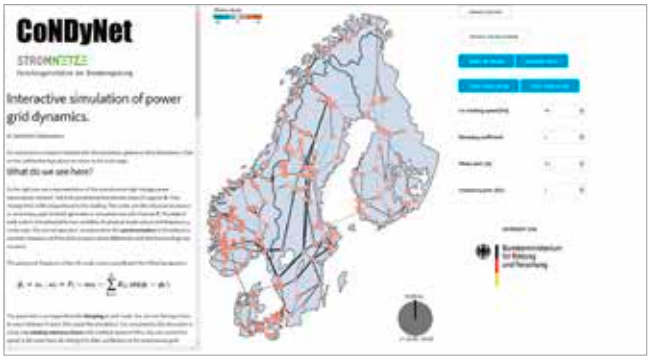
Since 2010 the Mathematisches Forschungsinstitut Oberwolfach engages in the MiMa – Museum for Minerals and Mathematics, together with the association of the Friends of Minerals and Mining in Oberwolfach and the municipality Oberwolfach. The museum shows a one-of-a-kind collection of minerals from all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

The exhibition of minerals deliberately focuses on the sites of the Black Forest in order to present the rich diversity of the region in a maximum variety. Special emphasis is put on the minerals of the mine "Clara" in Oberwolfach, which is still active today.

The maths exhibition delivers aesthetic insights into mathematics and enables visitors to playfully explore mathematical phenomenons. 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.



Match the net



Power Grid Simulation

Im Jahr 2017 wurden einige Neuheiten im mathematischen Bereich eingeführt. Eine neue Touch-Screen-Station zeigt nun neue, interaktive Exponate aus den Bereichen Geometrie und Dynamik, sowie musikalisch-mathematische Experimente. Ein Highlight an dieser Station ist das Spiel „Match the Net", bei dem dreidimensionale Polytope ihren aufgefalteten Darstellungen zugeordnet werden müssen. An einer weiteren neuen Touch-Screen-Station werden die Gewinner-Exponate des internationalen Wettbewerbs „Mathematik des Planeten Erde" gezeigt, darunter zum Beispiel eine Simulation des skandinavischen Stromnetzes, anhand derer man nachvollziehen kann, wie Störungen an einzelnen Knotenpunkten die Stabilität des gesamten Systems beeinträchtigen können.

In 2017, some new developments in the mathematics exhibition were introduced. Interactive exhibits from the fields of geometry and dynamics, as well as musical-mathematical experiments are presented on a new touch-screen. A highlight of this exhibit is the game "Match the Net", in which three-dimensional polytopes have to be assigned to their unfolded representations. Another new touch-screen station features the winning exhibits from the international "Mathematics of the Planet Earth" competition, including, for example, a simulation of the Scandinavian power grid that allows us to understand how disruptions at individual junctions may affect the stability of the entire system.

Jedes Jahr werden im Rahmen der Reihe „Kultur im MiMa" einige Sonderveranstaltungen mit verschiedenen Formaten und Themen organisiert. Dies können zum Beispiel Fachvorträge zu mineralogischen oder mathematischen Themen sein, aber auch Konzerte, Lesungen oder andere künstlerische Darbietungen. Im Jahr 2017 fanden Fachvorträge zu Uranmineralien aus dem Schwarzwald sowie Gold und Goldwäscherei am Oberrhein statt. Außerdem gab es einen Fotovortrag über Kuba.

Every year a number of special events with different formats and topics are organized as part of the series "Kultur im MiMa". These events can be lectures on mineralogical or mathematical topics, but also concerts, readings or other artistic performances. In 2017, lectures were given on uranium minerals from the Black Forest as well as on gold and gold mining on the Upper Rhine. There was also a photo lecture about Cuba.

Im Jahr 2017 kamen erneut über 6000 Besucherinnen und Besucher ins MiMa.

In 2017 more than 6000 people visited the 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.

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.

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

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 journalists, undergraduate and advanced high school students.

Das Projekt wird von JProf. Dr. Carla Cederbaum koordiniert. Sie ist als Chefeditorin für das Editieren der Texte verantwortlich. 2017 haben

The project is coordinated by JProf. Dr. Carla Cederbaum. As senior editor she is responsible for the editing process of the snapshots. In 2017

Dr. David Edward Bruschi, Prof. Dr. Andrew Cooper, Dr. Moritz Firsching, Sophia Jahns, Daniel Kronberg, Dr. Sara Munday, Johannes Niediek, Dr. Anja Randecker, Lara Skuppin und Sabiha Tokus Schnappschüsse editiert. Im Laufe des Jahres wurden 12 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 September 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, so zum Beispiel im Jahr 2017 bei der Installation neuer interaktiver Stationen. 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. Generell profitiert das MFO als Heimatinstitut und Teilhaber von IMAGINARY durch die Namensnennung bei allen IMAGINARY-Ausstellungen und Veranstaltungen. Die folgende Karte gibt eine Übersicht der weltweiten Aktivitäten von IMAGINARY im Jahr 2017.

Dr. David Edward Bruschi, Prof. Dr. Andrew Cooper, Dr. Moritz Firsching, Sophia Jahns, Daniel Kronberg, Dr. Sara Munday, Johannes Niediek, Dr. Anja Randecker, Lara Skuppin and Sabiha Tokus worked as junior editors. 12 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 September 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, for example in 2017 when new interactive stations were installed. 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. In general, as former founding institution and partner of IMAGINARY the MFO benefits by the acknowledgement at all IMAGINARY exhibitions and events. The following map provides an overview on the worldwide activities of IMAGINARY in 2017.

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 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 10,98 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 Forschungsgäste 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 acht größere Appartements sowie fünf Bungalows. Dadurch sind auch längere Aufenthalte im Rahmen des RiP-Programms und des Oberwolfach-Leibniz-Fellows-Programms möglich. Der Hauswirtschaftsbereich umfasst insgesamt 13 Stellen für Küche und Zimmerservice sowie für die Pflege von Gebäuden und Grundstück (davon waren 2017 11,89 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-Gemeinschaft, has established a budget-plan since 2006 as a basis for the common financing by the federation of Germany and the federal states.

The library building is located immediately opposite the guest house and was built with funds from the Volkswagen Foundation. 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 proofed 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 10.98 positions, covering scientific administration (planning and organization of the scientific program, public relations, 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 realization 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, eight apartments and five 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 positions for kitchen and room service as well as for the maintenance of the buildings and premises (11.89 positions staffed in 2017).

3.6. Finanzielle Übersicht

Erlöse 2017 (gerundet auf 1.000 €)	
Zuwendung Bund/Länder	3.168.000
Drittmittel	649.000
Spenden	96.000
sonstige Einnahmen	104.000
zweckgebundene Reste aus 2016	414.000
Summe Erlöse	**4.431.000**

Aufwendungen 2017 (gerundet auf volle 1.000 €)	
Personalausgaben	1.650.000
Materialaufwand	395.000
Aufwand für bezogene Leistungen	220.000
Abschreibungen	113.000
sonstige Aufwendungen (inklusive Sachausgaben Bibliothek)	1.657.000
Rückstellungen für zweckgebundene Reste	273.000
Investitionen	123.000
Summe Aufwendungen	**4.431.000**

Erläuterungen

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

Der Anteil von Drittmitteln, Spenden und sonstigen Einnahmen bezogen auf die Gesamtsumme der Erlöse liegt im Haushaltsjahr 2017 bei 21,13%. Die zweckgebundenen Reste aus 2016 sind dabei nicht berücksichtigt.

Öffentliche Mittel

Das MFO erhielt im Haushaltsjahr 2017 insgesamt 3,168 Mio. Euro Zuwendung von Bund und Ländern.

Drittmittel

Die projektbezogenen Drittmittel rekrutierten sich im Haushaltsjahr 2017 insbesondere aus Mitteln der National Science Foundation (NSF),

3.6. Financial overview

Revenues 2017 (rounded)	
Benefits from the federation/ federal states	3.168.000
Third party funds	649.000
Donations	96.000
Other income	104.000
Earmarked surpluses	414.000
Total revenues:	**4.431.000**

Expenses 2017 (rounded)	
Personnel department	1.650.000
Purchases	395.000
Expenses for drawn benefits	220.000
Consumption of fixed capital	113.000
Other Expenses (with material expenses for the library)	1.657.000
Provisions for earmarked surpluses	273.000
Investments	123.000
Total expenses:	**4.431.000**

Explanations

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

The proportion of private resources (own income, third-party-funds and donations) of the total sum of revenues is 21,13%. Funds carried forward from 2016 are disregarded here.

Public funding

In the fiscal year 2017 the MFO received 3.168 million Euro funding from the federation and the federal states.

Third-party funds

Earmarked third party funds in the fiscal year 2017 are mainly composed of the grants from the National Science Foundation (NSF), the

der Simons Foundation, der Carl Friedrich von Siemens Stiftung, der VolkswagenStiftung und aus Mitteln des Wettbewerbsverfahrens der Leibniz-Gemeinschaft.

Förderverein und Oberwolfach Stiftung

Zweckgebundene Spenden erhielt das MFO auch im Haushaltsjahr 2017 vom Förderverein und der Oberwolfach Stiftung. Die Gelder wurden für Reisekostenzuschüsse in besonderen Fällen, für die Unterstützung von Kinderbetreuungskosten 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), der Simons Foundation und der VolkswagenStiftung. Ein besonderes Dankeschön gilt natürlich auch dem Förderverein und der Oberwolfach Stiftung für die großzügige Unterstützung des MFO.

Simons Foundation, the Carl Friedrich von Siemens Foundation, the Volkswagen Foundation, and from the Leibniz Association.

Förderverein and Oberwolfach Foundation

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

3.7. Acknowledgement

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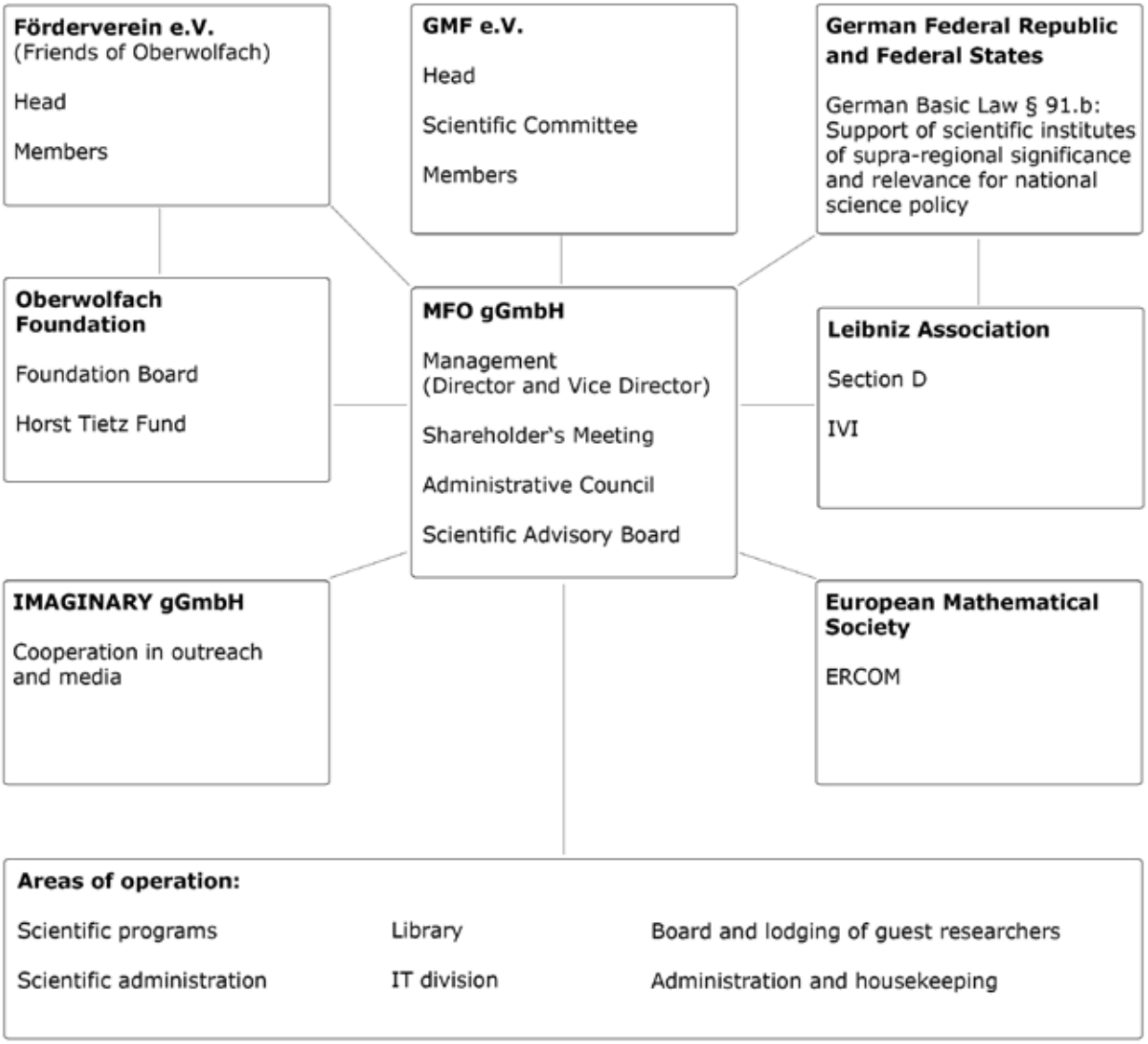
3.8. Organigramm



Erläuterungen

Das Mathematische Forschungsinstitut Oberwolfach (MFO) ist seit April 2005 eine gemeinnützige GmbH. Die Geschäftsführung des MFO besteht aus Direktor und stellvertretendem Direktor. Alleiniger Gesellschafter des MFO ist die Gesellschaft für Mathematische Forschung e.V. (GMF), die durch ihren Vorstand vertreten wird. Das MFO wird von der Bundesrepublik Deutschland und den Bundesländern im Rahmen der Forschungsförderung nach Artikel 91b des Grundgesetzes gemeinschaftlich finanziert, wobei das Sitzland Baden-Württemberg eine besondere Rolle einnimmt. Dabei ist die Mitgliedschaft des MFO in der Leibniz-Gemeinschaft Bestandteil der gemeinschaftlichen Finanzierung. Die Zuwendungsgeber sind im Verwaltungsrat des MFO vertreten, der als wichtigstes Aufsichtsgremium

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

über die mittel- und langfristige Finanz- und Budgetplanung entscheidet. Institut und Verwaltungsrat werden dabei vom wissenschaftlichen Beirat des MFO beraten, dem 6 bis 8 international angesehene Mathematiker angehören. Ferner ist das MFO Mitglied in ERCOM (European Research Centres on Mathematics), einem Komitee der European Mathematical Society.

Die Gesellschaft für Mathematische Forschung e.V. (GMF) hat ca. 80 Mitglieder, darunter die vier institutionellen Mitglieder DMV (Deutsche Mathematiker-Vereinigung), GAMM (Gesellschaft für angewandte Mathematik und Mechanik), EMS (European Mathematical Society) und Förderverein. Die GMF ist Eigentümer des Grundstücks und der Institutsgebäude des MFO. Der Vorstand der GMF besteht aus dem Vorstandsvorsitzenden, dem Schatzmeister und dem Vorsitzenden der Wissenschaftlichen Kommission. Die Wissenschaftliche Kommission der GMF besteht aus ca. 20-25 international angesehenen Mathematikern und ist in Abstimmung mit der Geschäftsführung des MFO zuständig für die Forschungs- und Entwicklungsplanung sowie die aktuelle wissenschaftliche Arbeitsplanung des MFO.

Der Verein zur Förderung des Mathematischen Forschungsinstituts Oberwolfach e.V. (Förderverein) hat etwa 600 Mitglieder, die das MFO durch Mitgliedsbeiträge zusätzlich finanziell unterstützen. Die Oberwolfach Stiftung, die im Förderverein als nicht rechtsfähige Stiftung gegründet wurde, sammelt Stiftungskapital aus dem wirtschaftlichen und dem privaten Bereich. Dabei spielt der Horst Tietz Fund als Sondervermögen innerhalb der Oberwolfach Stiftung eine besondere Rolle. Die Erträge des Stiftungskapitals kommen dem MFO zu Gute.

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.

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, and the head of the society is formed by the chairman, the treasurer, and the chairman of the Scientific Committee. The Scientific Committee of the GMF is composed of about 20 to 25 internationally renowned mathematicians and is responsible for the research and development planning, as well as for running decisions on scientific proposals, in agreement with the head of the MFO.

The Verein zur Förderung des Mathematischen Forschungsinstituts Oberwolfach e.V. (Förderverein) has about 600 members and provides additional financial support for the MFO by its membership fees. The Oberwolfach Foundation, 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.

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.

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