Oberwolfach
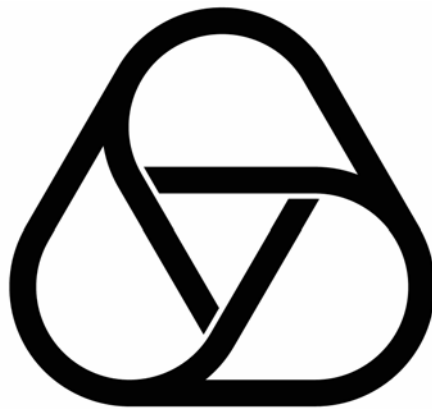
Jahresbericht
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Das Mathematische Forschungsinstitut Oberwolfach ist Mitglied der Leibniz-Gemeinschaft.

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

The Boy Surface at the Mathematisches Forschungsinstitut Oberwolfach
(http://www.mfo.de, boy surface)

Oberwolfach has been a unique and remarkable catalyst for mathematical ideas for more than five decades

David Mumford

Mathematik in Oberwolfach

Mathematische Forschung untersucht hauptsächlich Struktur und Wechselbeziehung mathematischer Objekte und zielt auf ihre zunehmend umfassende theoretische Beschreibung. Viele mathematische Fragestellungen stammen aus dem Versuch einer mathematischen Beschreibung der Natur, aber es kommt auch oft vor, dass der mathematische Rahmen bereits entwickelt ist, ehe sich mögliche Anwendungen zeigen. Forschungsfortschritte drücken sich in Theoremen aus, deren Beweise in der Regel kompliziert sind. Die schriftliche Ausarbeitung eines Beweises vollzieht sich meist am besten am heimatlichen Institut. Demgegenüber ist die Entwicklung neuer mathematischer Theorien und Beweisideen ein extrem kreativer Prozess, der sehr von Intuition und Erfahrung abhängt und der vom Austausch mit Kollegen sehr profitiert.

Dabei spielt auch der Zufall eine große Rolle. Zweck der Veranstaltungen am Mathematischen Forschungsinstitut Oberwolfach ist, die Wahrscheinlichkeit für einen „zufälligen" Fortschritt zu erhöhen. Während eines Vortrags kommt den Zuhörern angesichts der Hintergründe eines wichtigen Resultats bisweilen eine blitzartige Einsicht, die zu einem substantiellen Fortschritt in der eigenen Arbeit führt. In Kleingruppengesprächen können sie ihre Einsichten teilen, und die frischen Gedanken und Kommentare der Kollegen können auf gangbare Wege zukünftiger Forschung weisen. Es zeigt sich während solcher Gespräche oft, dass zwei oder drei Kollegen, die vor verschiedenem Hintergrund und mit unterschiedlicher Motivation arbeiten, doch an ähnlichen Problemen interessiert sind, und dass sie ihre Ideen zu einem gemeinsamen Forschungsprojekt vereinigen können. All dies geschieht beinahe täglich während der Oberwolfacher Tagungen. Eine große Zahl wichtiger Publikationen nahm auf diese Weise in Oberwolfach ihren Anfang. Im Gegensatz zu den typischerweise sehr großen Konferenzen, die überall auf der Welt veranstaltet werden, liegt die besondere Betonung der kleinen Workshops in Oberwolfach auf der aktiven Forschung, in der offene Fragen oft wichtiger als fertige Lösungen sind.

Mathematics at Oberwolfach

Mathematical research mainly studies the structure and inner relationship between mathematical objects, trying to develop more comprehensive theories about them. Many mathematical questions arise from the attempt to describe nature in mathematical terms, but it often happens that the mathematical framework is created before the appearance of the applications. The process of research, when successful, leads to mathematical theorems, whose proofs are typically highly complicated. The final write-up of a proof is usually best done at one's home institution, but the development of a mathematical theory and, within such a theory, of a promising idea for a proof, is an extremely creative process depending very much on intuition and experience and benefiting from broad participation.

Historically, coincidence also plays a big role. Improving the chances for progress by coincidence is one of the main purposes of the gatherings at the Overwolfach Institute. When getting to know the background of an important result during a talk, one can suddenly have a flash of insight, perhaps leading to considerable progress in one's own research. Small group discussions, inviting the fresh thoughts and comments of colleagues, can lead to the sharing of these insights and finding the right direction for further work. Often it happens that two or three colleagues, during such discussions, become aware that they, though coming from different backgrounds and with different motivation, are interested in similar problems and are able to unify their ideas in order to establish a common research project. All this happens nearly daily at these workshops. A great number of important papers have been initiated at Oberwolfach in this manner. In contrast with the typically large conferences held all over the world, the small workshops at Oberwolfach emphasize active research where open questions abound.

Gert-Martin Greuel

Vorwort des Direktors

Das Jahr 2005 hat wichtige Veränderungen für das Mathematische Forschungsinstitut Oberwolfach (MFO) gebracht, deren Auswirkungen für die Zukunft noch nicht voll erkennbar sind. Ich schaue zuversichtlich in diese Zukunft und bin überzeugt, dass die verbesserten Rahmenbedingungen dazu beitragen werden, dass das von den Mathematikern weltweit geschätzte und geliebte „Oberwolfach" seine beispielgebende Rolle für die mathematische Gemeinschaft behauptet und behutsam weiterentwickelt.

Der hiermit zum ersten Mal vorgelegte Jahresbericht soll den Lesern einen Überblick über das wissenschaftliche Programm und die sachlichen und finanziellen Rahmenbedingungen des Jahres 2005 geben. Ergänzende Information hierzu findet sich auf der Homepage des MFO.

Ich freue mich besonders, dass Herr Prof. Huisken die Mühe nicht scheute, seinen im Anschluss an die Mitgliederversammlung der Gesellschaft für Mathematische Forschung im Oktober 2005 gehaltenen Vortrag „Geometrische Evolutionsgleichungen und die Uniformisierung Riemannscher Mannigfaltigkeiten" auszuarbeiten und für den Jahresbericht zur Verfügung zu stellen. Es handelt sich um die erste "Oberwolfach Vorlesung", die jedes Jahr als öffentliche Veranstaltung während der Mitgliederversammlung stattfinden soll und hoffentlich eine neue, erfolgreiche Tradition begründet.

Director's Foreword

2005 has brought important changes for the Mathematisches Forschungsinstitut Oberwolfach (MFO) whose consequences are not yet fully recognizable for the future. I am looking with confidence into this future and I am convinced that the improved basic conditions will contribute to maintaining and further developing the exemplary role of "Oberwolfach", which is respected and beloved by mathematicians all over the world.

This annual report, which is issued for the first time, should give to the readers a survey on the scientific programme and the factual and financial framework of 2005. Additional information is provided on the homepage of the MFO.

The report also includes the extended version of the Oberwolfach Lecture "Geometrische Evolutionsgleichungen und die Uniformisierung Riemannscher Mannigfaltigkeiten" held by Professor Huisken to whom I would like to express my special thanks. It was the first public Oberwolfach Lecture presented after the meeting of the Gesellschaft für Mathematische Forschung in October 2005 and will hopefully be the beginning of a new and successful tradition.

Das Jahr 2005 stellt eine Zäsur in der Geschichte des Mathematischen Forschungsinstituts dar. Auf Empfehlung des Wissenschaftsrates aus dem Jahre 2000 wurde das Mathematische Forschungsinstitut 2005, mit finanzieller Wirkung zum 1.1.2006, in die gemeinsame Bund-Länder-Finanzierung aufgenommen. Seit dem 26.11.2004 ist das MFO Mitglied der Leibniz-Gemeinschaft, dessen damaliger Präsident, Hans-Olaf Henkel, das Institut im Juni 2005 besuchte. Die neue Struktur hat einige rechtliche Änderungen notwendig gemacht. Das Institut ist jetzt eine rechtlich selbständige Einrichtung in Form einer gemeinnützigen GmbH, deren alleiniger Gesellschafter die Gesellschaft für Mathematische Forschung (GMF) ist. Die GMF bleibt weiterhin Eigentümer an Grundstück und Gebäuden des MFO und garantiert in Zusammenarbeit mit dem Direktor die Qualität der wissenschaftlichen Programme.

Gemäß den Richtlinien der Rahmenvereinbarung Forschungsförderung teilen sich der Bund (BMBF) und die Länder die Grundfinanzierung des MFO zu je 50%, wobei das Sitzland Baden-Württemberg gegenüber den anderen Ländern einen erhöhten Anteil aufbringt. Wichtigster Ansprechpartner für uns wird weiterhin das Ministerium für Wissenschaft, Forschung und Kunst in Baden Württemberg sein.

Wie zu erwarten, ist mit diesen Änderungen der administrative Aufwand für das Institut enorm gestiegen. Die Details sind hier uninteressant, wir bemühen uns jedenfalls, dass unsere Gäste, die Teilnehmer an den wissenschaftlichen Programmen, sowenig wie möglich davon mitbekommen. Zur neuen Struktur des Instituts gehört der Verwaltungsrat, das oberste Kontrollgremium, mit Vertretern von Bund und Ländern, Vertretern der Gesellschaft für Mathematische Forschung sowie von externen Persönlichkeiten. Der neue, aus sechs bis acht international renommierten Mathematikerinnen und Mathematikern bestehende wissenschaftliche Beirat, hat die Aufgabe der regelmäßigen Beratung und Evaluation des Instituts, vor allem im wissenschaftlichen Bereich.

Das jährliche wissenschaftliche Programm des MFO wird wie bisher von der international besetzten wissenschaftlichen Kommission (früher: wissenschaftlicher Beirat) in Abstimmung mit dem Direktor festgelegt. Es war ein großer Erfolg, dass die Unabhängigkeit der wissenschaftlichen Kommission auch in der

The year 2005 marks a turning point in the history of the Mathematisches Forschungsinstitut. On the recommendation of the Science Council in the year 2000 the Mathematische Forschungsinstitut was included in the *Bund-Länder-Finanzierung* (this means funding from the German Ferderal Government and the community of German Länder) in 2005, with financial effect from January 1st, 2006. Since November 26th, 2004, the MFO has been a member of the Leibniz Association, whose former president, Hans-Olaf Henkel, visited the Institute in June 2005. Due to the new structure some legal changes have become necessary. Now the Institute is a legally independent organisation in the form of a non-profit GmbH with the Gesellschaft für Mathematische Forschung (GMF) as the sole shareholder. The GMF still remains owner of the premises and buildings of the MFO and guarantees, in cooperation with the Institute's Director, the quality of the scientific programme.

According to the guidelines for the support of scientific research in the Federal Republic of Germany, the federation (BMBF) and the federal states each provide 50% of the basic financing of the MFO. The federal state of Baden-Württemberg, where the MFO is located, has to make an increased contribution compared to the other ones. As in the past, the Ministry of Education, Science and Art of Baden-Württemberg will still be our main contact.

As expected, with these changes the Institute's administrative workload has increased considerably. Details do not need to be mentioned; in particular we take care that our guests, participants in the scientific programme, are bothered as little as possible. The new structure of the Institute comprises the Administrative Council, which is the supreme controlling committee, with representatives of the federation and the federal states, representatives of the Gesellschaft für Mathematische Forschung, as well as external personalities. The new Scientific Advisory Board, formed by six to eight internationally leading mathematicians, has the task of regular consultations and the Institute's evaluation particularly with respect to its scientific work.

As before, the annual scientific programme of the MFO is fixed by the international Scientific Committee (the former Scientific Board), in agreement with the Director. It was a big success that the independence of the Scientific Committee will also be maintained within the new structure. I would like to express my

neuen Struktur erhalten bleiben konnte. Ich möchte den bei den Verhandlungen beteiligten Vertretern der Gesellschaft für Mathematische Forschung für ihre Standhaftigkeit und den Vertretern von Bund und Land Baden-Württemberg für das Verständnis ausdrücklich danken. Der wissenschaftliche Ruf des Mathematischen Forschungsinstituts gründet nicht zuletzt in der Tatsache, dass bei der Auswahl des Programms ausschließlich wissenschaftliche Gesichtspunkte eine Rolle spielen.

Das wissenschaftliche Programm des Instituts besteht im Wesentlichen aus fünf Komponenten: den Workshops, Miniworkshops, Arbeitsgemeinschaften, Oberwolfach-Seminaren und dem Research in Pairs Programm. Alle Programme werden intensiv nachgefragt und wir können bei weitem nicht alle Wünsche auf Teilnahme erfüllen. Eine ausführliche Dokumentation finden Sie im zweiten Teil des Jahresberichts nach der Oberwolfach Lecture.

Der dritte Teil des Jahresberichts enthält einen Überblick über die Bibliothek mit der neuen online Fotosammlung, über den, auch in Oberwolfach, stetig wachsenden IT-Bereich mit dem neuen Referenzzentrum für mathematische Software, sowie über die Verwaltung und über die für das leibliche Wohl besorgte Hauswirtschaft. Den Abschluß bildet eine finanzielle Übersicht für das Jahr 2005.

Es ist außerordentlich erfreulich, dass überall dort, wo die hervorragende Rolle des Mathematischen Forschungsinstituts Oberwolfach für die mathematische Gemeinschaft bekannt ist, eine große Bereitschaft besteht, dem Institut bei finanziellen Problemen zu helfen. Mein Dank gilt in erster Linie dem Land Baden-Württemberg, das das Institut über so viele Jahrzehnte fast ausschließlich getragen hat, trotz schwieriger finanzieller Rahmenbedingungen. Dies schließt die Beamten im Ministerium für Wissenschaft, Forschung und Kunst ein, die mich in meiner Amtszeit immer mit Rat und Tat unterstützt haben.

Ein herzlicher Dank auch an die Oberwolfach-Stiftung und den Förderverein, in dem viele hundert Mathematiker durch ihren Mitgliedsbeitrag die Arbeit des Instituts unterstützen. Ohne die finanzielle Unterstützung von Oberwolfach-Stiftung und Förderverein wäre es nicht möglich gewesen, im Rahmen der Bibliothekserweiterung ein großes Gelände um das Institut herum zu erwerben. Damit ging endlich ein Traum der früheren Direktoren, insbesondere Herrn Barners, in Erfüllung. Eine erfreuliche Überraschung war die

gratitude to the representatives involved in the negotiations of the Gesellschaft für Mathematische Forschung for their persistence and the representatives of the federation and of the federal state of Baden-Württemberg for their understanding. The scientific reputation of the Mathematisches Forschungsinstitut is based on the fact that only scientific interests are of importance for the selection of the programme.

The scientific programme of the Institute is mainly based on five components: the workshops, mini-workshops, Arbeitsgemeinschaft, Oberwolfach Seminars and the Research in Pairs programme. All these activities are intensely demanded, and by no means can all requests for participation be fulfilled. Detailed documentation is provided in the second part of the annual report after the Oberwolfach Lecture.

The third part of the report provides an overview on the excellent library with the new online photo collection, on the steadily growing IT-division of the MFO, with the new reference center for mathematical software, as well as on the administration and housekeeping. Finally a financial statement for the year 2005 is provided.

It is particularly noteworthy that everywhere where the excellent role of the Mathematisches Forschungsinstitut Oberwolfach in the mathematical community is known, there is great readiness to help the Institute in financial problems. My thanks go, primarily, to the Land Baden-Württemberg which has almost exclusively supported the Institute for so many decades, in spite of difficult financial basic conditions. This includes the officials in the ministry of science, research and art who have always supported me with words and deeds in my term of office.

Sincerest thanks are due also to the Oberwolfach-Stiftung and the Förderverein in which hundreds of mathematicians support the work of the Institute by their membership fee. Without the financial support of the Oberwolfach-Stiftung and the Förderverein, it would not have been possible to acquire more property around the Institute for the enlargement of the library building. With this, a dream of the former directors, in particular of Mr. Barner, finally came true. It was also a great pleasure to receive the donation of Ms

Spende der Amerikanerin Rosemary Lonergan zu Ehren des Mathematikers John Todd, die sie der Oberwolfach Stiftung zum großen Teil für den Zukauf des Geländes zur Vefügung gestellt hat.

Der Erwerb von zusätzlichem Gelände um das Institut war notwendig geworden, um die Bibliothekserweiterung durchführen zu können. Die bisherige Bibliothek konnte die stetig wachsende Zahl von Büchern und Zeitschriftenbänden nicht mehr fassen. Wir sind glücklich und dankbar, dass die VolkswagenStiftung und die Klaus Tschira Stiftung zu gleichen Teilen die finanziellen Mittel für die Bibliothekserweiterung bewilligt haben. In meinem nächsten Jahresbericht werde ich über den Fortschritt der Baumaßnahmen berichten.

Auch bei den noch vor uns liegenden großen Sanierungsaufgaben an dem nun fast 40 Jahre alten Gästehaus und den Bungalows sind die Mittel von Förderverein und Oberwolfach-Stiftung unverzichtbar. Denn ohne einen Eigenanteil werden wir den Bund und das Land Baden-Württemberg nicht dazu bewegen können, den überwiegenden Teil der erheblichen Kosten zu übernehmen. Ich möchte alle Leser dieses Berichts ermuntern, die Arbeit von Förderverein und Oberwolfach-Stiftung durch Beiträge oder Spenden tatkräftig zu unterstützen.

Die Unterstützung durch die Europäische Gemeinschaft, durch die National Science Foundation (NSF) der USA und die Japanische Mathematische Gesellschaft (JAMS) sind sichtbarer Ausdruck der internationalen Wertschätzung der Arbeit des MFO. Mein herzlicher Dank gilt diesen Institutionen sowie allen anderen Spendern, worüber Sie in Abschnitt 3.5 Einzelheiten finden.

Der Erfolg des Instituts beruht auf seiner abgeschiedenen Lage und seiner Infrastruktur, die ideal auf die Bedürfnisse der Mathematik zugeschnitten ist, auf seiner exzellenten Bibliothek, die zu den weltbesten gehört, und nicht zuletzt auch auf dem Engagement und der wissenschaftlichen Urteilskraft aller, die das wissenschaftliche Programm gestalten. Hierzu gehören natürlich die schon erwähnte wissenschaftliche Kommission, aber vor allem auch alle diejenigen, die Anträge stellen und, falls die Anträge genehmigt werden, die besten Teilnehmer und Vortragenden auswählen und die Durchführung der Workshops organisieren, bis hin zu den Kurzberichten für die Publikation in den Oberwolfach Reports. Ihnen allen gilt mein herzlicher Dank.

Rosemary Lonergan, in honour of the mathematician John Todd, to the Oberwolfach Stiftung of which a considerable amount was used for the purchase of the property.

The acquisition of additional area around the Institute has become necessary to be able to carry out the library extension. The present library could not store any more the steadily increasing number of books and magazine volumes. We are happy and grateful that the VolkswagenStiftung and Klaus Tschira Stiftung have granted in equal parts the financial means for the library extension. In my next annual report I will report on the progress of the construction work.

The resources of the Förderverein and the Oberwolfach-Stiftung are also essential for the considerable renovation measures on the now nearly 40 year-old guest house that we will have to carry out in the coming years. Only by providing such a contribution is it possible to convince the federation and the federal state of Baden-Württemberg to bear the main part of the costs involved. I would like to encourage all readers of this report to provide active support for the work of the Förderverein and Oberwolfach-Stiftung by membership or donations.

Support from the European Community, from the National Science Foundation (NSF) of the USA and from the Japan Association of Mathematical Sciences (JAMS) provides a visible expression of the international esteem in which the work of the MFO is held. My sincerest thanks go to these institutions as well as to all other donors. More details will be provided in Section 3.5.

The success of the Institute is based on its remote location and its infrastructure, which perfectly suits the needs of mathematics, on its excellent library which is one of the world's best; and also on the dedication and outstanding scientific knowledge of those who decide on the scientific programme, namely the Scientific Committee. In addition it depends upon those who submit their applications and, if the applications are approved, select the best participants and lecturers, organise the workshops, and finally write the short reports which are published in the Oberwolfach Reports. To all of them I wish to express my sincerest thanks.

Mein Dank richtet sich auch an die Mitarbeiter des Instituts, die fast unsichtbar aber hoch effizient und mit Hingabe alle auftauchenden (nichtmathematischen) Probleme lösen.

Ich hoffe dieser Jahresbericht gibt den Lesern einen Einblick in die Arbeit des Instituts und die faszinierenden mathematischen Programme. Den Spendern und Unterstützern mag sie zeigen, dass ihr Engagement eine lohnende Investition ist, die anderen mag sie zu Unterstützung anregen.

My thanks are also owed to the employees of the Institute who solve all (non-mathematical) problems almost invisibly, but at the same time highly efficiently and with devotion.

I hope this annual report will give you an insight into the work of the Institute and its fascinating mathematical programme. I hope it will show donors and supporters that their engagement is a worthwhile investment, and may stimulate others to provide additional support.

Gert-Martin Greuel

Gesamtansicht des MFO

1. Oberwolfach Lecture

Geometric Flows and 3-Manifolds

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The current article arose from a lecture given by the author in October 2005 on the work of R. Hamilton and G. Perelman on Ricci-flow and explains central analytical ingredients in geometric parabolic evolution equations that allow the application of these flows to geometric problems including the Uniformisation Theorem and the proof of the Poincare conjecture. Parabolic geometric evolution equations of second order are nonlinear extensions of the ordinary heat equation to a geometric setting, so we begin by reminding the reader of the linear heat equation and its properties. We will then introduce key ideas in the simpler equations of curve shortening and 2-d Ricci-flow before discussing aspects of three-dimensional Ricci-flow.

1   The Heat Equation

A function $u : \mathrm{I\!R}^n \times [0, T] \to \mathrm{I\!R}$ is a solution of the heat equation if

$$\frac{d}{dt}u = \Delta u = \sum_i^n D_i D_i u \tag{1.1}$$

holds everywhere on $[0, T]$. The heat equation is the gradient flow of the Dirichlet energy

$$E(u) = \frac{1}{2} \int_{\mathrm{I\!R}^n} |Du|^2 \, d\mu \tag{1.2}$$

with respect to the L^2-norm and has the fundamental property of smoothing out all derivatives of a solution even for non-smooth initial data in a precise quantitative way: For example, a uniform bound on the absolute value of $|u|$ on some time interval $[0, t)$ implies a corresponding bound

$$\sup |D^k u(\cdot, t)| \le \frac{C_k}{t^{k/2}} \sup_{\mathrm{I\!R}^n \times [0,t)} |u| \tag{1.3}$$

for each higher derivative $D^k u$ after some waiting time. The scaling behavior of the equation arises from the fact that with u for each positive λ also the function

$$u_\lambda(x, t) = u(\lambda x, \lambda^2 t) \tag{1.4}$$

is a solution of the heat equation. With respect to this scaling the heat-kernel

$$\rho(x, t) = \frac{1}{(4\pi t)^{n/2}} \exp\left(-\frac{|x|^2}{4t}\right) \tag{1.5}$$

is a selfsimilar solution of the heat equation and thus connects the geometry of $\mathbb{R}^n$ with important analytical properties of heat-flow such as the Harnack inequality: For any positive solution $u > 0$ of the heat equation on $\mathbb{R}^n \times (0, T)$ one has the differential inequality

$$\Delta u - \frac{|Du|^2}{u} + \frac{n}{2t} u \geq 0, \tag{1.6}$$

with equality being valid on the heat-kernel. This inequality is equivalent to

$$\frac{d}{dt} \log u \geq |D \log u|^2 - \frac{n}{2t} \tag{1.7}$$

and implies by integration a sharp Harnack inequality for the values of u. General differential Harnack inequalities in the context of smooth Riemannian manifolds $(\mathcal{M}, g)$ were established in the work of Li and Yau, compare [9] . In the Euclidean case the inequality reads

$$u(x_2, t_2) \geq u(x_1, t_1) \Big(\frac{t_1}{t_2}\Big)^{n/2} \exp\left(- \frac{|x_2 - x_1|^2}{4(t_2 - t_1)} \right) \tag{1.8}$$

for all $x_1, x_2 \in \mathbb{R}$ and $t_2 > t_1 > 0$ since the expression

$$\frac{|x_2 - x_1|^2}{4(t_2 - t_1)} \tag{1.9}$$

minimizes the action

$$\frac{1}{4} \int_\gamma |\dot{\gamma}|^2 d\tau \tag{1.10}$$

among curves γ connecting the events $(x_1, t_1), (x_2, t_2)$. It turns out that sharp inequalities of this type that hold with equality on selfsimilar solutions are one key to the understanding of the behavior of the Ricci-flow and its singularities.

2 Harmonic Map Heat-flow

When considering more general maps $u : (\mathcal{M}^m, g) \to (N^n, h)$ between two Riemannian manifolds one studies again the L^2- gradient flow of the Dirichlet energy

$$E(u) = \frac{1}{2} \int_{\mathcal{M}^m} ||du||^2_{g,h} \, d\mu_g, \tag{2.1}$$

where the energy density $||du||^2$ is now computed with respect to the metrics g, h. The resulting parabolic system of equations

$$\frac{d}{dt u} = \Delta_{g,h} u \tag{2.2}$$

is linear in the second derivatives of u but has a quadratic nonlinearity in du due to the dependence of the target metric on the map u. The stationary points of this system are harmonic maps and it was the first triumph of geometric evolution equations when Eells and Sampson were able to show that in the case of negatively curved target manifolds the flow has a long time solution that converges to a harmonic map in the same homotopy class, see [1]. This striking result motivated the search for other evolution equations that would be able to deform a given geometric object into some canonical representative of its class. On the other hand the harmonic map heat-flow also provided the first examples of singularitie s in solutions of a geometric evolution equation when positive curvature in the target manifold forced so called bubbling phenomena.

3   Mean Curvature Flow

For $F_0 : \mathcal{M}^n \to \mathbb{R}^{n+1}$ a smooth immersion of an n–dimensional hypersurface in Euclidean space, $n \geq 1$, the evolution of $\mathcal{M}_0 = F_0(\mathcal{M})$ by mean curvature flow is the one–parameter family of smooth immersions $F : \mathcal{M}^n \times [0, T[\to \mathbb{R}^{n+1}$ satisfying

$$\frac{\partial F}{\partial t}(p, t) = -H(p, t)\nu(p, t), \qquad p \in \mathcal{M}^n, t \geq 0, \tag{3.1}$$

$$F(\cdot, 0) = F_0. \tag{3.2}$$

Here $H(p, t)$ and $\nu(p, t)$ are the mean curvature and the outer normal respectively at the point $F(p, t)$ of the surface $\mathcal{M}_t^n = F(\cdot, t)(\mathcal{M}^n)$. The signs are chosen such that $-H\nu = \vec{H}$ is the mean curvature vector and the mean curvature of a convex surface is positive. In case $n = 1$ this flow is called the curve shortening flow. It is the gradient flow of n-dimensional area with respect to the L^2-norm and has similar scaling and smoothing properties as the heat equation and the harmonic map heat-flow. However, since now the righthand side of the equation,

$$-H(p, t)\nu(p, t) = \Delta_t F(p, t), \tag{3.3}$$

is computed from the Laplace-Beltrami operator with respect to the evolving induced metric on the hypersurface, the system of equations depends on first derivatives of the solution and is only quasilinear. It leads to a system of reaction-diffusion equations for the evolving second fundamental form of the solution surface,

$$\frac{d}{dt}h_j^i = \Delta h_j^i + |A|^2 h_j^i. \tag{3.4}$$

The nonlinear term can cause blowup of the curvature, an example is a shrinking sphere with $\mathcal{M}_t^n = S_{R(t)}^n(0)$ and $R(t) = \sqrt{R_0^2 - 2nt}$. Here the curvature H^2 blows up with the rate $(T-t)^{-1}$ at the singular time T. It is a remarkable fact that despite the singularity the diffusion part of the equation is strong enough to enforce a selfsimilar structure in the formation of the singularity.

The following uniformisation theorem for curves in the plane proven by Grayson [2] following work of Gage and Hamilton is a highly nontrivial one-dimensional demonstration of how a geometric evolution equation can straighten out a given geometry:

Theorem 3.1 (M. Grayson) *If $F_0 : S^1 \to \mathbb{R}^2$ is an embedded initial curve, then the solution of the curve shortening flow (3.1) remains embedded and becomes convex after some finite time. It then converges smoothly to a point while its shape approaches a selfsimilar shrinking circle.*

One successful strategy for the proof of this result that we would like to briefly sketch consists in classifying all possible singularities of the curve shortening flow in the plane together with arguments that rule out all such possibilities accept the known shrinking circle.

Main ingredient for this approach is a *monotonicity formula* involving surface area with a heat-kernel as a weighting function: Let $u(x, t) = \sqrt{2(T-t)}\rho(x, T-t)$ be the backward heat-kernel adapted to the n-dimensional hypersurface, then

$$\frac{d}{dt}\int_{\mathcal{M}^n} u\, d\mu = -\int_{\mathcal{M}^n} |H + \nabla_\nu \log u|^2 u\, d\mu, \tag{3.5}$$

compare [7]. Since the zeros of the RHS are exactly the selfsimilar shrinking solutions of mean curvature flow, one can deduce with parabolic rescaling that all singularities of the flow with the

natural blowup rate $1/\sqrt{2(T-t)}$ for the second fundamental form are asymptotically selfsimilar - and among these the shrinking circle is the only embedded possibility. The proof of Grayson's result is then complete if one can show that there is no singularity with a higher blowup rate of curvature than observed in the case of the shrinking circle. By a rescaling argument again this can be done if all convex translating solutions of mean curvature flow can be ruled out as the profile of the singularity. The key ingredient in this last step is a Harnack inequality for the curvature of convex curves moving by the curve shortening flow, that is fully analogous to the differential Harnack inequality (1.6) in the linear heat equation:

$$\kappa_{ss} - \frac{|\kappa_s|^2}{\kappa} + \frac{1}{2t}\kappa \geq 0. \tag{3.6}$$

It can be deduced that the "grim reaper" curve $y(x,t) = -\log\cos(x) + t$ is the only convex translating solution of the flow and this singularity profile can then be ruled out using the global embeddedness assumption for the initial curve in a quantitative way.

In summary, it is not necessary to control the shape of the evolving curves at intermediate times, the classification of all relevant singularities is sufficient. And this classification is achieved with the help of a sharp Harnack inequality and sharp integral estimates that characterize selfsimilar solutions of the flow. We will find exactly the same ingredients when studying the approach to the classical uniformisation theorem and the Poincare conjecture by Ricci-flow.

4   Ricci-Flow

Given a Riemannian manifold $(\mathcal{M}^n, g_0)$ in 1982 Richard Hamilton proposed to solve the evolution equation [3]

$$\frac{d}{dt}g = -2Rc(g) \tag{4.1}$$

with the given metric g_0 as initial datum. Here $Rc(g(t))$ is the Ricci curvature of the evolving metric and the manifold is assumed to be compact without boundary. The equation is a quasilinear parabolic system of equations which is in many ways analogous to mean curvature flow. E.g. the evolution equation for the curvature resulting from Ricci-flow is again a system of reaction-diffusion equations that have the Laplace-Beltrami operator as their leading part in all components of the system:

$$\frac{d}{dt}\text{Riem} = \Delta\text{Riem} + \text{Quad}(\text{Riem}). \tag{4.2}$$

The algebraic properties of the quadratic reaction term determine the interplay of the various curvature quantities during the flow. In three dimensions the Riemann curvature tensor can be fully expressed in terms of the Ricci tensor, allowing a concentration of attention on the behavior of the three eigenvalues of this symmetric tensor field during the evolution. In [3] Hamilton was able to fully understand the 3-dimensional case with positive Ricci curvature:

Theorem 4.1 *If the initial Riemannian metric g_0 on a closed 3-manifold has positive Ricci curvature then the solution of Ricci flow contracts smoothly to zero volume in finite time and appropriate rescalings of the metric converge to a smooth metric of constant sectional curvature. In particular, any 3-manifold carrying a metric of positive Ricci curvature is diffeomorphic to a spherical space-form.*

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In three dimensions the algebraic properties of the reaction terms in (4.2) strongly favor metrics of constant positive sectional curvature while the second Bianchi identities allow control of the gradient of the scalar curvature through the gradient of the tracefree part of the Ricci tensor. It was then possible to prove the theorem with the maximum principle being the essential tool.

On two dimensional spheres the maximum principle seems not to be enough to control the size of the curvature and an appeal to integral estimates and a Harnack estimate becomes an alternative avenue just like in the curve shortening of embedded curves. Hamilton [4] proved that a Li-Yau type Harnack inequality holds for the scalar curvature R in 2-d Ricci flow that is analogous to the ordinary heat equation, we only state the scalar version

$$\Delta R - \frac{|DR|^2}{R} + \frac{n}{2t}R \geq 0. \tag{4.3}$$

Using this inequality it is possible in a fashion analogous to the case of curve shortening to prove that the only possible singularities of 2-spheres are either asymptotic to shrinking self-similar spheres or to a "cigar"-type capped cylinder that satisfies Ricci-flow by moving under diffeomorphisms along a radial gradient vectorfield on $\mathbb{R}^2$. The metric of such a "translating soliton solution" is explicitly given by

$$ds^2 = \frac{dx^2 + dy^2}{1 + x^2 + y^2} \tag{4.4}$$

and satisfies the corresponding soliton equation

$$\frac{d}{dt}g_{ij} = (L_X g)_{ij} = 2D_i D_j f = -2R_{ij}, \tag{4.5}$$

where $X = Df$ is the gradient vector field driving the diffeomorphism.

Again in parallel to the case of curve shortening this last model for a singularity can then be ruled out for example by an isoperimetric inequality satisfied by 2-d Ricci-flow. Gathering all cases and using an extra argument due to Chow it follows from the work of Hamilton that the Ricci flow has the best possible behavior on all 2-d surfaces:

Theorem 4.2 *For any initial metric on a two-dimensional Riemann surface the solution of Ricci flow converges to a metric of constant Gauss curvature in the same conformal class (when appropriately rescaled).*

We note that in the spherical case the shrinking surface has to be scaled up while in the case of negative Gauss curvature the Ricci flow is expanding the surface such that it has to be scaled down; in the case of the torus the volume stays constant and no rescaling is necessary. As a final comment we note that the eternal selfsimilar solutions of curve shortening flow ("grim reaper") and Ricci-flow respectively ("cigar") that appeared in our analysis of singularities are of independent interest in the theory of Renormalisationgroup flows where they are known as the "hairpin" solution of curve shortening flow and the "2-d Riemannian black hole" respectively.

5   Ricci-Flow singularities in 3 dimensions

If the assumption of positive Ricci curvature is dropped in dimension $n = 3$ new singularities become possible, in particular when a long thin neck of type $S^2 \times [a, b]$ connecting two larger

pieces of the three-manifold begins to pinch off under the influence of the large sectional curvature present in the small S^2. Such neckpinch singularities will inevitably happen for general initial data and cannot be avoided.

The great idea driving the work of Hamilton and Perelman in three dimensions is that this is essentially the only singularity that the Ricci flow can develop in finite time and that this singular behavior of the flow can in fact be turned to advantage: According to the geometrisation conjecture of Thurston every closed three-manifold admits a decomposition into irreducible pieces of eight different types along spherical and toroidal necks. The expectation is that standard neckpinch singularities at finitely many space-time instances of Ricci flow will happen at just the right places to effect the desired decomposition along spherical necks automatically and that the pinching of toroidal necks only happens in infinite Ricci flow time in a controllable way. One hopes to construct a standard surgery procedure for thin necks which replaces a piece of a spherical neck close to some cylinder $S^2 \times [a, b]$ by two positively curved spherical caps while keeping track of all curvature quantities -this procedure should then be carefully used each time a neckpinch forms. In particular, on a simply connected closed 3-manifold it is expected that after finitely many spherical neckpinch singularities which cut up the 3-manifold into disjoint pieces there will be only finitely many singularities asymptotic to selfsimilar shrinking 3-spheres analogous to the 2-d case: If this were true, we could retrace our flow backwards and conclude that the original surface was a finite connected sum of standard 3-spheres, hence a 3-sphere, thus proving the Poincare conjecture.

There are several major analytical obstacles to this program: There will be degenerate spherical neckpinches where some small 3-dimensional bubble doesn't pinch off properly and instead a 3-dimensional hemisphere gets squashed into a long thin horn developing rapidly towards a cusp. Again, this behavior is expected and cannot be avoided. A further difficulty lies in the need to demonstrate that these singularities are almost exactly axisymmetric in a precise quantitative way: Only then it will be possible to devise a detailed quantitative surgery algorithm for both cutting off the horns and cutting out the spherical necks.

By using first maximum principle estimates on the reaction-diffusion system for the Ricci curvature establishing that all singularities in 3-d are asymptotically non-negatively curved (Hamilton-Ivey estimates) and then proving a higher dimensional version of the Li-Yau type Harnack inequality for the Ricci tensor Hamilton gave a preliminary classification of finite time singularities of 3-d Ricci flow in [5]: The classification includes the selfsimilar shrinking 3-sphere, the expected selfsimilar spherical neckpinch singularity $S^2 \times \mathbb{R}$ and the translating Ricci solitons of strictly positive curvature modelling the tip of the horn in a degenerate spherical neckpinch. Unfortunately there is one more possible singularity model on the list, namely the "cigar" type translating 2-d soliton from (4.4) cross $\mathbb{R}$. The presence of such a singularity could indicate a degenerating cross-section of a pinching neck and would make the proposed surgery and continuation of the flow impossible. A further complication lay in the fact that Hamilton's classification only applied in regions where the curvature of the manifold is of comparable size to the maximum curvature in the region - making it inapplicable in certain situations. Just like in curve shortening or in 2-d Ricci flow a new estimate was needed to rule out the undesirable "cigar" singularity.

Perelman in his breakthrough contributions in [10] discovered new estimates for weighted volume distributions on the evolving three-manifold that enabled him to rule out the cigar type solitons since they have very little volume in large regions of small curvature, so called "collapsed regions", which are not present in the other singularity models.

One of the crucial new concepts developed by Perelman for this purpose is the concept of a

new action on curves $\gamma : [\tau_1, \tau_2] \to (\mathcal{M}^3, g(t))$ in Ricci flow space-time, given by

$$\mathcal{L}(\gamma) := \int_\gamma \sqrt{\tau}(R(\gamma(\tau)) + |\dot{\gamma}(\tau)|^2)d\tau \tag{5.1}$$

that leads to the concept of a $\mathcal{L}$-shortest curve in a natural way. Fixing a point $p \in \mathcal{M}^3$ and $\tau_1 = 0$ we let $L(q, \tau)$ be the $\mathcal{L}$-length of the $\mathcal{L}$-shortest curve connecting p and q and denote by $l(q, \tau) = \frac{1}{2\sqrt{\tau}}L(q, \tau)$ the reduced distance. Then Perelman proves

Theorem 5.1 *The reduced volume*

$$V(\tau) = \int_\mathcal{M} \tau^{-\frac{n}{2}} \exp{(-l(q, \tau))}dq \tag{5.2}$$

is monotonically increasing in τ if the metric satisfies $\frac{d}{d\tau}g_{ij} = 2R_{ij}$.

This result following from a careful analysis of the variational behavior of the $\mathcal{L}-$ geodesics should be seen as related in spirit to the monotonicity formulae for mean curvature flow and harmonic map heat-flow discussed earlier in this article since the integrand resembles a nonlinear backward heat-kernel adapted to the space-time geometry of the Ricci flow. Also compare the $\mathcal{L}-$integral with the action appearing in the Li-Yau Harnack inequality (1.10).

The theorem just explained can be seen to exclude collapsing behavior on finite time intervals, thus ruling out the undesirable "cigar"-type singularity in 3-d Ricci flow at finite times. This is the starting point for a precise quantitative description of the remaining singularities involving spherical neckpinches and for encorporating the quantitative surgery procedure on necks and horns developed by Hamilton in [6].

Perelman sketches in [11] how to set up an algorithm from smooth Ricci flow and intermittent surgeries that maintains all the a priori estimates controlling the flow and keeps the total number of surgeries finite on finite time intervals. Finally, in [12] Perelman outlines that for a subclass of 3-manifolds containing all possible counterexamples of the Poincare conjecture the Ricci flow must stop at a finite time when the volume tends to zero. Simply connectedness and the classification of singularities described above ensures that there are only finitely many spheres left at this stage of the procedure which is the desired outcome implying the Poincare conjecture.

Since the time of the lecture in Oberwolfach three careful manuscripts have appeared that give details of the above results, by Kleiner-Lott [13], by Cao-Zhu [14] and Morgan-Tian [15]. The first two manuscripts include details also for the whole geometrisation conjecture while the last manuscript follows Perelman's arguments in [12] on finite time extinction providing a shorter route to the Poincare conjecture. Hamilton has announced an algorithm based on his previous work and Perelman's non-collapsing estimate that follows the strategy of [6]. Finally, in [8] Huisken and Sinestrari constructed a mean curvature flow with surgery for two-convex hypersurfaces that is inspired by Hamilton's surgery approach in [6].

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2. Wissenschaftliches Programm

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

2.1 Übersicht der Programme

Das Mathematische Forschungsinstitut Oberwolfach (MFO) hat zwei große zentrale Aufgaben: das wöchentliche Workshop-Programm und das Research in Pairs Programm für längerfristige Forschungsaufenthalte. Daneben gibt es in geringerem Umfang Serviceleistungen des MFO.

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

Das Mini-Workshop-Programm
Im Rahmen dieses Programmes können jährlich 12 einwöchige Mini-Workshops mit je etwa 15 Teilnehmern veranstaltet werden. Diese Mini-Workshops wenden sich besonders an junge Forscher und ermöglichen es, auf

2. Scientific Programme

The Director of the Institute decides on the scientific programme in cooperation with the Scientific Committee of the Gesellschaft für Mathematische Forschung e.V. For the scientific programme, this is the most important panel of the Institute. It relies on the voluntary work of about 20 top-class mathematicians, covering all areas of mathematics. The Scientific Committee examines all proposals for scientific events at the Institute prior to their approval. The programme is fixed in a competitive procedure according to strictly scientific criteria. This year as in preceding years, the MFO received much more proposals than could be approved.

2.1 Overview on the programme

The Mathematisches Forschungsinstitut Oberwolfach (MFO) has two big central tasks: the weekly workshop programme and the Research in Pairs programme for longer-term research stays. In addition there are some further services provided by the MFO.

The Workshop Programme

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

The Mini-Workshop Programme
This programme offers 12 week-long mini-workshops per year, each with about 15 participants. These mini-workshops are aimed especially at junior researchers, and make it possible to take account of recent develop-

aktuelle Entwicklungen schnell zu reagieren, da über die Themen der Mini-Workshops erst ein halbes Jahr vor der Veranstaltung entschieden wird.

ments, since the subjects are fixed only half a year before the mini-workshops take place.

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

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

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

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

Das Research in Pairs Programm
Der zweite Forschungsschwerpunkt ist das Programm „Research in Pairs" (RiP). Dieses Programm ermöglicht es jeweils 2 bis 4 Forschern, die von verschiedenen Institutionen kommen, 2 Wochen bis 3 Monate am Mathematischen Forschungsinstitut Oberwolfach für die Arbeit an einem vorher festzulegenden Projekt zu verbringen (insgesamt 258 Personenwochen in 2005). Bewerbungen sind an den Direktor zu richten.

The Research in Pairs Programme
The second main activity of the Institute is the Research in Pairs (RiP) programme. This programme aims at small groups of 2-4 researchers from different places working together at the Mathematisches Forschungsinstitut Oberwolfach for periods ranging from 2 weeks up to 3 months on specific projects (totally 258 person weeks in 2005). Applications should be addressed to the Director.

Die Oberwolfach Reports
Um die Ergebnisse der Workshops auch einem international weiten Kreis zugänglich zu machen, wurde in 2004 als neue regelmäßige Publikation die Buchserie „Oberwolfach Reports" (OWR) mit jährlich insgesamt 4 Ausgaben von insgesamt mehr als 3000 Seiten in einer Auflage von 300 Stück in Zusammenarbeit mit dem Publishing House der European Mathematical Society gegründet. Die OWR beinhalten erweiterte Kurzfassungen aller Vorträge im Umfang von jeweils ein bis drei Seiten einschließlich Literaturhinweisen und belegen das ausgezeichnete Niveau der Veranstaltungen. Viele neue Entdeckungen und Entwicklungen wurden im Institut zum ersten Mal einem ausgesuchten Forscherkreis vorgestellt und sind in den Oberwolfach Reports dokumentiert. Die OWR sind international auf großes Interesse gestoßen, was sich in der großen Zahl von Abonnenten und Tauschpartnern zeigt.

The Oberwolfach Reports
In 2004, the "Oberwolfach Reports" (OWR) were initiated as a new series of publications of the Institute in collaboration with the Publishing House of the European Mathematical Society. They appear quarterly in an edition of 300 copies, comprising more than 3000 pages per year. The OWR contain extended abstracts of all given talks, of one up to three pages per talk, including references. The aim is to report periodically upon the state of mathematical research, and to make these reports available to the mathematical community. The OWR provide proof of the excellent quality of the events at the MFO. Many new discoveries and developments have been introduced at the Institute to a select group of researchers and are documented in the Oberwolfach Reports. The OWR have met with great interest worldwide, as is clear from the numerous subscribers and partners participating in exchange arrangements.

Der Oberwolfach-Preis

Der Oberwolfach-Preis wird etwa alle drei Jahre von der Oberwolfach Stiftung in Kooperation mit dem MFO und der wissenschaftlichen Kommission an junge europäische Forscher im Alter von höchsten 35 Jahren verliehen (zuletzt 2004). Der Preis ist für ausgezeichnete Errungenschaften in jeweils wechselnden Gebieten der Mathematik ausgelobt.

Weitere Aktivitäten

In zweijährlichem Wechsel finden Fortbildungsveranstaltungen für Lehrkräfte bzw. Bibliotheksangestellte des Landes Baden-Württemberg statt. In 2005 gab es eine Bibliothekarsfortbildung mit 30 Teilnehmern. Das Institut beherbergt auch die abschließende Trainingswoche für besonders begabte Schüler zur Vorbereitung auf die Internationale Mathematik-Olympiade.

Oberwolfach Prize

The Oberwolfach Prize is awarded approximately every third year by the Oberwolfach Stiftung in cooperation with the MFO and the Scientific Committee to young European mathematicians not older than 35 years (last in 2004). The prize is awarded for excellent achievements in changing fields of mathematics.

Further activities

On a two-year-rotation, a training week for school teachers respectively librarians of the State of Baden-Württemberg takes place. In 2005, a librarians' training week with 30 participants was held. The Institute also hosts the final training week for especially gifted pupils to prepare for the International Mathematical Olympiad.

2.2 Jahresprogramm 2005

Im Jahr 2005 wurden während 41 Wochen Workshops durchgeführt (39 Workshops voller Größe und 3 Workshops halber Größe), sowie 12 Miniworkshops während vier Wochen und zwei Arbeitsgemeinschaften während zwei Wochen. Insgesamt nahmen mehr als 2500 Forscher aus aller Welt an diesen Programmen sowie am Research in Pairs teil (2729 Personenwochen), ca. 30% aus Deutschland, 40% aus Resteuropa und 30% aus dem nichteuropäischen Ausland. Das Institut legt großen Wert darauf, dass alle Gebiete der Mathematik und ihre Grenzgebiete, auch im Hinblick auf Anwendungen, vertreten sind. Das folgende Tagungsprogramm belegt diese Politik.

2.2 Annual schedule 2005

During 41 weeks of the year 2005 workshops have taken place (39 full-size workshops and 3 half-size workshops), as well as 12 mini-workshops taking up four weeks and two Arbeitsgemeinschaften taking up two weeks. In total, more than 2500 researchers from all over the world attended these programmes and the Research in Pairs programme (2729 person weeks): about 30% from Germany, 40% from the rest of Europe, and 30% from non-European countries. The Institute emphasizes that all fields of mathematics and related areas are represented, with applications also being taken into account. The following scientific programme provides evidence of this policy.

Workshops

02.01.-08.01.05 Gitter und Anwendungen
Organizers: Christiane Bachoc, Bordeaux
Eva Bayer-Fluckiger, Lausanne
Gabriele Nebe, Ulm

09.01.-15.01.05 Optimization and Applications
Organizers: Florian Jarre, Düsseldorf
Claude Lemarechal, Saint Ismier
Jochem Zowe, Erlangen

16.01.-22.01.05 Graph Theory
Organizers: Reinhard Diestel, Hamburg
Alexander Schrijver, Amsterdam
Paul D. Seymour, Princeton

23.01.-29.01.05 Entanglement and Decoherence: Mathematics and Physics of Quantum Information and Computation
Organizers: Sergio Albeverio, Bonn
Gianfausto Dell'Antonio, Roma
Francesco De Martini, Roma

30.01.-05.02.05 Gemischte und nicht-standard Finite-Elemente-Methoden mit Anwendungen
Organizers: Dietrich Braess, Bochum
Carsten Carstensen, Wien
Klaus Hackl, Bochum

06.02.-12.02.05 Representation Theory of Finite-Dimensional Algebras
Organizers: Idun Reiten, Trondheim
Claus Michael Ringel, Bielefeld

13.02.-19.02.05 Komplexe Algebraische Geometrie
Organizers: Fabrizio Catanese, Bayreuth
Yujiro Kawamata, Tokyo
Gang Tian, MIT Cambridge
Eckart Viehweg, Essen

27.02.-05.03.05 Regelungstheorie
Organizers: Frank Allgöwer, Stuttgart
Uwe Helmke, Würzburg
Huibert Kwakernaak, Twente

06.03.-12.03.05 Groups and Geometries
Organizers: Martin Liebeck, London
Bernhard Mühlherr, Bruxelles
Gernot Stroth, Halle-Wittenberg

13.03.-19.03.05 Enveloping Algebras and Geometric Representation Theory
Organizers: Shrawan Kumar, Chapel Hill
Peter Littelmann, Wuppertal
Wolfgang Soergel, Freiburg

20.03.-26.03.05 Mathematical Logic: Proof Theory, Type Theory and Constructive Mathematics
Organizers: Samuel R. Buss, La Jolla
Yiannis N. Moschovakis, Los Angeles
Helmut Schwichtenberg, München

27.03.-02.04.05 Free Probability Theory
Organizers: Philippe Biane, Paris
Roland Speicher, Kingston
Dan Voiculescu, Berkeley

10.04.-16.04.05 Discrete Geometry
Organizers: Martin Henk, Magdeburg
Jiri Matousek, Prague
Emo Welzl, Zürich

17.04.-23.04.05 Optimal Control of Coupled Systems of PDE
Organizers: Karl Kunisch, Graz
Günter Leugering, Darmstadt
Jürgen Sprekels, Berlin
Fredi Tröltzsch, Berlin

24.04.-30.04.05 Kommutative Algebra
Organizers: Winfried Bruns, Osnabrück
Hubert Flenner, Bochum
Craig Huneke, Lawrence

08.05.-14.05.05 Stochastic Analysis and Non-Classical Random Processes
Organizers: Jean-Dominique Deuschel, Berlin
Wendelin Werner, Paris
Ofer Zeitouni, Minneapolis

22.05.-28.05.05 Schnelle Löser für partielle Differentialgleichungen
Organizers: Randolph E. Bank, La Jolla
Wolfgang Hackbusch, Leipzig
Gabriel Wittum, Heidelberg

29.05.-04.06.05 Nonlinear Evolution Problems
Organizers: Klaus Ecker, Berlin
Jalal Shatah, New York
Michael Struwe, Zürich

05.06.-11.06.05 **Complexity Theory**	
Organizers:	Joachim von zur Gathen, Paderborn
	Oded Goldreich, Rehovot
	Claus Schnorr, Frankfurt
	Madhu Sudan, MIT Cambridge

12.06.-18.06.05 **Geometric Topology and Connections with Quantum Field Theory**
Organizers: Peter Teichner, La Jolla
Stephan Stolz, Notre Dame

19.06.-25.06.05 **Algebraische Zahlentheorie**
Organizers: Christopher Deninger, Münster
Peter Schneider, Münster
Anthony J. Scholl, Durham

26.06.-02.07.05 **Topological and Variational Methods for Differential Equations**
Organizers: Thomas Bartsch, Giessen
E. Norman Dancer, Sydney

03.07.-09.07.05 **Real Analysis, Harmonic Analysis and Applications to PDE**
Organizers: Detlef Müller, Kiel
Elias M. Stein, Princeton

10.07.-16.07.05 **Dynamical Systems**
Organizers: Helmut W. Hofer, New York
Jean-Christophe Yoccoz, Paris
Eduard Zehnder, Zürich

17.07.-23.07.05 **Explicit Methods in Number Theory**
Organizers: Henri Cohen, Talence
Hendrik W. Lenstra, Jr, Leiden
Don B. Zagier, Bonn

24.07.-30.07.05 **Partielle Differentialgleichungen**
Organizers: Tom Ilmanen, Zürich
Reiner Schätzle, Bonn
Neil Trudinger, Canberra

31.07.-06.08.05 **Dynamical System Methods in Fluid Dynamics**
Organizers: Jerrold E. Marsden, Pasadena
Jürgen Scheurle, München

07.08.-13.08.05 **Differentialgeometrie im Großen**
Organizers: Bernhard Leeb, München
Paul Seidel, Chicago
Gang Tian, MIT Cambridge

21.08.-27.08.05 **Analysis and Geometric Singularities**
Organizers: Jochen Brüning, Berlin
Rafe Mazzeo, Stanford
Paolo Piazza, Roma

21.08.-27.08.05 **Mathematical Population Genetics**
Organizers: Ellen Baake, Greifswald
Warren Ewens, Philadelphia
Anton Wakolbinger, Frankfurt

28.08.-03.09.05 *C**-Algebren
Organizers: Claire Anantharaman-Delaroche, Orleans
Siegfried Echterhoff, Münster
Uffe Haagerup, Odense
Dan Voiculescu, Berkeley

04.09.-10.09.05 **Cohomology of Finite Groups: Interactions and Applications**
Organizers: Alejandro Adem, Madison
Jon F. Carlson, Athens
Hans-Werner Henn, Strasbourg

11.09.-17.09.05 **Arakelov Geometry**
Organizers: Jean-Benoit Bost, Orsay
Klaus Künnemann, Regensburg
Damian Roessler, Zürich

18.09.-24.09.05 **Analysis and Quantum Theory**
Organizers: Volker Bach, Mainz
Jan Derezinski, Warszawa
Jan-Philip Solovej, Kobenhavn

25.09.-01.10.05 **Low-Dimensional Manifolds**
Organizers: Michel Boileau, Toulouse
Klaus Johannson, Frankfurt
Peter Scott, Ann Arbor

16.10.-22.10.05 **Statistische und Probabilistische Methoden der Modellwahl**
Organizers: Jürgen Berger, Duke
Holger Dette, Bochum
Gabor Lugosi, Barcelona
Axel Munk, Göttingen

23.10.-29.10.05 **Noncommutative Geometry and Quantum Field Theory**
Organizers: Sergio Doplicher, Rom
Mario Paschke, Leipzig
Rainer Verch, Leipzig
Eberhard Zeidler, Leipzig

30.10.-05.11.05 **Reactive Flow and Transport Through Complex Systems**
Organizers: Cornelius J. van Duijn, Eindhoven
Andro Mikelic, Villeurbanne
Christoph Schwab, Zürich

06.11.-12.11.05 **Combinatorial Optimization**
Organizers: Rainer E. Burkard, Graz
David Shmoys, Ithaca
Uwe Zimmermann, Braunschweig

27.11.-03.12.05 **Heat Kernels, Stochastic Processes and Functional Inequalities**
Organizers: Thierry Coulhon, Cergy
Bruno Franchi, Bologna
Takashi Kumagai, Kyoto
Karl-Theodor Sturm, Bonn

04.12.-10.12.05 **Set Theory**
Organizers: Sy Friedman, Vienna
Menachem Magidor, Jerusalem
Hugh Woodin, Berkeley

11.12.-17.12.05 **Mathematics in the Physical Sciences, 1650-2000**
Organizers: Niccolo Guicciardini, Siena
Tinne Hoff Kjeldsen, Roskilde
David E. Rowe, Mainz

Miniworkshops

20.02.-26.02.05 **Mathematical Methods and Models of Continuum Biomechanics**
Organizers: Ray W. Ogden, Glasgow
Guiseppe Saccomandi, Lecce

20.02.-26.02.05 **Interface Problems in Computational Fluid Dynamics**
Organizers: Eberhard Bänsch, Berlin
Lutz Tobiska, Magdeburg
Noel J. Walkington, Pittsburgh

20.02.-26.02.05 **Analytical and Numerical Methods in Image and Surface Processing**
Organizers: Gerhard Dziuk, Freiburg
Ulrich Reif, Darmstadt
Martin Rumpf, Duisburg-Essen
Peter Schröder, Pasadena

01.05.-07.05.05 **Numerical Upscaling: Theory and Applications**
Organizers: Achi Brandt, Rehovot
Richard Ewing, College Station
Oleg Iliev, Kaiserslautern

01.05.-07.05.05 **Aspects of Ricci-Flow**
Organizers: Klaus Ecker, Berlin
Tom Ilmanen, Zürich
Gerhard Huisken, Potsdam

01.05.-07.05.05 **Particle Systems with Several Conservation Laws: Fluctuations and Hydrodynamic Limit**
Organizers: Christian Klingenberg, Würzburg
Gunter M. Schütz, Jülich
Balint Toth, Budapest

14.08.-20.08.05 **Operators on Spaces of Analytic Functions**
Organizers: Ernst Albrecht, Saarbrücken
Jean Esterle, Bordeaux
Raymond Mortini, Metz
Stefan Richter, Tennesse

14.08.-20.08.05 **Convergence of Adaptive Algorithms**
Organizers: Mark Ainsworth, Glasgow
Carsten Carstensen, Berlin
Willy Dörfler, Karlsruhe

14.08.-20.08.05 **Gerbes, Twisted K-Theory and Conformal Field Theory**
Organizers: Branislav Jurco, München
Jouko Mickelsson, Helsinki
Christoph Schweigert, Hamburg

13.11.-19.11.05 **Dynamics of Cocycles and One-Dimensional Spectral Theory**
Organizers: David Damanik, Pasadena
Russell Johnson, Firenze
Daniel Lenz, Chemnitz

13.11.-19.11.05 **Analysis and Computation of Microstructures in Finite Plasticity**
Organizers: Klaus Hackl, Bochum
Sergio Conti, Duisburg-Essen
Michael Ortiz, Pasadena

13.11.-19.11.05 **Heterotic Strings, Derived Categories, and Stacks**
Organizers: Bjorn Andreas, Berlin
Emanuel Scheidegger, Wien
Eric Sharpe, Salt Lake City
Ping Xu, University Park

Arbeitsgemeinschaft

03.04.-09.04.05 **Algebraic Cobordism**
Organizers: Marc Levine, Boston
Fabien Morel, Paris

02.10.-08.10.05 **Modern Foundations for Stable Homotopy Theory**
Organizers: John Rognes, Oslo
Stefan Schwede, Bonn

Oberwolfach-Seminare

15.05.-21.05.05 **Finite Group Schemes and p-divisible Groups**
Organizers: Fabrizio Andreatta, Padova
Brian Conrad, Michigan
Rene Schoof, Rome

15.05.-21.05.05 **Topological K-Theory for Non-commutative Algebras and Applications**
Organizers: Joachim Cuntz, Münster
Ralf Meyer, Münster
Jonathan Rosenberg, Maryland

09.10.-15.10.05 **Bioinformatics Approaches for Finding cis-regulatory Motifs and Modules**
Organizers: Wolfgang Huber, Cambridge, UK
Xiaole Shirley Liu, Cambridge, Mass.
Terry Speed, Melbourne/Berkeley

09.10.-15.10.05 **Deformations of Algebraic and Analytic Structures**
Organizers: Ragnar-Olaf Buchweitz, Toronto
Hubert Flenner, Bochum

19.11.-25.11.05 **Representation Theory and Applications**
Organizers: Peter Littelmann, Köln
Nicolai Reshetikhin, Berkeley

19.11.-25.11.05 **Dependence and Tail Modelling with Applications to Finance, Insurance, Teletraffic and Climate**
Organizers: Richard Davis, Fort Collins
Holger Drees, Hamburg
Thomas Mikosch, Copenhagen

Fortbildungsveranstaltungen / Training weeks

23.10.-29.10.05 **Fortbildungslehrgang für Bibliothekare**
Organizer: Klaus Franken, Konstanz

29.05.-04.06.05 **Trainings- und Abschlußseminar für die Internationale Mathematik-Olympiade**
Organizer: Arthur Engel, Frankfurt

Research in Pairs

Eine Teilnehmerliste für das RiP-Programm 2005 finden Sie unter Abschnitt 2.8.

The participants of the RiP programme 2005 are listed in Section 2.8.

2.3 Workshops
WORKSHOP 0501

02.01.-08.01.05 Gitter und Anwendungen
Organizers: Christiane Bachoc, Bordeaux
                      Eva Bayer-Fluckiger, Lausanne
                      Gabriele Nebe, Ulm

ABSTRACT
The theory of lattices has many applications and interactions with various other mathematical and technical disciplines such as information technology, topology, algebraic geometry, representation theory, combinatorics, number theory and modular forms to name only the most prominent ones. The research interests of the participants varied from engineering sciences, algebraic and analytic number theory, coding theory, algebraic geometry to name only a few.

PARTICIPANTS
Abdukhalikov, Kanat (Almaty), Baake, Michael (Bielefeld), Bacher, Roland (Saint-Martin-d'Heres), Bachoc, Christine (Talence), Bannai, Eiichi (Fukuoka), Bayer-Fluckiger, Eva (Lausanne), Belfiore, Jean-Claude (Paris), Berge, Anne-Marie (Talence), Böcherer, Siegfried (Mannheim), Bost, Jean-Benoit (Orsay), Bowert, Frank (Dortmund), Cerri, Jean-Paul (Aydoilles), Chan, Wai Kiu (Middletown), Coulangeon, Renaud (Talence), Elbaz-Vincent, Philippe (Montpellier), Gaborit, Philippe (Limoges), Gangl, Herbert (Bonn), Houriet, Julien (Lausanne), Ibukiyama, Tomoyoshi (Osaka), Icaza, Maria Ines (Talca), Kim, Myung-Hwan (Seoul), King, Oliver D. (Cambridge), Krieg, Aloys (Aachen), Kumar, Abhinav (Cambridge), Künnemann, Klaus (Regensburg), Martinet, Jacques (Talence), Morales, Jorge F. (Baton Rouge), Nebe, Gabriele (Aachen), Nguyen, Phong (Paris), Oggier, Frederique (Lausanne), Plesken, Wilhelm (Aachen), Pohst, Michael E. (Berlin), Quebbemann, Heinz-Georg (Oldenburg), Riener, Cordian (Talence), Scharlau, Rudolf (Dortmund), Schoof, Rene (Roma), Schulze-Pillot, Rainer (Saarbrücken), Serre, Jean-Pierre (Paris), Shioda, Tetsuji (Tokyo), Skoruppa, Nils-Peter (Siegen), Sole, Patrick (Valbonne), Souvignier, Bernd (Nijmegen), Staemmler, Ute (Saarbrücken), Suarez Atias, Ivan (Lausanne), Teider, Maria (Ulm), Tiep, Pham Huu (Gainesville), Vallentin, Frank (Garching), Venkov, Boris B. (St. Petersburg), Viterbo, Emanuele (Torino), Voigt, Ina (Dortmund), Watanabe, Takao (Osaka)

09.01.-15.01.05 Optimization and Applications

Organizers: Florian Jarre, Düsseldorf
                     Claude Lemarechal, Saint Ismier
                     Jochem Zowe, Erlangen

ABSTRACT

This workshop was devoted to optimization problems, their theory and resolution, and above all applications of them. The topics covered existence and stability of solutions; design, analysis, development and implementation of algorithms; applications in mechanics, telecommunications, medicine, and operations research. Some emphasis was put on the still recent subject of optimization over the cone of positive semidefinite matrices (SDP).

PARTICIPANTS

Acary, Vincent (Montbonnot, St. Ismier), Achtziger, Wolfgang (Dortmund), Alexandrov, Natalia (Hampton), Anstreicher, Kurt M. (Iowa City), Beck, Amir (Haifa), Ben-Tal, Aharon (Haifa), Eisenblätter, Andreas (Berlin), Epelman, Marina (Ann Arbor), Ferris, Michael (Madison), Fletcher, Roger (Dundee), Freund, Robert M. (Cambridge), Freund, Roland W. (Davis), Gilbert, Jean-Charles (Rocquencourt), Gugat, Martin (Erlangen), Halicka, Margareta (Bratislava), Heinkenschloss, Matthias (Houston), Helmberg, Christoph (Chemnitz), Jarre, Florian (Düsseldorf), Kanzow, Christian (Würzburg), Klatte, Diethard (Zürich), Kocvara, Michal (Prague), Leibfritz, Friedemann (Trier), Lemarechal, Claude (Montbonnot, St. Ismier), Lewis, Adrian (Ithaca), Leyffer, Sven (Argonne), Mizuno, Shinji (Tokyo), Mombaur, Katja (Heidelberg), Monteiro, Renato D.C. (Atlanta), Nesterov, Yurii (Louvain-la-Neuve), Potra, Florian-A. (Baltimore), Rendl, Franz (Klagenfurt), Renegar, James (Ithaca), Roos, Kees (Delft), Sartenaer, Annick (Namur), Saunders, Mike (Stanford), Stoer, Josef (Würzburg), Strodiot, Jean-Jacques (Namur), Todd, Michael J. (Ithaca), Toint, Philippe L. (Namur), Tsuchiya, Takashi (Tokyo), Tütüncü, Reha (Pittsburgh), Ulbrich, Michael (Hamburg), Ulbrich, Stefan (Darmstadt), Vial, Jean Philippe (Geneve), Wright, Stephen J. (Madison), Zowe, Jochem (Bayreuth)

16.01.-22.01.05 Graph Theory
Organizers: Reinhard Diestel, Hamburg
                     Alexander Schrijver, Amsterdam
                     Paul D. Seymour, Princeton

ABSTRACT
This conference had its focus on graph structure, decomposition, and representation. There had been several informal discussion groups, considering a wide range of topics, but the main three topics were: infinite graphs, topological methods and their use to prove theorems in graph theory, and Rota's conjecture for matroids. Three topics gave rise to particularly active and long-running discussions: the proof of the Erdős-Menger conjecture, the prospects of extending the graph minors project to matroids, and the use of topological methods for combinatorial problems.

PARTICIPANTS
Aharoni, Ron (Haifa), Archdeacon, Dan (Burlington), Berger, Eli (Princeton), Bessy, Stephane (Sophia Antipolis), Böhme, Thomas (Ilmenau), Bruhn, Henning (Hamburg), Chudnovsky, Maria (Princeton), Diestel, Reinhard (Hamburg), Ding, Guoli (Baton Rouge), Fleiner, Tamas (Budapest), Frank, Andras (Budapest), Geelen, James F. (Köln), Gerards, Bert (Amsterdam), Gijswijt, Dion (Amsterdam), Goddyn, Luis (Burnaby), Göring, Frank (Chemnitz), Guenin, Bertrand (Waterloo), Haxell, Penny (Waterloo), van der Holst, Hein (Eindhoven), Jackson, Bill (London), Jordan, Tibor (Budapest), Kawarabayashi, Ken-ichi (Miyagi), Kiraly, Tamas (Budapest), Kriesell, Matthias (Hannover), Kühn, Daniela (Birmingham), Laviolette, Francois (Sainte-Foy), Linial, Nathan (Jerusalem), Mader, Wolfgang (Hannover), Maffray, Frederic (Grenoble), McCuaig, Bill (Burnaby), Mohar, Bojan (Ljubljana), Norine, Serguei (Atlanta), Osthus, Deryk (Birmingham), Oum, Sang-il (Princeton), Oxley, James (Baton Rouge), Pouzet, Maurice (Lyon), Rautenbach, Dieter (Bonn), Richter, Bruce (Waterloo), Robertson, Neil (Columbus), Russell, Paul (Cambridge), Sauer, Norbert (Calgary), Schrijver, Alexander (Amsterdam), Seymour, Paul (Princeton), Tardos, Gabor (Budapest), Thomas, Robin (Atlanta), Thomasse, Stephan (Lyon), Vella, Antoine (Waterloo), Wagner, Peter (Cambridge), Whittle, Geoff (Wellington)

23.01.-29.01.05 Entanglement and Decoherence: Mathematics and Physics of Quantum Information and Computation

Organizers: Sergio Albeverio, Bonn
Gianfausto Dell'Antonio, Roma
Francesco De Martini, Roma

ABSTRACT

The scientific programm focused mainly on the following subjects: 1) Quantum Entanglement and Nonlocality: including Bell-type inequalities (theoretical and experimental studies), equivalence of quantum states under local unitary transformations. 2) Quantum Separability: separability criteria for multiple quantum mixed states in arbitrary dimension. 3) Decoherence: study of models; quantum error corrections, fault tolerant computation, multiparticle problems. 4) Sources of Quantum Entanglement. 5) Quantum Information: quantum cloning, teleportation, key distribution, algorithms. 6) Quantum Measurement and Quantum Optics; Holonomic quantum gates; Quantum semigroups; Continuum Observation. 7) Mathematical Quantum and non commutative structures in connection with quantum information theory.

PARTICIPANTS

Adami, Riccardo (Roma), Albeverio, Sergio (Bonn), Altafini, Claudio (Trieste), Barbieri, Marco (Roma), Benatti, Fabio (Trieste), Boscain, Ugo (Trieste), Bruss, Dagmar (Düsseldorf), Cattaneo, Laura (Bonn), Chen, Kai (Bonn), Cirac, Ignacio (Garching), Correggi, Michele (Wien), Cufaro Petroni, Nicola (Bari), D'Ariano, Giacomo Mauro (Pavia), De Martini, Francesco (Roma), Dürr, Detlef (München), Fei, Shao-Ming (Bonn), Figari, Rodolfo (Napoli), Finco, Domenico (Bonn), Gao, Xiu-Hong (Beijing), Gill, Richard D. (Utrecht), Goswami, Debashish (Kolkata), Hellmich, Mario (Bielefeld), Holevo, Alexander S. (Moscow), Hornberger, Klaus (München), Horodecki, Pawel (Gdansk), Jaksch, Dieter (Oxford), Jing, Naihuan (Bielefeld), Karpinski, Marek (Bonn), Kostrykin, Vadim (Aachen), Leuchs, Gerd (Erlangen), Li-Jost, Xianqing (Leipzig), Macchiavello, Chiara (Pavia), Massar, Serge (Bruxelles), Meschede, Dieter (Bonn), Michelangeli, Alessandro (Trieste), Morato, Laura Maria (Verona), Moroder, Tobias (Erlangen), Paolucci, Anna Maria (Torino), Piani, Marco (Gdansk), Plenio, Martin (London), Raimond, Jean-Michel (Paris), Ricci, Marco (Roma), Sciarrino, Fabio (Roma), Teta, Alessandro (L'Aquila), Vacchini, Bassano (Milano), Wang, Xiao-Hong (Beijing), Wang, Zhi-Xi (Beijing), Werner, Reinhard F. (Braunschweig), Zhang, Yong (Leipzig), Ziman, Mario (Bratislava)

30.01.-05.02.05 Gemischte und nicht-standard Finite-Elemente-Methoden mit Anwendungen

Organizers: Dietrich Braess, Bochum
                Carsten Carstensen, Wien
                Klaus Hackl, Bochum

ABSTRACT

Mixed and non-conforming finite element methods form a general mathematical framework for the spatial discretisation of partial differential equations, mainly applied to elliptic equations of second order and are becoming increasingly important for the solution of nonlinear problems. These methods are under active discussion in the mathematical and the engineering community and aim of the workshop was to provide a joint forum for the current state of research.

PARTICIPANTS

Ainsworth, Mark (Glasgow), Arbogast, Todd (Austin), Armero, Francisco (Berkeley), Bartels, Sören (Berlin), Becker, Roland (Pau), Bletzinger, Kai-Uwe (München), Braess, Dietrich (Bochum), Brenner, Susanne C. (Columbia), Carstensen, Carsten (Berlin), Duran, Ricardo (Buenos Aires), Falk, Richard S. (Piscataway), Funken, Stefan A. (Middlesex), Garikipati, Krishna (Ann Arbor), Hackbusch, Wolfgang (Leipzig), Hackl, Klaus (Bochum), Hansbo, Peter (Göteborg), Hoppe, Ronald H.W. (Augsburg), Hoppe, Ulrich (Bochum), Houston, Paul (Leicester), Hu, Jun (Berlin), Ivljanin, Isidora (Bochum), Jensen, Max (Berlin), Knabner, Peter (Erlangen), Langer, Ulrich (Linz), Lazarov, Rajco D. (College Station), Lovadina, Carlo (Pavia), Mergheim, Julia (Kaiserslautern), Miehe, Christian (Stuttgart), Monk, Peter (Newark), Radu, Florin Adrian (Erlangen), Rannacher, Rolf (Heidelberg), Reddy, B. Daya (Rondebosch), Reese, Stefanie (Bochum), Sacco, Riccardo (Milano), Schöberl, Joachim (Linz), Stein, Erwin (Hannover), Steinmann, Paul (Kaiserslautern), Stephan, Ernst Peter (Hannover), Verfürth, Rüdiger (Bochum), Wagner, Werner (Karlsruhe), Wall, Wolfgang A. (Garching), Weinberg, Kerstin (Berlin), Wieners, Christian (Karlsruhe), Winther, Ragnar (Oslo), Wohlmuth, Barbara (Stuttgart)

06.02.-12.02.05 Representation Theory of Finite-Dimensional Algebras
Organizers: Idun Reiten, Trondheim
                    Claus Michael Ringel, Bielefeld

ABSTRACT

Methods and results from the representation theory of finite dimensional algebras have led to many interactions with other areas of mathematics. The aim of this workshop was, in addition to stimulating progress in the representation theory of algebras, to further develop such interactions with commutative algebra, algebraic geometry, group representation theory, Lie-algebras and quantum groups, but also with the new theory of cluster algebras.

PARTICIPANTS

Asashiba, Hideto (Osaka), Avramov, Luchezar (Lincoln), Beligiannis, Apostolos (Karlovassi), Benson, David J. (Aberdeen), van den Bergh, Michel (Diepenbeek), Brüstle, Thomas (Sherbrooke), Buan, Aslak Bakke (Trondheim), Buchweitz, Ragnar-Olaf (Toronto), Burban, Igor (Bonn), Carlson, Jon F. (Athens), Chen, Bo (Bielefeld), Coelho, Flavio Ulhoa (Sao Paulo), Erdmann, Karin (Oxford), Farnsteiner, Rolf (Bielefeld), Geiss, Christof (Mexico), Green, Edward L. (Blacksburg), Happel, Dieter (Chemnitz), Hille, Lutz (Hamburg), Holtmann, Angela (Bielefeld), Hubery, Andrew (Paderborn), Iyama, Osamu (Nagoya), Iyengar, Srikanth B. (Lincoln), Keller, Bernhard (Paris), Kerner, Otto (Düsseldorf), König, Steffen (Leicester), Krause, Henning (Paderborn), Lenzing, Helmut (Paderborn), Leuschke, Graham (Syracuse), Marsh, Robert J. (Leicester), Martinez-Villa, Roberto (Morelia), Martsinkovsky, Alex (Boston), Neeman, Amnon (Canberra), de la Pena, Jose Antonio (Mexico), Peng, Liangang (Chengdu), Platzeck, Maria Ines (Bahia Blanca), Reineke, Markus (Münster), Reiten, Idun (Trondheim), Rickard, Jeremy (Bristol), Ringel, Claus Michael (Bielefeld), Schmidmeier, Markus (Boca Raton), Schröer, Jan (Leeds), Skowronski, Andrzej (Torun), Smalo, Sverre O. (Trondheim), Solberg, Oeyvind (Trondheim), Unger, Luise (Hagen), Xi, Chang-Chang (Beijing), Xiao, Jie (Beijing), Yoshino, Yuji (Okayama), Zacharia, Dan (Syracuse), Zelevinsky, Andrei V. (Boston), Zwara, Grzegorz (Torun)

13.02.-19.02.05 **Komplexe Algebraische Geometrie**
Organizers: Fabrizio Catanese, Bayreuth
                  Yujiro Kawamata, Tokyo
                  Gang Tian, MIT Cambridge
                  Eckart Viehweg, Essen

ABSTRACT
The topics of this workshop comprised moduli spaces and invariant theory, Hodge theory and variations of Hodge structures, surfaces, classification and geometry of higher dimensional varieties, complex analytic methods, arithmetic questions and motivic integration, and algebraic curves. New fashionable topics alongside with new insights on long standing classical open problems had been presented, and there was also cross-fertilization with other research topics as arithmetic and physics

PARTICIPANTS
Aprodu, Marian (Bayreuth), Bauer-Catanese, Ingrid (Bayreuth), Blickle, Manuel (Essen), Böhning, Christian (Bayreuth), Brion, Michel (Saint-Martin-d'Heres), Campana, Frederic (Vandoeuvre-les-Nancy), Caporaso, Lucia (Roma), Catanese, Fabrizio (Bayreuth), Corti, Alessio (Cambridge), Debarre, Olivier (Strasbourg), Ein, Lawrence (Chicago), Ekedahl, Torsten (Stockholm), Esnault, Helene (Essen), Ghigi, Alessandro (Milano), Hulek, Klaus (Hannover), Huybrechts, Daniel (Paris), Kawamata, Yujiro (Tokyo), Kebekus, Stefan (Köln), Kovacs, Sandor (Seattle), Küronya, Alex (Essen), Li, Jun (Stanford), Lönne, Michael (Hannover), Miyaoka, Yoichi (Tokyo), Möller, Martin (Essen), Mukai, Shigeru (Kyoto), Oguiso, Keiji (Tokyo), Paul, Sean T. (New York), Peternell, Thomas (Bayreuth), Pignatelli, Roberto (Povo), Pirola, Gian Pietro (Pavia), Reid, Miles (Coventry), Schreyer, Frank-Olaf (Saarbrücken), Schröer, Stefan (Düsseldorf), Schumacher, Georg (Marburg), Sernesi, Edoardo (Roma), Shepherd-Barron, Nick I. (Cambridge), van Straten, Duco (Mainz), Szemberg, Tomasz (Essen), Teicher, Mina (Ramat-Gan), Tian, Gang (Princeton), Toda, Yukinobu (Tokyo), Tommasi, Orsola (Mainz), Tonoli, Fabio (Bayreuth), Verra, Alessandro (Roma), Viehweg, Eckart (Essen), Voisin, Claire (Paris), Yang, Yihu (Leipzig), Yasuda, Takehiko (Tokyo), Zuo, Kang (Mainz)

27.02.-05.03.05 Regelungstheorie

Organizers: Frank Allgöwer, Stuttgart
Uwe Helmke, Würzburg
Huibert Kwakernaak, Twente

ABSTRACT

Control theory is an interdisciplinary field that is located at the crossroads of pure and applied mathematics with systems engineering. It therefore covers a wide variety of topics, ranging from fundamental mathematical aspects to real world engineering applications of industrial relevance. In particular, it has deep connections to different branches of pure and applied mathematics, including, e.g., operator theory, real and complex analysis, probability theory, commutative algebra, as well as algebraic and differential geometry.

PARTICIPANTS

Allgöwer, Frank (Stuttgart), Antoulas, Athanasios C. (Houston), Benner, Peter (Chemnitz), Blondel, Vincent (Louvain-la-Neuve), Byrnes, Christopher I. (St. Louis), Colonius, Fritz (Augsburg), Dirr, Gunther (Würzburg), Dourdoumas, Nicolaos (Graz), Ebenbauer, Christian (Stuttgart), Findeisen, Rolf (Stuttgart), Fliess, Michel (Palaiseau), Flockerzi, Dietrich (Magdeburg), Fuhrmann, Paul A. (Beer-Sheva), Gluesing-Luerssen, Heide (Groningen), Grüne, Lars (Bayreuth), Helmke, Uwe (Würzburg), Hippe, Peter (Erlangen), Hüper, Knut (Canberra), Hutchinson, Ryan (Zürich), Ilchmann, Achim (Ilmenau), Isidori, Alberto (Roma), Jacob, Birgit (Berlin), Kleinsteuber, Martin (Würzburg), Knobloch, Hans Wilhelm (Würzburg), Krener, Arthur J. (Davis), Kwakernaak, Huibert (Enschede), Lunze, Jan (Bochum), Morari, Manfred (Zürich), Nijmeijer, Henk (Eindhoven), Olsder, Geert Jan (Delft), Respondek, Witold (Mont Saint Aignan), Rosenthal, Joachim (Zürich), Rudolph, Joachim (Dresden), Scherer, Carsten W. (Delft), Scherpen, Jacqueline (Delft), Schlacher, Kurt (Linz-Auhof), van Schuppen, Jan H. (Amsterdam), Sussmann, Hector J. (Piscataway), Thoma, Manfred (Hannover), Tibken, Bernd (Wuppertal), Valcher, Maria Elena (Padova), Willems, Jan C. (Leuven), Wirth, Fabian (Bremen), Zeitz, Michael (Stuttgart), Zerz, Eva (Aachen)

06.03.-12.03.05 Groups and Geometries

Organizers: Martin Liebeck, London
Bernhard Mühlherr, Bruxelles
Gernot Stroth, Halle-Wittenberg

ABSTRACT

The workshop focused on finite simple groups, Lie-type groups and their interactions with geometry. The talks centered around the classification of the finite simple groups and its applications, simple algebraic groups and group-theoretic applications of Moufang buildings. The conference showed that the theory of simple groups and their geometries is a very active area and that there is a lot of interaction with an increasing number of other areas. There is in particular growing impact of algebraic groups on the theory of finite groups.

PARTICIPANTS

Abramenko, Peter (Charlottesville), Aschbacher, Michael (Pasadena), Baumeister, Barbara (Berlin), Buekenhout, Francis (Bruxelles), Bundy, David (Kiel), Caprace, Pierre-Emmanuel (Bruxelles), Chermak, Andrew L. (Manhattan), Cohen, Arjeh M. (Eindhoven), Cuypers, Hans (Eindhoven), De Medts, Tom (Gent), Fischer, Bernd (Bielefeld), Flavell, Paul (Birmingham), Gramlich, Ralf (Darmstadt), Hall, Jonathan I. (East Lansing), Hirn, Andreas (Halle), Ivanov, Alexander A. (London), Kantor, William M. (Eugene), Lawther, Ross (Cambridge), Liebeck, Martin W. (London), Lyons, Richard N. (New Brunswick), Magaard, Kay (Detroit), Van Maldeghem, Hendrik (Gent), Martin, Ben (Christchurch), Mühlherr, Bernhard (Bruxelles), Nikolov, Nikolay (Oxford), Parker, Christopher W. (Birmingham), Parmeggiani, Gemma (Padova), Praeger, Cheryl E. (Crawley), Pyber, Laszlo (Budapest), Röhrle, Gerhard (Southampton), Rowley, Peter J. (Manchester), Saxl, Jan (Cambridge), Segal, Dan (Oxford), Segev, Yoav (Beer Sheva), Seress, Akos (Columbus), Shalev, Aner (Jerusalem), Shpectorov, Sergey V. (Bowling Green), Smith, Stephen D. (Chicago), Solomon, Ronald M. (Columbus), Stein, Alexander (Kiel), Stellmacher, Bernd (Kiel), Stroth, Gernot (Halle), Tent, Katrin (Bielefeld), Testerman, Donna M. (Lausanne), Timmesfeld, Franz-Georg (Gießen), Weiss, Richard M. (Medford), Wilson, Robert A. (London)

13.03.-19.03.05 Enveloping Algebras and Geometric Representation Theory

Organizers: Shrawan Kumar, Chapel Hill
                      Peter Littelmann, Wuppertal
                      Wolfgang Soergel, Freiburg

ABSTRACT

The study of Enveloping Algebras has undergone a significant and continuous evolution and moreover has inspired a wide variety of developments in many areas of mathematics including Ring Theory, Differential Operators, Invariant Theory, Quantum Groups and Hecke Algebras. The aim of the workshop was to bring together researchers from diverse but highly interrelated subjects to discuss new developments and bring forward the research in this whole area by fostering the scientific interaction.

PARTICIPANTS

Andersen, Henning Haahr (Aarhus), Baur, Karin (La Jolla), Bernstein, Joseph (Tel Aviv), Braverman, Alexander (Providence), Bravi, Paolo (Padova), Brundan, Jonathan (Eugene), Duflo, Michel (Paris), Fiebig, Peter (Freiburg), Finkelberg, Michael (Moscow), Fourier, Ghislain (Wuppertal), Ginzburg, Victor (Chicago), Greenstein, Jacob (Riverside), Hille, Lutz (Hamburg), Jantzen, Jens Carsten (Aarhus), Joseph, Anthony (Rehovot), Kapovich, Misha (Davis), Khomenko, Oleksandr (Freiburg), Knop, Friedrich (Piscataway), Kostant, Bertram (Cambridge), Kumar, Shrawan (Chapel Hill), Levasseur, Thierry (Brest), Littelmann, Peter (Köln), Maffei, Andrea (Roma), Millson, John (College Park), Mirkovic, Ivan (Amherst), Mokler, Claus (Wuppertal), Opdam, Eric (Amsterdam), Pandzic, Pavle (Zagreb), Papi, Paolo (Roma), Premet, Alexander (Manchester), Reineke, Markus (Münster), Rumynin, Dmitriy (Coventry), Sahi, Siddhartha (New Brunswick), Schiffmann, Olivier (Paris), Schilling, Anne (Davis), Schnürer, Olaf (Freiburg), Serganova, Vera V. (Berkeley), Soergel, Wolfgang (Freiburg), Stroppel, Catharina (Glasgow), Toledano Laredo, Valerio (Paris), Vasserot, Eric (Cergy-Pontoise), Vilonen, Kari (Evanston), Zelevinsky, Andrei V. (Boston)

20.03.-26.03.05 Mathematical Logic: Proof Theory, Type Theory and Constructive Mathematics

Organizers: Samuel R. Buss, La Jolla
                Yiannis N. Moschovakis, Los Angeles
                Helmut Schwichtenberg, München

ABSTRACT

The workshop had several aims: To promote interaction between traditional proof theory and a more structural mathematical proof theory, to further develop constructive mathematics, to explore the relevance of classical mathematics to algorithms, to understand in depth mathematical concepts in connection with algorithms and proofs, to further develop the notion of a certificate, and to understand the connections between the complexity of formal proofs, computational complexity and descriptive complexity.

PARTICIPANTS

Aczel, Peter (Manchester), Aehlig, Klaus (München), Beckmann, Arnold (Swansea), Beklemishev, Lev D. (Moscow), Berger, Ulrich (Swansea), Buchholz, Wilfried (München), Buss, Samuel R. (La Jolla), Cantini, Andrea (Firenze), Cook, Stephen A. (Toronto), Coquand, Thierry (Göteborg), Dowek, Gilles (Palaiseau), Ferreira, Fernando (Lisboa), Gerhardy, Philipp (Darmstadt), Hyland, J.Martin E. (Cambridge), Iemhoff, Rosalie (Wien), Jäger, Gerhard (Bern), Johannsen, Jan (München), Kohlenbach, Ulrich (Darmstadt), Krajicek, Jan (Praha), Leustean, Laurentiu (Darmstadt), Loew, Tobias (Darmstadt), Martin-Loef, Per (Stockholm), Matthes, Ralph (München), Mints, Grigori (Stanford), Moschovakis, Joan Rand (Los Angeles), Moschovakis, Yiannis N. (Los Angeles), Negri, Sara (Helsinki), Oitavem, Isabel (Lisboa), Oliva, Paulo (London), Palmgren, Erik (Uppsala), Pattinson, Dirk (München), Pohlers, Wolfram (Münster), Pollett, Chris (San Jose), Pudlak, Pavel (Praha), Rathjen, Michael (Leeds), Reiher, Christian (München), Sambin, Giovanni (Padova), Schimanski, Stefan (München), Schuster, Peter (München), Schwichtenberg, Helmut (München), Setzer, Anton (Swansea), Soltys, Michael (Hamilton), Strahm, Thomas (Bern), Streicher, Thomas (Darmstadt), Tupailo, Sergei (Columbus), Urban, Christian (München), Uustalu, Tarmo (Tallinn), Visser, Albert (Utrecht), Wainer, Stanley S. (Leeds), Weiermann, Andreas (Utrecht)

27.03.-02.04.05 Free Probability Theory

Organizers: Philippe Biane, Paris
                  Roland Speicher, Kingston
                  Dan Voiculescu, Berkeley

ABSTRACT

Free probability theory is a line of research which parallels aspects of classical probability, in a non-commutative context where tensor products are replaced by free products, and independent random variables are replaced by free random variables. The theory grew out of attempts to solve some longstanding problems about von Neumann algebras of free groups. In the almost twenty years since its creation, free probability has become a subject in its own right, with connections to several other parts of mathematics: operator algebras, the theory of random matrices, classical probability and the theory of large deviations, algebraic combinatorics, topology. Free probability also has connections with applied mathematics (wireless communication) and some mathematical models in theoretical physics.

PARTICIPANTS

Anshelevich, Michael (Riverside), Banica, Teodor (Toulouse), Benaych-Georges, Florent (Paris), Biane, Philippe (Paris), Bouten, Luc (Nijmegen (EU), Bozejko, Marek (Wroclaw), Brown, Nathaniel (University Park), Cabanal-Duvillard, Thierry (Paris), Capitaine, Mireille (Toulouse), Collins, Benoit (Kyoto), Donati-Martin, Catherine (Paris Cedex), Dykema, Ken (Münster), Edelman, Alan (Cambridge), Germain, Emmanuel (Paris), Götze, Friedrich (Bielefeld), Goodman, Frederick (Iowa City), Guionnet, Alice (Lyon), Haagerup, Uffe (Odense M), Hora, Akihito (Okayama), Jez, Artur (Wroclaw), Jorgensen, Palle E.T. (Iowa City), Jung, Kenley (Los Angeles), Koestler, Claus (Kingston), Krystek, Anna (Wroclaw), Ledoux, Michel (Toulouse), Lehner, Franz (Graz), Maassen, Hans (ED Nijmegen), Maida, Mylene (Lyon), Maurel-Segala, Edouard (Lyon), Mingo, James (Kingston), Mitchener, Paul (Göttingen), Norouzizadeh, Behnam (Göttingen), Novak, Jonathan (Kingston), Petz, Denes (Budapest), Pisier, Gilles (Paris), Rao, Raj(Nadakuditi) (Cambridge), Rumpf, Philipp (Göttingen), Schick, Thomas (Göttingen), Schultz, Hanne (Odense), Schulz-Baldes, Hermann (Erlangen), Shlyakhtenko, Dimitri (Los Angeles), Sniady, Piotr (Wroclaw), Speicher, Roland (Kingston, Ontario), Stefan, Marius B. (Los Angeles), Stolz, Michael (Bochum), Szarek, Stanislaw Jerzy (Cleveland), Tauböck, Georg (Wien), Thorbjornsen, Steen (Odense), Ueda, Yoshimichi (Fukuoka), Villani, Cedric (Lyon), Wojakowski, Lukasz (Wroclaw)

10.04.-16.04.05 Discrete Geometry

Organizers: Martin Henk, Magdeburg
Jiri Matousek, Prague
Emo Welzl, Zürich

ABSTRACT

The workshop provided an overview of recent developments in Discrete Geometry. There had been survey talks concerning optimization problems for point configurations and convex polytopes, counting problems, combinatorial solutions of geometric problems and other important subjects of the field. Two special afternoon sessions on geometric transversal theory and on a new release of the geometric software Cinderella.

PARTICIPANTS

Aliev, Iskander (Edinburgh), Ambühl, Christoph (Manno), Asinowski, Andrei (Haifa), Barany, Imre (London), Bezdek, Karoly (Calgary), Böröczky, Jr., Karoly (Budapest), Braß, Peter (New York), Brehm, Ulrich (Dresden), Cabello, Sergio (Ljubljana), Cerny, Jakub (Praha), Cohn, Henry (Redmond), Connelly, Robert (Ithaca), Csorba, Peter (Zürich), Elekes, György (Budapest), Felsner, Stefan (Berlin), Füredi, Zoltan (Urbana), Fukuda, Komei (Zürich), Goodman, Jacob E. (New York), Gritzmann, Peter (Garching bei München), Henk, Martin (Magdeburg), Holmsen, Andreas (New York), Jelinek, Vit (Praha), Joswig, Michael (Darmstadt), Karolyi, Gyula (Budapest), Katchalski, Meir (Haifa), Kozlov, Dmitry N. (Zürich), Larman, David G. (London), De Loera, Jesus A. (Davis), Matousek, Jiri (Praha), McAllister, Tyrrell (Davis), McMullen, Peter (London), Nevo, Eran (Jerusalem), Pach, Janos (New York), Pfeifle, Julian (Barcelona), Pinchasi, Rom (Cambridge), Pollack, Richard M. (New York), Por, Attila (Cleveland), Richter-Gebert, Jürgen (Garching), Rote, Günter (Berlin), Schröder, Thilo (Berlin), Schürmann, Achill (Magdeburg), Sharir, Micha (Tel Aviv), Solymosi, Jozsef (Vancouver), Streinu, Ileana (Northampton), Szekely, Laszlo A. (Columbia), Toth, Csaba David (Santa Barbara), Valtr, Pavel (Praha), Visy, Balazs (Bonn), Wagner, Uli (Zürich), Welzl, Emo (Zürich), Witte, Nikolaus (Berlin), Ziegler, Günter M. (Berlin), Zong, Chuanming (Beijing)

17.04.-23.04.05 Optimal Control of Coupled Systems of PDE

Organizers: Karl Kunisch, Graz
                     Günter Leugering, Darmstadt
                     Jürgen Sprekels, Berlin
                     Fredi Tröltzsch, Berlin

ABSTRACT

Current research in the control of PDE is driven by a multitude of applications in engineering and science that are modelled by coupled systems of nonlinear differential equations. Associated optimal control problems need efficient numerical methods to deal with the resulting very large problems. There is a fast development of numerical methods and the associated analysis must keep track to justify them and to prepare the basis for further research. It has been the main intention of this Conference to tighten the links between applications, numerics and analysis with some emphasis on the analytic aspects. The program of the workshop covered various topics such as controllability, feedback control, optimality conditions, analysis and control of Navier-Stokes equations, model reduction of large systems, optimal shape design, and applications in crystal growth, chemical reactions and aviation.

PARTICIPANTS

Bergounioux, Maitine (Orleans), Bociu, Lorena V. (Charlottesville), De los Reyes, Juan Carlos (Berlin), Delfour, Michel (Montreal), Eller, Matthias (Washington), Gauger, Nicolas R. (Braunschweig), Griesse, Roland (Linz), Gugat, Martin (Erlangen), Hackbusch, Wolfgang (Leipzig), Hafizoglu, Cavit (Charlottesville), Heinkenschloss, Matthias (Houston), Heuveline, Vincent (Karlsruhe), Hintermüller, Michael (Graz), Hinze, Michael (Hamburg), Hömberg, Dietmar (Berlin), Hoppe, Ronald H.W. (Augsburg), Horn, Mary Ann (Nashville), Ito, Kazufumi (Raleigh), Kaltenbacher, Barbara (Erlangen), Kunisch, Karl (Graz), Lasiecka, Irena (Charlottesville), Leibfritz, Friedemann (Trier), Leugering, Günter (Erlangen), Maurer, Helmut (Münster), Meyer, Christian (Berlin), Prüfert, Uwe (Berlin), Puel, Jean Pierre (Versailles), Rannacher, Rolf (Heidelberg), Raymond, Jean-Pierre (Toulouse), Rösch, Arnd (Linz), Sachs, Ekkehard (Trier), Schulz, Volker (Trier), Sokolowski, Jan (Vandoeuvre-les-Nancy), Sprekels, Jürgen (Berlin), Stadler, Georg (Graz), Stingl, Michael (Erlangen), Stykel, Tatjana (Berlin), Theißen, Karsten (Münster), Toivanen, Jari Antero (Raleigh), Toundykov, Daniel Y. (Charlottesville), Tröltzsch, Fredi (Berlin), Tucsnak, Marius (Vandoeuvre les Nancy), Tuffaha, Amjad (Charlottesville), Turinici, Gabriel (Paris), Ulbrich, Michael (Hamburg), Ulbrich, Stefan (Darmstadt), Vexler, Boris (Linz), Wachsmuth, Daniel (Berlin), Zolesio, Jean-Paul (Sophia Antipolis)

WORKSHOP 0517

24.04.-30.04.05 Kommutative Algebra
Organizers: Winfried Bruns, Osnabrück
Hubert Flenner, Bochum
Craig Huneke, Lawrence

ABSTRACT
The lectures of the conference had been devoted to new results in the following areas: characteristic p-methods, that have had a extremely strong influence on the development of commutative algebra; combinatorial commutative algebra and effective methods, that led to spectacular applications two decades ago and is now a very active subfield of commutative algera; homological methods and invariants, where in the last decade considerable progress has been made through the use of differential graded algebras, derived categories and the duality between the polynomial ring and the exterior algebra; multiplier ideals, that have led to surprising results in ideal theory. The participants also included a significant group of researchers from affine geometry

PARTICIPANTS
Abhyankar, Shreeram S. (West Lafayette), Asanuma, Teruo (Toyama-shi), Avramov, Luchezar (Lincoln), Blickle, Manuel (Essen), Brenner, Holger (Sheffield), Bruns, Winfried (Osnabrück), Buchweitz, Ragnar-Olaf (Toronto), Caviglia, Giulio (Berkeley), Chardin, Marc (Paris), Conca, Aldo (Genova), Crachiola, Anthony J. (New Orleans), Cutkosky, Stephen Dale (Columbia), Ein, Lawrence (Chicago), Eisenbud, David (Berkeley), Enescu, Florian (Atlanta), Flenner, Hubert (Bochum), Freudenburg, Gene (Kalamazoo), Goto, Shiro (Kawasaki-shi), Gubeladze, Joseph (San Francisco), Gurjar, Rajendra V. (Mumbai), Hartshorne, Robin (Berkeley), Hashimoto, Mitsuyasu (Nagoya), Heitmann, Raymond C. (Austin), Herzog, Jürgen (Essen), Huneke, Craig (Lawrence), Hyry, Eero (Helsinki Yliopisto), Iyengar, Srikanth B. (Lincoln (NSF), Kaliman, Shulim (Coral Gables), Katzman, Mordechai (Sheffield), Kawasaki, Takesi (Tokyo), Kunz, Ernst (Regensburg), Kurano, Kazuhiko (Kawasaki), Leuschke, Graham (Syracuse), Makar-Limanov, Leonid (Detroit), Miller, Claudia (Syracuse), Miyanishi, Masayoshi (Sanda), Nagel, Uwe (Lexington), Popescu, Dorin Mihail (Bucharest), Römer, Tim (Osnabrück), Sather-Wagstaff, Sean (Urbana), Schenzel, Peter (Halle), Schröer, Stefan (Düsseldorf), Sega, Liana M. (East Lansing), Singh, Anurag (Salt Lake City), Storch, Uwe (Bochum), Stückrad, Jürgen (Leipzig), Sturmfels, Bernd (Berkeley), Swanson, Irena (Las Cruces), Takagi, Shunsuke (Fukuoka), Trung, Ngo-Viet (Hanoi), Ulrich, Bernd (West Lafayette), Zaidenberg, Mikhail (Saint-Martin-d'Heres)

08.05.-14.05.05 Stochastic Analysis and Non-Classical Processes

Organizers: Jean-Dominique Deuschel, Berlin

Wendelin Werner, Paris

Ofer Zeitouni, Minneapolis

ABSTRACT

The workshop focused on recent developments in the theory of stochastic processes and flows, with special emphasis on emerging new classes of processes, as well as new objects whose limits are expected to coincide with such processes. A prominent role was played by the SLE family of processes, motion in random media, non-classical noises and flows, and random planar maps.

PARTICIPANTS

Aldous, David (Berkeley), Angel, Omer (Vancouver), Barlow, Martin T. (Vancouver), Bauer, Robert (Urbana), Ben Arous, Gerard (New York), Bolthausen, Erwin (Zürich), Bougerol, Philippe (Paris), Boutillier, Cedric (Amsterdam), Castell, Fabienne (Marseille), Chassaing, Philippe (Vandoeuvre les Nancy), Chen, Dayue (Beijing), Deuschel, Jean Dominique (Berlin), Dubedat, Julien (New York), Eichelsbacher, Peter (Bochum), Funaki, Tadahisa (Tokyo), Gärtner, Jürgen (Berlin), Gantert, Nina (Münster), Goergen, Laurent (Zürich), Götze, Friedrich (Bielefeld), Hammond, Alan Michael (Berkeley), Hu, Yueyun (Villetaneuse), Klenke, Achim (Mainz), König, Wolfgang (Leipzig), Kozma, Gady (Princeton), Lawler, Gregory F. (Ithaca), Ledoux, Michel (Toulouse), Le Gall, Jean-Francois (Paris), Le Jan, Yves (Orsay), Limic, Vlada (Vancouver), Litterer, Christian (Oxford), Lyons, Terence J. (Oxford), Marckert, Jean-Francois (Versailles), Mathieu, Pierre (Marseille), Mattingly, Jonathan C. (Durham), Meleard, Sylvie (Palaiseau), Merkl, Franz (München), Miermont, Gregory (Orsay), Mörters, Peter (Bath), O'Connell, Neil (Cork), Owhadi, Houman (Marseille), Pete, Gabor (Berkeley), Schmitz, Tom (Zürich), Sznitman, Alain-Sol (Zürich), Toth, Balint (Budapest), Trujillo Ferreras, Jose A. (Ithaca), Tsirelson, Boris (Tel Aviv), Warren, Jonathan (Coventry), Weill, Mathilde (Paris), Werner, Wendelin (Orsay), Winkel, Matthias (Oxford), Zeitouni, Ofer (Minneapolis), Zerner, Martin (Tübingen)

22.05.-28.05.05 Schnelle Löser für partielle Differentialgleichungen

Organizers: Randolph E. Bank, La Jolla
Wolfgang Hackbusch, Leipzig
Gabriel Wittum, Heidelberg

ABSTRACT

The field of solvers for the algebraic systems arising from the discretization of partial differential equations has developed to a major area of numerical mathematics and scientific computing. Solvers are an essential part of simulation codes for problems from science and technology, in many cases determining the complexity of the whole simulation. Major areas of solvers represented at the workshop are: Multigrid methods, H-matrices, domain decomposition methods, and conjugate gradient methods. Besides that, several talks were given on other aspects of solving partial differential equations, such as discretization schemes and the algebraic properties of the resulting stiffness matrices, overall solution strategies, and application areas where solving plays a crucial rôle.

PARTICIPANTS

Bank, Randolph E. (La Jolla), Börm, Steffen (Leipzig), Braess, Dietrich (Bochum), Bramble, James H. (College Station), Brenner, Susanne C. (Columbia), Dahmen, Wolfgang (Aachen), Deuflhard, Peter (Berlin), Dryja, Maksymilian (Warszawa), Eberhard, Jens P. (College Station), Falgout, Robert D. (Livermore), van Gijzen, Martin (Delft), Gordner, Achim (Heidelberg), Grasedyck, Lars (Leipzig), Haase, Gundolf (Graz), Hackbusch, Wolfgang (Leipzig), Hiptmair, Ralf (Zürich), Holst, Michael (La Jolla), Hoppe, Ronald H.W. (Augsburg), Jimack, Peter (Leeds), Johannsen, Klaus (Austin), Khoromskij, Boris N. (Leipzig), Kunoth, Angela (Bonn), Langer, Ulrich (Linz), Lemke, Babett (Heidelberg), Meyer, Arnd (Chemnitz), Mittelmann, Hans D. (Tempe), Mo, Zeyao (Beijing), Nägel, Arne (Heidelberg), Neuss, Nicolas (Heidelberg), Ovall, Jeffrey (Leipzig), Reisinger, Christoph (Oxford), Reusken, Arnold (Aachen), Russell, Thomas F. (Arlington), Sauter, Stefan A. (Zürich), Schulz, Volker (Trier), Schweitzer, Marc Alexander (Bonn), Stevenson, Rob (Utrecht), Stüben, Klaus (Sankt Augustin), Wan, Justin W.L. (Waterloo), Wheeler, Mary Fanett (Austin), Widlund, Olof B. (New York), Wieners, Christian (Karlsruhe), Wittum, Gabriel (Heidelberg), Xu, Jinchao (University Park), Yserentant, Harry (Berlin), Zenger, Christoph (Garching)

29.05.-04.06.05 Nonlinear Evolution Problems

Organizers: Klaus Ecker, Berlin
               Jalal Shatah, New York
               Michael Struwe, Zürich

ABSTRACT

Subject of this workshop were three types of nonlinear evolution problems — geometric evolution equations (essentially of parabolic type), nonlinear hyperbolic equations, and dispersive equations. In the first group of equations, in particular the Ricci flow and conformal flows such as the Yamabe flow and the Q-curvature flow were considered. The class of hyperbolic equations was represented by wave maps, Einstein's equations of gravitation and nonlinear wave equations in waveguides and cones. Among the dispersive equations the nonlinear Schroedinger equation and the KdV equation were considered.

PARTICIPANTS

Ambrosio, Luigi (Pisa), Andersson, Lars (Golm), Brendle, Simon (Princeton), Bressan, Alberto (University Park), Buckland, John (Canberra), Capogna, Luca (Fayetteville), Clutterbuck, Julie (Berlin), Cuccagna, Scipio (Reggio Emilia), D'Ancona, Piero (Roma), Dafermos, Mihalis (Cambridge), Daskalopoulos, Panagiota (New York), Ecker, Klaus (Berlin), Escher, Joachim (Hannover), Feldman, Mikhail (Madison), Georgiev, Vladimir S. (Pisa), Grueneberg, Michel (Golm), Huisken, Gerhard (Golm), Isenberg, James (Eugene), Keel, Markus (Minneapolis), Krieger, Joachim (Cambridge), Kuwert, Ernst (Freiburg), Lenzmann, Ralf-Enno (Zürich), List, Bernhard (Golm), Malchiodi, Andrea (Trieste), McCoy, James (Wollongong), Merle, Frank (Cergy-Pontoise), Metzger, Jan (Golm), Moser, Roger (New York), Müller, Reto (Zürich), Nahmod, Andrea R. (Amherst), Planchon, Fabrice (Villetaneuse), Racke, Reinhard (Konstanz), Rendall, Alan (Golm), Ringström, Hans (Stockholm), Rodnianski, Igor (Princeton), Schätzle, Reiner (Tübingen), Schnürer, Oliver C. (Berlin), Schulze, Felix (Berlin), Schwetlick, Hartmut (Bath), Sesum, Natasa (Cambridge), Shatah, Jalal (New York), Simon, Miles (Freiburg), Soner, H. Mete (Istanbul), Struwe, Michael (Zürich), Wu, Sijue (Ann Arbor)

05.06.-11.06.05 Complexity Theory

Organizers: Joachim von zur Gathen, Paderborn
Oded Goldreich, Rehovot
Claus Schnorr, Frankfurt
Madhu Sudan, MIT Cambridge

ABSTRACT

Computational Complexity is a central field of Computer Science and is concerned with the study of the *intrinsic complexity* of computational tasks. The workshop has focused on several sub-areas of complexity theory, such as the complexity of Undirected Connectivity, the PCP Theorem, Cryptography, the complexity of Matrix Multiplication, and Holographic Reductions.

PARTICIPANTS

Aaronson, Scott (Princeton), Akavia, Adi (Cambridge), Arora, Sanjeev (Princeton), Barak, Boaz (Princeton), Beame, Paul (Seattle), Ben-Sasson, Eli (Chicago), Bläser, Markus (Saarbrücken), Blömer, Johannes (Paderborn), Bürgisser, Peter (Paderborn), Buss, Samuel R. (La Jolla), Chuzhoy, Julia (Cambridge), Dinur, Irit (Jerusalem), Dvir, Zeev (Rehovot), Gabizon, Ariel (Rehovot), von zur Gathen, Joachim (Bonn), Goldreich, Oded (Rehovot), Goldwasser, Shafi (Cambridge), Guruswami, Venkatesan (Seattle), Hastad, Johan (Stockholm), Heintz, Joos (Santander), Ishai, Yuval (Haifa), Kabanets, Valentine (Burnaby), Kaltofen, Erich (Raleigh), Koy, Henrik (Frankfurt), Krause, Matthias (Mannheim), Kushilevitz, Eyal (Haifa), Lotz, Martin (Hong Kong), Meyer auf der Heide, Friedhelm (Paderborn), Naor, Moni (Rehovot), Patrascu, Mihai (Cambridge), Pudlak, Pavel (Praha), Raz, Ran (Rehovot), Regev, Oded (Tel Aviv), Reingold, Omer (Rehovot), Reischuk, Rüdiger (Lübeck), Rothblum, Guy (Rehovot), Safra, Shmuel (Ramat-Aviv), Schnorr, Claus-Peter (Frankfurt), Schöning, Uwe (Ulm), Shaltiel, Ronen (Haifa), Shpilka, Amir (Rehovot), Sohler, Christian (Paderborn), Sudan, Madhu (Cambridge), Ta-Shma, Amnon (Tel Aviv), Tauman Kalai, Yael (Chicago), Umans, Chris (Pasadena), Valiant, Leslie G. (Cambridge), Wigderson, Avi (Princeton), Yao, Andrew C.-C. (Bejing), Yekhanin, Sergey M. (Cambridge), Zuckerman, David (Austin)

12.06.-18.06.05 Geometric Topology and Connections with Quantum Field Theory

Organizers: Peter Teichner, La Jolla
Stephan Stolz, Notre Dame

ABSTRACT

In recent years, the interplay between traditional geometric topology and theoretical physics, in particular quantum field theory, has played a significant role in the work of many researchers. The idea of this workshop was to bring these people together so that the fields will be able to grow together in the future. Most of the talks in the workshop were related to Elliptic Cohomology, Differential K-Theory, or Topological Quantum Field Theory.

PARTICIPANTS

Ando, Matthew (Urbana), Aschieri, Paolo (Alessandria), Baas, Nils A. (Trondheim), Bär, Christian (Potsdam), Bar-Natan, Dror (Toronto), Bartels, Arthur (Münster), von Bodecker, Hanno (Bochum), Bödigheimer, Carl-Friedrich (Bonn), Bunke, Ulrich (Göttingen), Caprace, Pierre-Emmanuel (Bruxelles), Cheung, Pokman (Stanford), Cohen, Ralph (Stanford), Dessai, Anand N. (Münster), Douglas, Christopher (Stanford), Ebert, Johannes (Bonn), Freed, Daniel S. (Austin), Garoufalidis, Stavros (Atlanta), Giansiracusa, Jeffrey H. (Oxford), Godin, Veronique (Princeton), Gorbounov, Vassily (Lexington), Gukov, Sergei (Cambridge), Henriques, Andre (Münster), Hill, Mike (Cambridge), Himpel, Benjamin (Bonn), Hohnhold, Henning (Berkeley), Hopkins, Mike J. (Cambridge), Hu, Po (Detroit), Jacobsson, Magnus (Roma), Joachim, Michael (Münster), Jurco, Branislav (München), Kirk, Paul A. (Bloomington), Kitchloo, Nitya (Baltimore), Kreck, Matthias (Heidelberg), Kriz, Igor (Ann Arbor), Lesch, Matthias (Bonn), Lescop, Christine (Saint-Martin-d'Heres), Le, Thang (Atlanta), Lück, Wolfgang (Münster), Lurie, Jacob (Cambridge), Markert, Elke (Bonn), Moore, Gregory W. (Piscataway), Posthuma, Hessel (Nijmegen), Pries, Christopher (Berkeley), Redden, Corbett (Notre Dame), Rezk, Charles (Urbana), Roberts, Justin (La Jolla), Rognes, John (Oslo), Schick, Thomas (Göttingen), Segal, Graeme (Oxford), Stolz, Stephan (Notre Dame), Strickland, Neil P. (Sheffield), Teichner, Peter (Berkeley), Thurston, Dylan (Cambridge), Wassermann, Antony (Marseille), Wurzbacher, Tilmann (Metz)

Workshop 0525

19.06.-25.06.05 Algebraische Zahlentheorie
Organizers: Christopher Deninger, Münster
       Peter Schneider, Münster
       Anthony J. Scholl, Durham

ABSTRACT
The aim of the workshop was to give an overview of recent developments in Algebraic Number Theory and Arithmetic Algebraic Geometry. Some of the topics were number fields with a given ramification, non-commutative Iwasa theory, p-adic modular forms, p-adic differential equations, the Tate-Shafarevich group, arithmetic cohomology and duality, and Shimura varieties.

PARTICIPANTS
Berger, Laurent (Bures-Sur-Yvette), Besser, Amnon (Beer-Sheva), Böckle, Gebhard (Essen), Braun, Sebastian (Heidelberg), Chenevier, Gaetan (Paris), Chinburg, Ted C. (Philadelphia), Coates, John H. (Cambridge), Deninger, Christopher (Münster), Dimitrov, Mladen (Pasadena), Fontaine, Jean-Marc (Orsay), Gealy, Matthew (Pasadena), Geisser, Thomas (Los Angeles), Große Klönne, Elmar (Münster), Hartl, Urs (Freiburg), Herz, Gabriel (Münster), Ito, Tetsushi (Kyoto), Jannsen, Uwe (Regensburg), Kasten, Hendrik (Karlsruhe), Kedlaya, Kiran S. (Cambridge), Kim, Minhyong (Tucson), Kings, Guido (Regensburg), Kisin, Mark (Chicago), Künnemann, Klaus (Regensburg), Langer, Andreas (Exeter), Ludsteck, Thomas (Stuttgart), Naumann, Niko (Regensburg), Navilarekallu, Tejaswi (Pasadena), Nekovar, Jan (Paris), Orlik, Sascha (Leipzig), Papikian, Mirhan (Bures-sur-Yvette), Paskunas, Vytautas (Bielefeld), Ramakrishna, Ravi (Ithaca), Rapoport, Michael (Bonn), Saito, T. (Tokyo), Schmidt, Alexander (Regensburg), Schmidt, Claus-Günther (Karlsruhe), Schmithüsen, Gabriela (Karlsruhe), Schneider, Peter (Münster), Scholl, Anthony J. (Cambridge), de Shalit, Ehud (Jerusalem), Spieß, Michael (Bielefeld), Stevens, Glenn (Boston), Strauch, Matthias (Münster), Sujatha, Ramadorai (Mumbai), Taylor, Martin J. (Manchester), Teitelbaum, Jeremy (Chicago), Vogel, Denis (Regensburg), Werner, Annette (Stuttgart), Wingberg, Kay (Heidelberg), Yoshida, Teruyoshi (Cambridge), Zerbes, Sarah (Cambridge), Zink, Ernst-Wilhelm (Berlin)

26.06.-02.07.05 Topological and Variational Methods for Differential Equations

Organizers: Thomas Bartsch, Giessen
                    E. Norman Dancer, Sydney

ABSTRACT

Topological and variational methods have been at the core of nonlinear analysis for a long time and are still experiencing major new developments. They have had enormous new applications in the study of boundary value problems for nonlinear differential equations, in analyzing complicated (possibly infinite-dimensional) dynamics, phase transition and pattern formation, to name a few. The workshop was mainly dedicated to variational methods for nonlinear elliptic and parabolic differential equations and systems with a special emphasis on Morse theory and Lusternik-Schnirelmann theory, nonlinear Schrödinger equations, singularly perturbed equations and their stable solutions, multi-peak type solutions (both positive and sign-changing), symmetry and nodal properties of solutions to elliptic boundary value problems, and long-time dynamics for semilinear parabolic equations.

PARTICIPANTS

Ackermann, Nils (Gießen), Ambrosetti, Antonio (Trieste), Bahri, Abbas (New Brunswick), Bartsch, Thomas (Gießen), Barutello, Vivina (Milano), Buffoni, Boris (Lausanne), Byeon, Jaeyoung (Pohang), Catrina, Florin (Worcester), Clapp, Monica (Mexico), Coti-Zelati, Vittorio (Napoli), Dancer, E. Norman (Sydney), Degiovanni, Marco (Brescia), Du, Yihong (Armidale NSW), Felmer, Patricio L. (Santiago), Fiedler, Bernold (Berlin), Ghoussoub, Nassif (Vancouver), Grossi, Massimo (Roma), Grunau, Hans-Christoph (Magdeburg), Kunze, Markus (Essen), Lauterbach, Reiner (Hamburg), Lin, Chang Shou (Chia Yi), Liu, Zhaoli (Beijing), Lou, Yuan (Columbus), Majer, Pietro (Pisa), Malchiodi, Andrea (Trieste), Pacella, Filomena (Roma), Passaseo, Donato (Lecce), Peng, Shuangjie (Giessen), Perera, Kanishka (Melbourne), Quittner, Pavol (Bratislava), Rabinowitz, Paul H. (Madison), Reichel, Wolfgang (Zürich), Rybakowski, Krzysztof (Rostock), Sandstede, Björn (Guildford), van Schaftingen, Jean (Louvain-La-Neuve), Sweers, Guido H. (Delft), Szulkin, Andrzej (Stockholm), Tanaka, Kazunaga (Tokyo), Terracini, Susanna (Milano), Vandervorst, Robert (Amsterdam), Wang, Guofang (Leipzig), Wang, Zhi-Qiang (Logan), Wei, Juncheng (Shatin), Weth, Tobias (Gießen), Willem, Michel (Louvain-la-Neuve), Winter, Matthias (Stuttgart), Wulff, Claudia (Guildford), Yan, Shusen (Armidale NSW), Zhang, Zhitao (Giessen)

03.07.-09.07.05 Real Analysis, Harmonic Analysis and Applications to PDE

Organizers: Detlef Müller, Kiel
              Elias M. Stein, Princeton

ABSTRACT
There have been important developments in the last few years in the point-of-view and methods of harmonic analysis, and at the same time significant concurrent progress in the application of these to partial differential equations and related subjects.Major areas and results represented at the workshop are: Multilinear analysis; geometry of sets in $\mathbb{R}^d$; singular integrals; oscillatory integrals, Fourier integral operators and maximal operators; dispersive linear and non-linear equations; Schrödinger operators with rough potentials.

PARTICIPANTS
Arendt, Wolfgang (Ulm), Bak, Jong-Guk (Pohang), Bejenaru, Ioan (Los Angeles), Carbery, Anthony (Edinburgh), Colliander, James E. (Toronto), Cowling, Michael (Sydney), Diening, Lars (Freiburg), Farwig, Reinhard (Darmstadt), Grafakos, Loukas (Columbia), Hebisch, Waldemar (Wroclaw), Herr, Sebastian (Dortmund), Hulanicki, Andrzej (Wroclaw), Ikromov, Isroil (Samarkand), Ionescu, Alexandru D. (Madison), Iosevich, Alexander (Columbia), Kempe, Michael (Kiel), Kenig, Carlos E. (Chicago), Koch, Herbert (Dortmund), Kolountzakis, Mihalis (Iraklion), Kunstmann, Peer Christian (Karlsruhe), Lacey, Michael T. (Atlanta), Lanzani, Loredana (Fayetteville), Lee, Sanghyuk (Madison), Mauceri, Giancarlo (Genova), McIntosh, Alan G.R. (Canberra), Meyer, Ralf (Kiel), Müller, Detlef (Kiel), Muscalu, Camil (Ithaca), Nagel, Alexander (Madison), Olevskii, Alexander (Ramat Aviv), Petermichl, Stefanie (Austin), Phong, Duong H. (New York), Poguntke, Detlev (Bielefeld), Pramanik, Malabika (Pasadena), Roudenko, Svetlana A. (Durham), Sikora, Adam (ACT), Sjögren, Peter (Göteborg), Smith, Hart (Seattle), Sogge, Christopher D. (Baltimore), Soria, Fernando (Madrid), Stein, Elias M. (Princeton), Tataru, Daniel (Berkeley), Thiele, Christoph (Los Angeles), Torres, Rodolfo H. (Lawrence), Trebels, Walter (Darmstadt), Vargas, Ana (Madrid), Vega, Luis (Bilbao), Wainger, Stephen (Madison), Weis, Lutz (Karlsruhe), Ziesler, Sarah N. (River Forest)

10.07.-16.07.05 Dynamical Systems

Organizers: Helmut W. Hofer, New York
                   Jean-Christophe Yoccoz, Paris
                   Eduard Zehnder, Zürich

ABSTRACT

The main themes of the workshop were the new results and developments in the area of classical dynamical systems, in particular in celestial mechanics and Hamiltonian systems. Among the main topics were new global results on the Reeb dynamics on 3-manifolds, KAM theory in finite and infinite dimensions, as well as new developments in Floer homology and its applications.

High points were the first complete existence proof of quasiperiodic solutions in the planetarian *N*-body problem, and the solution of a long-standing conjecture of Anosov about the number of closed geodesics on Finsler 2-spheres.

PARTICIPANTS

Abbas, Casim (East Lansing), Abbondandolo, Alberto (Pisa), Albers, Peter (Leipzig), Angenent, Sigurd B. (Madison), Bangert, Victor (Freiburg), Bolotin, Sergey (Moscow), Celli, Martin (Paris), Chaperon, Marc (Paris), Chenciner, Alain (Paris), Cheng, Chong-Qing (Nanjing), Colin de Verdiere, Mathilde (Dijon), Craig, Walter (Hamilton), Eliasson, Hakan (Paris), Fathi, Albert (Lyon), Fejoz, Jaques (Paris), Forni, Giovanni (Evanston), Ginzburg, Victor (Chicago), Gürel, Basak (Stony Brook), Hasselblatt, Boris (Medford), Hofer, Helmut W. (New York), Katok, Anatole B. (University Park), Katok, Svetlana (University Park), Kerman, Ely (Urbana), Knauf, Andreas (Erlangen), Knieper, Gerhard (Bochum), Kuperberg, Krystyna (Auburn), Latschev, Janko (Berlin), Levi, Mark (University Park), Lin, Kevin K. (New York), Lisi, Samuel (New York), de la Llave, Rafael (Austin), Long, Yiming (Tianjin), Macarini, Leonardo (Rio de Janeiro), Madero, Breno (New York), Mather, John N. (Princeton), Ostrover, Yaron (Tel Aviv), Perez-Marco, Ricardo (Villetaneuse), Pöschel, Jürgen (Stuttgart), Rabinowitz, Paul H. (Madison), Sauzin, David (Paris), Schlenk, Felix (Bruxelles), Schwarz, Matthias (Leipzig), Siburg, Karl Friedrich (Dortmund), Siefring, Richard (New York), Tabachnikov, Serge (University Park), Wayne, Clarence Eugene (Boston), Weber, Joa (München), Wendl, Chris (Cambridge), Wysocki, Krzysztof (University Park), Yoccoz, Jean-Christophe (Paris), Young, Lai-Sang (New York), Zehnder, Eduard (Zürich)

17.07.-23.07.05 Explicit Methods in Number Theory
Organizers: Henri Cohen, Talence
                     Hendrik W. Lenstra, Jr, Leiden
                     Don B. Zagier, Bonn

ABSTRACT
The topics of this workshop comprised modular forms and the computation of their co-efficients, q-expansions, and Arakelov geometry; rational and integral points on curves and higher-dimensional varieties; integer factorization; counting points on varieties over finite fields; class groups of quadratic and cubic fields and their relationship to geometry, analysis, and arithmetic.

PARTICIPANTS
Belabas, Karim (Talence), Bennett, Michael (Vancouver), Bernstein, Daniel J. (Chicago), Bhargava, Manjul (Princeton), Bosma, Wieb (Nijmegen), Bosman, Johan (Leiden), Bright, Martin (Liverpool), Bröker, Reinier (Leiden), Byeon, Dongho (Seoul), Calegari, Frank (Cambridge), Carls, Robert (Leiden), Cohen, Henri (Talence), Couveignes, Jean-Marc (Toulouse), Cremona, John E. (Nottingham), de Jong, Robin (Leiden), Delaunay, Christophe (Villeurbanne), Dokchitser, Tim (Cambridge), Edixhoven, Bas (Leiden), Flynn, Eugene Victor (Liverpool), Frey, Gerhard (Essen), Gangl, Herbert (Bonn), Gunnells, Paul E. (Amherst), van Hoeij, Mark (Tallahassee), Jansen, Bas (Leiden), Kayal, Neeraj (Kanpur), Kedlaya, Kiran S. (Cambridge), Kleinjung, Thorsten (Bonn), Klüners, Jürgen (Kassel), Kohel, David R. (Sydney), Lauder, Alan G. B. (Oxford), Lenstra, Hendrik W. (Leiden), van Luijk, Ronald (Berkeley), Mestre, Jean-Francois (Paris), Pohst, Michael E. (Berlin), Poonen, Bjorn (Berkeley), Raulf, Nicole (Bonn), Roblot, Xavier-Francois (Villeurbanne), Rodriguez Villegas, Fernando (Austin), Schoof, Rene (Roma), Siksek, Samir (Coventry), de Smit, Bart (Leiden), Stark, Harold M. (La Jolla), Stein, William A. (Seattle), Stevenhagen, Peter (Leiden), Stoll, Michael (Bremen), Top, Jaap (Groningen), Voight, John (Berkeley), Vollmer, Ulrich (Darmstadt), Watkins, Mark J. (Bristol), Wiese, Gabor (Leiden), Zagier, Don B. (Bonn)

24.07.-30.07.05 Partielle Differentialgleichungen

Organizers: Tom Ilmanen, Zürich
               Reiner Schätzle, Bonn
               Neil Trudinger, Canberra

ABSTRACT

The workshop dealt with partial differential equations in geometry and technical applications. The main topics were the combination of nonlinear partial differential equations and geometric measure theory, conformal invariance and the Willmore functional, and regularity of free boundaries. New results combining partial differential equations and geometric problems were presented in the area of minimal surfaces, free boundaries and singular limits, for example the construction of branched minimal surfaces, the regularity of free boundaries in the wake of the monotonicity formula of Weiss and a proof of a conjecture of De Giorgi.

PARTICIPANTS

Alberti, Giovanni (Pisa), Angelsberg, Gilles (Zürich), Apushkinskaya, Darya (Saarbrücken), Chang, Sun-Yung Alice (Princeton), De Lellis, Camillo (Zürich), Duzaar, Frank (Erlangen), Ecker, Klaus (Berlin), Feldman, Mikhail (Madison), Frehse, Jens (Bonn), Grueneberg, Michel (Golm), Gursky, Matthew John (Notre Dame), Hong, Min-Chun (Brisbane), Huisken, Gerhard (Golm), Jäger, Willi (Heidelberg), Jerrard, Robert L. (Toronto), Kirchheim, Bernd (Oxford), Kuo, Hung-Ju (Taichung), Kuwert, Ernst (Freiburg), Labutin, Denis A. (Santa Barbara), Lamm, Tobias (Zürich), Magnani, Valentino (Pisa), Malchiodi, Andrea (Trieste), Martin, Gaven J. (Auckland), Menne, Ulrich (Tübingen), Mingione, Giuseppe R. (Parma), Montanari, Annamaria (Bologna), Müller, Stefan (Leipzig), Ould Ahmedou, Mohameden (Tübingen), Röger, Matthias (Eindhoven), Schätzle, Reiner (Tübingen), Schnürer, Oliver C. (Berlin), Schulz, Friedmar (Ulm), Simon, Leon M. (Stanford), Simon, Miles (Freiburg), Sinestrari, Carlo (Roma), Smoczyk, Knut (Hannover), Steffen, Klaus (Düsseldorf), Stroffolini, Bianca (Napoli), Struwe, Michael (Zürich), Tonegawa, Yoshihiro (Sapporo), Toro, Tatiana (Seattle), Trudinger, Neil S. (Canberra), Urbas, John (Canberra), Wang, Guofang (Leipzig), Wickramasekera, Neshan (La Jolla), Yang, Paul C. (Princeton)

31.07.-06.08.05 Dynamical System Methods in Fluid Dynamics

Organizers: Jerrold E. Marsden, Pasadena
                Jürgen Scheurle, München

ABSTRACT

The workshop was organized around the infusion of new techniques from dynamical systems, geometric methods, multiscale analysis, scientific computation, and control theory into traditional methods in fluid mechanics. The specific subjects had been: Dynamical Systems, Geometric, Analytical, and PDE Methods; Mixing in Geophysical Flows; Control; Computational Methods; Interface Problems; Symmetry Methods; Averaged Euler and Navier Stokes Equations; Vortex Dynamics.

PARTICIPANTS

Audusse, Emmanuel (Berlin), Bauer, Christian (Garching), Beyn, Wolf-Jürgen (Bielefeld), Borisov, Alexey V. (Izhevsk), Cotter, Colin (London), Dellnitz, Michael (Paderborn), Fetecau, Razvan (Stanford), Fiedler, Bernold (Berlin), Friedlander, Susan (Chicago), Gay-Balmaz, Francois (Lausanne), Gottwald, Georg A. (Sydney), Haller, George (Cambridge), John, Thomas (Santa Barbara), Junge, Oliver (Paderborn), Kanso, Eva (Pasadena), Kilic, Mustafa Sabri (Cambridge), Kilin, Alexander (Izhevsk), Klein, Rupert (Potsdam), Lekien, Francois (Princeton), Lermusiaux, Pierre F. J. (Cambridge), Liebscher, Stefan (Berlin), Mamaev, Ivan S. (Izhevsk), Marsden, Jerrold E. (Pasadena), Melli-Huber, Juan (Princeton), Mohseni, Kamran (Boulder), Newton, Paul (Los Angeles), Oliver, Marcel (Bremen), Padberg, Kathrin (Paderborn), Ratiu, Tudor S. (Lausanne), Reich, Sebastian (Potsdam), Ross, Shane (Los Angeles), Rottmann-Matthes, Jens (Bielefeld), Rowley, Clarence (Princeton), Scheurle, Jürgen (Garching), Shadden, Shawn (Pasadena), Shashikanth, Banavara (Las Cruces), Shvydkoy, Roman (Chicago), Siegmund, Stefan (Frankfurt), Staley, Martin (Los Alamos), Surana, Amit (Cambridge), Thümmler, Vera (Bielefeld), Turhan, Murat (Lausanne), Vater, Stefan (Potsdam)

07.08.-13.08.05 Differentialgeometrie im Großen

Organizers: Bernhard Leeb, München
Paul Seidel, Chicago
Gang Tian, MIT Cambridge

ABSTRACT

The meeting continued the biannual conference series *Differentialgeometrie im Großen* at the MFO which was established in the 60's by Klingenberg and Chern. While global Riemannian geometry with its connections to geometric analysis and topology remained an important focus of the conference, this time special emphasis was given to complex and symplectic geometry.

PARTICIPANTS

Albers, Peter (Leipzig), Ammann, Bernd (Vandoeuvre-Les-Nancy), Bär, Christian (Potsdam), Balser, Andreas (München), Bryant, Robert (Durham), Carberry, Emma (Cambridge), Chen, Xiuxiong (Madison), Degeratu, Anda (Durham), Dinkelbach, Jonathan (München), Fine, Joel (London), Goette, Sebastian (Regensburg), Hanke, Bernhard (München), Hein, Hans-Joachim (Bonn), Kapovitch, Vitali (Münster), Kollross, Andreas (Augsburg), Leeb, Bernhard (München), Link, Gabriele (Karlsruhe), Loftin, John (Newark), Lohkamp, Joachim (Münster), Lott, John (Ann Arbor), Lytchak, Alexander (Bonn), Maillot, Sylvain (Strasbourg), Manolescu, Ciprian (New York), Metzger, Jan (Golm), Mikhalkin, Grigory (Toronto), Mundet i Riera, Ignasi (Barcelona), Munoz, Vicente (Madrid), Ni, Lei (La Jolla), Paul, Sean T. (New York), Perutz, Tim (Cambridge), Porti, Joan (Bellaterra), Ritter, Alexander F. (Chicago), Rollin, Yann (London), Sawon, Justin (Stony Brook), Schick, Thomas (Göttingen), Schwarz, Matthias (Leipzig), Seidel, Paul (Chicago), Sesum, Natasa (Cambridge), Shi, Yuguang (Beijing), Siebert, Bernd (Freiburg), Smith, Ivan (Cambridge), Tian, Gang (Princeton), Usher, Michael (Princeton), Vogel, Thomas (Stanford), Wang, Guofang (Leipzig), Wehrheim, Katrin (Cambridge), Weingart, Gregor (Bonn), Weinkove, Ben (Cambridge), Weiss, Hartmut (München), Wilking, Burkhard (Münster)

21.08.-27.08.05 Analysis and Geometric Singularities

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

ABSTRACT

This workshop focused on several of the main areas of current research concerning analysis on singular and noncompact spaces. Topics included harmonic analysis and Hodge theory on, and the theory of compactifications of, locally symmetric spaces; new topological techniques in index theory; nonlinear elliptic problems related to metrics with special geometry; various more traditional problems in spectral geometry concerning estimation of eigenvalues and the spectral function.

PARTICIPANTS

Ammann, Bernd (Vandoeuvre-Les-Nancy), Azzali, Sara (Roma), Brüning, Jochen (Berlin), Bunke, Ulrich (Göttingen), Carron, Gilles (Nantes), Degeratu, Anda (Durham), Graham, Robin (Seattle), Grieser, Daniel (Oldenburg), Hunsicker, Eugenie (Appleton), Ji, Lizhen (Ann Arbor), Mazzeo, Rafe (Stanford), Moroianu, Sergiu (Bucharest), Müller, Werner (Bonn), Pacard, Frank (Creteil), Piazza, Paolo (Roma), Polterovich, Iosif (Montreal), Roganova, Svetlana (Berlin), Saper, Leslie D. (Durham), Schick, Thomas (Göttingen), Singer, Michael A. (Edinburgh), Weiss, Hartmut (München), Yeganefar, Nader (Berlin)

21.08.-27.08.05 Mathematical Population Genetics

Organizers: Ellen Baake, Greifswald
Warren Ewens, Philadelphia
Anton Wakolbinger, Frankfurt

ABSTRACT

The meeting was devoted to mathematical aspects of population genetics, a branch of theoretical biology that is concerned with the genetic structure of populations under the influence of various evolutionary processes such as genetic drift, mutation, selection, recombination, and migration. The main focus was on probabilistic aspects of the dynamics, with the Moran model and its relatives as a central theme, and the corresponding stochastic processes forward and backward in time as a unifying point of view.

PARTICIPANTS

Alkemper, Roland (Mainz), Baake, Ellen (Bielefeld), Baake, Michael (Bielefeld), Berestycki, Nathanael (Vancouver), Birkner, Matthias (Berlin), Bürger, Reinhard (Wien), Champagnat, Nicolas (Berlin), Cuthbertson, Charles (Oxford), Depperschmidt, Andrej (Berlin), Etheridge, Alison M. (Oxford), Evans, Steven N. (Berkeley), Ewens, Warren J. (Philadelphia), Feng, Shui (Hamilton), Griffiths, Robert Charles (Oxford), Hudson, Richard (Chicago), Hutzenthaler, Martin (Frankfurt), Krone, Steve (Moscow), Metzler, Dirk (Frankfurt), Möhle, Martin (Tübingen), Munday, Paul (Oxford), Pennings, Pleuni (Planegg-Martinsried), Pfaffelhuber, Peter (Planegg), Schneider, Kristan (Wien), Schweinsberg, Jason (La Jolla), Spano, Dario (Oxford), Stannat, Wilhelm (Bielefeld), Stephan, Wolfgang (Planegg), Swart, Jan M. (Praha), Wakeley, John (Cambridge), Wakolbinger, Anton (Frankfurt)

28.08.-03.09.05 C*-Algebren

Organizers: Claire Anantharaman-Delaroche, Orleans
Siegfried Echterhoff, Münster
Uffe Haagerup, Odense
Dan Voiculescu, Berkeley

ABSTRACT

The aim of the workshop was to bring together researchers from basically all areas related to operator algebra theory. Topics included Ergodic Theory, L^2-(co-)homology, classification of C^*-algebras, Operator Theory, von Neumann algebras, KK-theory and the Baum-Connes conjecture, quantum spaces and quantum groups, mathematical physics, non-commutative probability theory, and the theory of operator spaces.

PARTICIPANTS

Anantharaman-Delaroche, Claire (Orleans), Asaeda, Marta (Iowa City), Banica, Teodor (Toulouse), Bisch, Dietmar (Nashville), Blackadar, Bruce (Reno), Blanchard, Etienne (Paris), Bratteli, Ola (Oslo), Buss, Alcides (Münster), Chabert, Jerome (Aubiere), Christensen, Erik (Kobenhavn), Cuntz, Joachim (Münster), Dadarlat, Marius (West Lafayette), Dykema, Ken (Münster), Echterhoff, Siegfried (Münster), Eilers, Soren (Copenhagen), Elliott, George A. (Toronto), Evans, David E. (Cardiff), Germain, Emmanuel (Paris), Güntner, Erik (Honolulu, HI), Haagerup, Uffe (Odense M), Kirchberg, Eberhard (Berlin), Larsen, Nadia Slavila (Oslo), Musat, Magdalena (La Jolla), Neshveyev, Sergey (Oslo), Nest, Ryszard (Kobenhavn), Oyono, Herve (Aubiere), Paravicini, Walther (Münster), Phillips, N. Christopher (Eugene), Pimsner, Mihai (Philadelphia), Pisier, Gilles (Paris), Popa, Sorin (Los Angeles), Przybyszewska, Agata (Odense), Radulescu, Florin G. (Iowa City), Renault, Jean N. (Orleans), Rordam, Mikael (Odense), Schultz, Hanne (Odense), Shlyakhtenko, Dimitri (Los Angeles), Skandalis, Georges (Paris), Stormer, Erling (Oslo), Thom, Andreas B. (Münster), Thomsen, Klaus (Aarhus), Thorbjornsen, Steen (Odense), Timmermann, Thomas (Münster), Toms, Andrew (Fredericton), Tu, Jean-Louis (Metz), Vaes, Stefaan (Paris), Vergnioux, Roland (Münster), Wassermann, Antony (Marseille), Wassermann, Simon (Glasgow), Wenzl, Hans (La Jolla), Winter, Wilhelm (Münster)
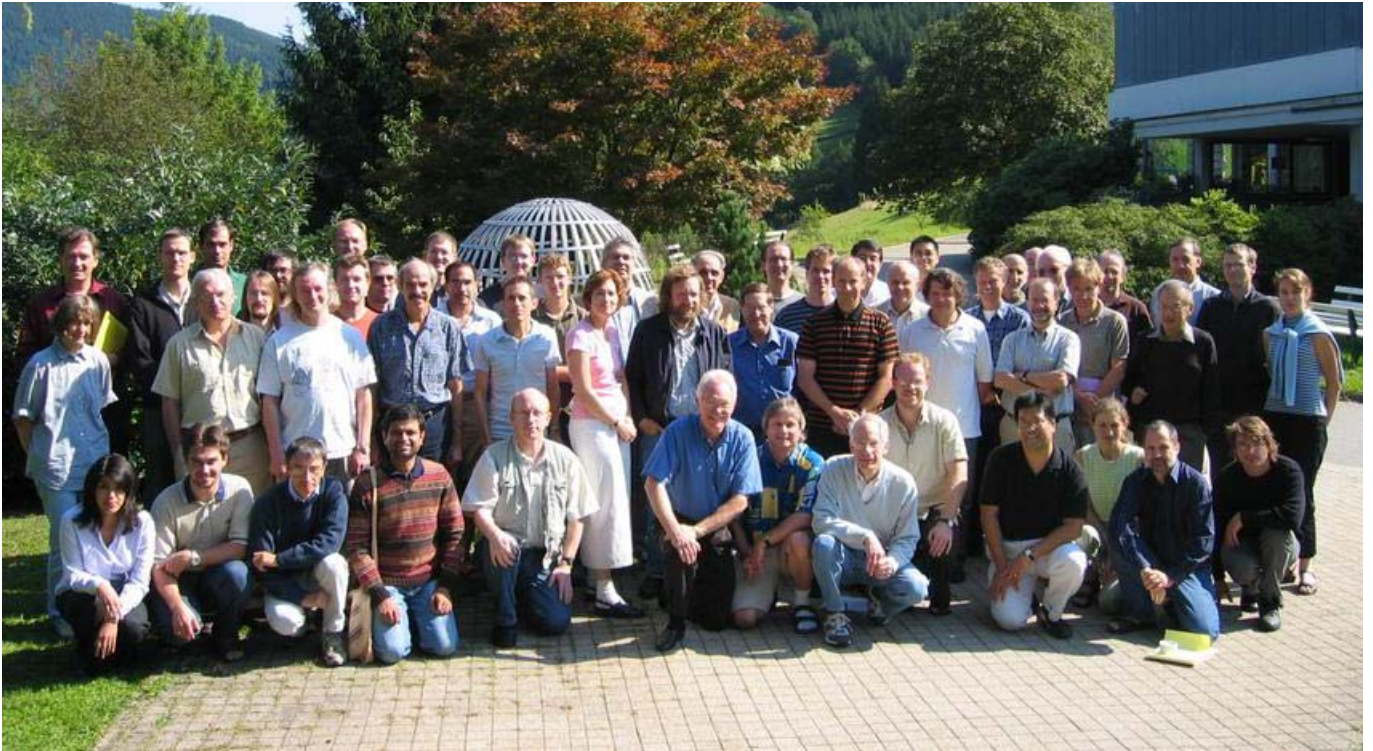
04.09.-10.09.05 Cohomology of Finite Groups: Interactions and Applications

Organizers: Alejandro Adem, Madison
Jon F. Carlson, Athens
Hans-Werner Henn, Strasbourg

ABSTRACT

Besides several talks on the cohomology of finite groups there were talks on related subjects, such as the cohomology of infinite groups, of quantum groups and of local rings, on functor cohomology, on transformation groups and p-compact groups, on homological algebra and triangulated categories, on endotrivial modules in modular representation theory and on the Alperin conjecture as well as on K-theory, on invariant theory, on commutative algebra and relations to stable homotopy theory.

PARTICIPANTS

Adem, Alejandro (Madison), Alperin, Jonathan L. (Chicago), Andersen, Kasper K.S. (Aarhus), Avramov, Luchezar (Lincoln), Bauer, Tilman (Münster), Benson, David J. (Aberdeen), Bouc, Serge (Paris), Broto, Carles (Bellaterra), Broue, Michel (Paris), Browder, William (Princeton), Carlson, Jon F. (Athens), Chuang, Joseph (Bristol), Cohen, Frederick R. (Rochester), Collinet, Gael (Strasbourg), Erdmann, Karin (Oxford), Fong, Paul (Chicago), Friedlander, Eric M. (Evanston), Green, David J. (Jena), Greenlees, John (Sheffield), Grodal, Jesper (Chicago), Hanke, Bernhard (München), Henn, Hans-Werner (Strasbourg), Holm, Thorsten (Leeds), Iyengar, Srikanth B. (Lincoln), Jackson, Michael A. (Rochester), Kessar, Radha (Aberdeen), Krause, Henning (Paderborn), Kropholler, Peter H. (Glasgow), Kuhn, Nicholas J. (Charlottesville), Lannes, Jean (Palaiseau), Levi, Ran (Aberdeen), Linckelmann, Markus (Aberdeen), Lück, Wolfgang (Münster), Mazza, Nadia (Aberdeen), Moller, Jesper Michael (Copenhagen), Nakano, Daniel K. (Athens), Notbohm, Dietrich (Leicester), Oliver, Robert (Villetaneuse), Pakianathan, Jonathan (Rochester), Pevtsova, Julia (Seattle), Rickard, Jeremy (Bristol), Robinson, Geoffrey R. (Aberdeen), Röscheisen, Andreas (Heidelberg), Schuster, Björn (Wuppertal), Schwartz, Lionel (Villetaneuse), Smith, Jeff (West Lafayette), Smith, Stephen D. (Chicago), Stancu, Radu (Columbus), Symonds, Peter (Manchester), Thevenaz, Jacques (Lausanne), Viruel, Antonio (Malaga), Weiss, Nicolas (Strasbourg), Yalcin, Ergün (Bilkent, Ankara), Zimmermann, Alexander (Amiens)

11.09.-17.09.05 Arakelov Geometry

Organizers:
Jean-Benoit Bost, Orsay
Klaus Künnemann, Regensburg
Damian Roessler, Zürich

ABSTRACT

Arakelov geometry studies the geometry and arithmetic of schemes of finite type over Spec $\mathbb{Z}$, i.e., systems of polynomial equations with integer coefficients. It combines methods from algebraic geometry, number theory, and hermitian differential geometry. The talks covered various aspects of Arakelov geometry from analytic torsion over adelic and non-archimedean analytic spaces to modular forms and diophantine geometry.

PARTICIPANTS

Autissier, Pascal (Rennes), Borek, Thomas (Zürich), Bost, Jean-Benoit (Orsay), Bruinier, Jan Hendrik (Köln), Burgos Gil, Jose I. (Barcelona), Chambert-Loir, Antoine (Rennes), Chen, Huayi (Palaiseau), de Jong, Robin (Leiden), Dourov, Nikolai (Bonn), Ebel, Tobias (Düsseldorf), Eriksson, Dennis (Paris), Faltings, Gerd (Bonn), Feliu, Elisenda (Barcelona), Freixas i Montplet, Gerard (Paris), Gasbarri, Carlo (Roma), Gaudron, Eric (Saint-Martin-d'Heres), van der Geer, Gerard (Amsterdam), Gillet, Henri (Chicago), Gubler, Walter (Dortmund), Hahn, Tobias (Berlin), Kawaguchi, Shu (Kyoto), Köhler, Kai (Düsseldorf), Kramer, Jürg (Berlin), Kühn, Ulf (Berlin), Künnemann, Klaus (Regensburg), Levin, Aaron D. (Berkeley), Maillot, Vincent (Paris), Massold, Heinrich (Zürich), Ma, Xiaonan (Palaiseau), Moriwaki, Atsushi (Kyoto), Naumann, Niko (Regensburg), Parshin, Alexei N. (Moscow), Randriambololona, Hugues (Paris), Remond, Gael (Saint-Martin d'Heres), Roessler, Damian (Zürich), Seibold, Martin (Regensburg), Sombra, Martin (Barcelona), Soule, Christophe (Bures-sur-Yvette), Szpiro, Lucien (New York), Takeda, Yuichiro (Fukuoka), Tamvakis, Harry (Waltham), Thuillier, Amaury (Regensburg), Wildeshaus, Jörg (Villetaneuse), Wüstholz, Gisbert (Zürich), Yoshikawa, Ken-Ichi (Tokyo)

18.09.-24.09.05 Analysis and Quantum Theory
Organizers: Volker Bach, Mainz
                             Jan Derezinski, Warszawa
                             Jan-Philip Solovej, Kobenhavn

ABSTRACT

The workshop focused on problems in mathematical physics, especially those connected to quantum field theory. Several theoretical physicists introduced a mostly mathematically oriented audience to topics in theoretical physics such as perturbative quantum field theory and fractional quantum Hall effect, thus bridging the gap between theoretical physics and mathematics. Apart from these reviews, a selection of research reports on recent results in mathematical physics was presented.

PARTICIPANTS

Bach, Volker (Mainz), Barbaroux, Jean-Marie (La Garde), Bru, Jean-Bernard (Mainz), Cassanas, Roch (Nantes), Catto, Isabelle (Paris), Cornean, Horia (Aalborg), Correggi, Michele (Wien), Dall'Acqua, Anna (München), De Roeck, Wojciech (Leuven), Derezinski, Jan (Warszawa), Dolbeault, Jean (Paris), Dürr, Detlef (München), Dybalski, Wojciech (Göttingen), Ferroglia, Andrea (Freiburg), Fournais, Sören (Orsay), Friesecke, Gero (Coventry), Fröhlich, Jürg M. (Zürich), Gerard, Christian (Orsay), Golenia, Sylvain (Bucharest), Griesemer, Marcel (Stuttgart), Gutkin, Boris (Haifa), Hainzl, Christian (Birmingham), Helffer, Bernard (Orsay), Huber, Matthias (München), Hurth, Tobias (Geneva), Jakubassa-Amundsen, Doris (München), Kalf, Hubert (München), Könenberg, Martin (Mainz), Lewin, Mathieu (Cergy-Pontoise), Maceda, Marco (München), Matte, Oliver (München), Meissner, Krzysztof (Warszawa), Morozov, Sergey (München), Pachucki, Krzysztof (Warszawa), Panati, Annalisa (Orsay), Pizzo, Alessandro (Zürich), Remiddi, Ettore (Bologna), Rindler-Daller, Tanja (Wien), Schach Moeller, Jacob (Aarhus), Seiringer, Robert (Princeton), Sere, Eric (Paris), Shoufan, Marwan (Mainz), Skibsted, Eric (Aarhus), Soerensen, Thomas O. (München), Solovej, Jan-Philip (Kobenhavn), Stockmeyer, Edgardo (München), Wugalter, Semjon (München), Yngvason, Jakob (Wien)

25.09.-01.10.05 Low-Dimensional Manifolds

Organizers: Michel Boileau, Toulouse
Klaus Johannson, Frankfurt
Peter Scott, Ann Arbor

ABSTRACT

The main themes of this workshop on Low-Dimensional Topology covered a wide range of topics such as Heegaard surfaces, the curve complex, hyperbolic manifolds, orbifolds, knot theory and geometric group theory. Specifically, the topics of the talks on recent results included non-zero degree maps, limit groups, Kleinian groups with bounded geometry, real projective structures on 3-Manifolds, volumes of hyperbolic 3-manifolds, cone-3-manifolds, laminations, mapping class groups, the geometry of the pants and curve complexes, distances of Heegaard splittings, and the Waldhausen conjecture.

PARTICIPANTS

Abhau, Jochen (Innsbruck), Anderson, James W. (Southampton), Baker, Mark D. (Rennes), Balser, Andreas (München), Bödigheimer, Carl-Friedrich (Bonn), Boileau, Michel (Toulouse), Boyer, Steven (Montreal), Bridson, Martin R. (London), Brinkmann, Peter (Berlin), Brock, Jeffrey F. (Providence), Bromberg, Kenneth (Salt Lake City), Canary, Dick (Ann Arbor), Cooper, Daryl (Santa Barbara), Derbez, Pierre (Marseille), Dinkelbach, Jonathan (München), Gordon, Cameron M. (Austin), Gueritaud, Francois (Paris), Heusener, Michael (Aubiere), Hog-Angeloni, Cynthia (Frankfurt), Jaco, William H. (Stillwater), Johannson, Klaus (Frankfurt), Kerckhoff, Steven P. (Stanford), King, Simon (Darmstadt), Kuessner, Thilo (Siegen), Li, Tao (Chestnut Hill), Lustig, Martin (Marseille), Maillot, Sylvain (Strasbourg), Marxen, Tobias (Berlin), Masur, Howard (Chicago), Matignon, Daniel (Marseille), Matveev, Sergei V. (Chelyabinsk), Metzler, Wolfgang (Frankfurt), Moriah, Yoav (Haifa), Paoluzzi, Luisa (Dijon), Papazoglou, Panos (Athens), Porti, Joan (Bellaterra), Repovs, Dusan (Ljubljana), Rubinstein, Joachim Hyam (Parkville, Victoria), Sakuma, Makoto (Osaka), Scharlemann, Martin (Santa Barbara), Schick, Thomas (Göttingen), Schleimer, Saul (Piscataway), Schöbel, Konrad (Marseille), Schultens, Jennifer (Davis), Vogt, Elmar (Berlin), Wahl, Nathalie (Chicago), Walsh, Genevieve (Austin), Weidmann, Richard (Frankfurt), Weiss, Hartmut (München), Zentner, Raphael (Marseille), Zimmermann, Bruno (Trieste)

16.10.-22.10.05 Statistische und Probabilistische Methoden der Modellwahl

Organizers: Jürgen Berger, Duke
                Holger Dette, Bochum
                Gabor Lugosi, Barcelona
                Axel Munk, Göttingen

ABSTRACT

The key task in model selection is to select a *proper* mathematical model based on information generated by data and/or by prior knowledge. Proper might mean a model with minimal prediction error, a model which describes the main qualitative data features, such as bumps and modes, or a model of low computational complexity. Mathematical techniques and concepts encountered with this workshop are wide spread, ranging from concentration and oracle inequalities, asymptotic analysis and distribution theory to testing theory, information measures and nonconvex optimization.

PARTICIPANTS

Bartlett, Peter L. (Berkeley), Bayarri, Maria-Jesus (Valencia), Berger, James O. (Durham), Birke, Melanie (Bochum), Bissantz, Nicolai (Göttingen), Bogdan, Malgorzata (Wroclaw), Boucheron, Stephane (Paris), Boysen, Leif (Göttingen), Bunea, Florentina (Tallahassee), Clyde, Merlise (Durham), Dahlhaus, Rainer (Heidelberg), Davies, P. Laurie (Essen), Dette, Holger (Bochum), Dümbgen, Lutz (Bern), Fahrmeir, Ludwig (München), Gather, Ursula (Dortmund), van de Geer, Sara (Zürich), George, Edward I. (Philadelphia), Ghosh, Jayanta K. (West Lafayette), Györfi, Laszlo (Budapest), Härdle, Wolfgang (Berlin), Hjort, Nils Lid (Oslo), Holzmann, Hajo (Göttingen), Ickstadt, Katja (Dortmund), Janssen, Arnold (Düsseldorf), Johnson, Valen E. (Houston), Koltchinskii, Vladimir (Albuquerque), Kreiß, Jens-Peter (Braunschweig), van der Linde, Angelika (Bremen), Loubes, Jean-Michel (Montpellier), Lugosi, Gabor (Barcelona), Matic, Rada (Göttingen), McCulloch, Robert E. (Chicago), Müller, Peter (Houston), Müller, Klaus-Robert (Berlin), Munk, Axel (Göttingen), Neumann, Michael Helmut (Jena), Neumeyer, Natalie (Bochum), Nobel, Andrew B. (Chapel Hill), Ostrovski, Vladimir (Düsseldorf), Paulo, Rui (Bristol), Pericchi, Luis Raul (San Juan), Robert, Christian P. (Paris), Scheder, Regine (Bochum), Spokoiny, Vladimir (Berlin), Stadtmüller, Ulrich (Ulm), Steland, Ansgar (Bochum), Tsybakov, Alexander B. (Paris), van der Vaart, Aad W. (Amsterdam), Valeinis, Janis (Göttingen), Van Keilegom, Ingrid (Louvain-la-Neuve), Wegkamp, Marten (Tallahassee), Wieczorek, Gabriele (Bochum)

23.10.-29.10.05 Noncommutative Geometry and Quantum Field Theory

Organizers: Sergio Doplicher, Rom
Mario Paschke, Leipzig
Rainer Verch, Leipzig
Eberhard Zeidler, Leipzig

ABSTRACT

The workshop gathered experts from both mathememathics and physics working on the interrelation of Noncommutative Geometry and Quantum Field Theory, which has become one of the central topics in mathematical physics over the last decade. The talks mainly focused on the possible noncommuativity of spacetime, applications of the local index formula in quantum field theory and the significant recent progress concerning the construction of interacting quantum field theories over noncommutative spaces.

PARTICIPANTS

Aschieri, Paolo (Alessandria), Bahns, Dorothea (Golm), Doplicher, Sergio (Roma), Fredenhagen, Stefan (Zürich), Fredenhagen, Klaus (Hamburg), Gayral, Victor (Copenhagen), Gracia-Bondia, Jose M. (Madrid), Grimstrup, Jesper M. (Kobenhavn), Grosse, Harald (Wien), Guido, Daniele (Roma), Jureit, Jan Hendryk (Marseille), Kopf, Tomas (Opava), Landsman, Nicolaas P. (Nijmegen), Langmann, Edwin (Stockholm), Lechner, Gandalf (Göttingen), Lizzi, Fedele (Napoli), Longo, Roberto (Roma), Madore, John (Orsay), Morsella, Gerardo (Roma), Müger, Michael (Nijmegen), Paschke, Mario (Leipzig), Perrot, Denis (Villeurbanne), Piacitelli, Gherardo (Trieste), Rennie, Adam (Copenhagen), Savchuk, Yurii (Leipzig), Scheck, Florian (Mainz), Sitarz, Andrzej (Krakow), van Suijlekom, Walter D. (Trieste), Verch, Rainer (Leipzig), Vignes-Tourneret, Fabien (Orsay), Weiner, Mihaly (Roma), Woronowicz, Stanislaw L. (Warsaw), Zahn, Jochen (Hamburg), Zeidler, Eberhard (Leipzig)

30.10.-05.11.05 Reactive Flow and Transport Through Complex Systems

Organizers: Cornelius J. van Duijn, Eindhoven
Andro Mikelic, Villeurbanne
Christoph Schwab, Zürich

ABSTRACT

The meeting focused on mathematical aspects of reactive flow, diffusion and transport through complex systems. The research interest of the participants varied from physical modeling using PDEs, mathematical modeling using upscaling and homogenization, numerical analysis of PDEs describing reactive transport, PDEs from fluid mechanics, computational methods for random media, and computational multiscale methods.

PARTICIPANTS

Abdulle, Assyr (Basel), Bastian, Peter (Heidelberg), Berlyand, Leonid (University Park), Bonnetier, Eric (Grenoble), de Borst, Rene (Delft), Bouchitte, Guy (La Garde), Bourgeat, Alain (Villeurbanne), Braides, Andrea (Roma), Chechkin, Gregory A. (Moscow), Devigne, Vincent (Saint-Etienne), van Duijn, Cornelius J. (Eindhoven), Engquist, Björn (Austin), Giovangigli, Vincent (Palaiseau), Golovaty, Yuri (Lviv), Guidoboni, Giovanna (Houston), Hilfer, Rudolf (Stuttgart), Hoang, Viet Ha (Cambridge), Jäger, Willi (Heidelberg), Jaffre, Jerome (Le Chesnay), Kern, Michel (Le Chesnay), Khvoenkova, Nina (Gif-sur-Yvette), Knabner, Peter (Erlangen), Lacharme, Severine (Heidelberg), Lenzinger, Michael (Heidelberg), Luckhaus, Stephan (Leipzig), Marusic-Paloka, Eduard (Zagreb), Matthies, Hermann G. (Braunschweig), Mikelic, Andro (Lyon), Neuss, Nicolas (Heidelberg), Neuss-Radu, Maria (Heidelberg), Niethammer, Barbara (Berlin), Otto, Felix (Bonn), Pop, Sorin I. (Eindhoven), Pousin, Jerome (Villeurbanne), Reichert, Christian (Heidelberg), Rosier, Carole (Calais), Schneider, Reinhold (Kiel), Schwab, Christoph (Zürich), Schweizer, Ben (Basel), Stevens, Angela (Leipzig), Svanstedt, Nils (Gothenburg), Tempone, Raul (Tallahassee), Todor, Radu-Alexandru (Zürich)

06.11.-12.11.05 **Combinatorial Optimization**

Organizers: Rainer E. Burkard, Graz
David Shmoys, Ithaca
Uwe Zimmermann, Braunschweig

ABSTRACT

Combinatorial Optimization is a particularly active research area with links to many other areas in mathematics, e.g., to Combinatorics, Graph Theory, Geometry and Integer Programming. Furthermore, there are important connections to Theoretical Computer Science, Operations Research and many application areas. Differing research directions in Combinatorial Optimization, current hot topics as well asclassical streams were present in the talks.

PARTICIPANTS

Aardal, Karen (Amsterdam), Ahuja, Nitin (Braunschweig), Anstreicher, Kurt M. (Iowa City), Arora, Sanjeev (Princeton), Butkovic, Peter (Birmingham), Caprara, Alberto (Bologna), Conforti, Michelangelo (Padova), Cook, William J. (Atlanta), Cornuejols, Gerard (Pittsburgh), Cunningham, William H. (Waterloo, Ontario), Fekete, Sandor P. (Braunschweig), Frank, Andras (Budapest), Fujishige, Satoru (Kyoto), Gassner, Elisabeth (Graz), Goemans, Michel (Cambridge), Gritzmann, Peter (Garching bei München), Guenin, Bertrand (Waterloo, Ontario), Hamacher, Horst W. (Kaiserslautern), Hansmann, Ronny (Braunschweig), Hatzl, Johannes (Graz), Helmberg, Christoph (Chemnitz), Hiller, Benjamin (Berlin), Hochbaum, Dorit S. (Berkeley), Jünger, Michael (Köln), Klinz, Bettina (Graz), Korte, Bernhard (Bonn), Krause, Stefan (Braunschweig), Levi, Retsef (Yorktown Heights), Liebling, Thomas M. (Lausanne), Lübbecke, Marco E. (Berlin), Martin, Alexander (Darmstadt), McCormick, S. Thomas (Vancouver), Möhring, Rolf (Berlin), Mutzel, Petra (Dortmund), Nemhauser, George L. (Atlanta), Pap, Gyula (Budapest), Pferschy, Ulrich (Graz), Queyranne, Maurice (Vancouver), Reinelt, Gerhard (Heidelberg), Rendl, Franz (Klagenfurt), Rote, Günter (Berlin), Schrijver, Alexander (Amsterdam), Schultz, Rüdiger (Duisburg), Schulz, Andreas S. (Cambridge), Schulz, Michael (Köln), Shmoys, David B. (Ithaca), Skutella, Martin (Dortmund), Stein, Clifford (New York), Stenzel, Björn (Berlin), Swamy, Chaitanya (Pasadena), Vygen, Jens (Bonn), Weismantel, Robert (Magdeburg), Williamson, David P. (Ithaca), Woeginger, Gerhard (Eindhoven), Wolsey, Laurence A. (Louvain-la-Neuve), Zimmermann, Uwe (Braunschweig)

27.11.-03.12.05 Heat Kernels, Stochastic Processes and Functional Inequalities

Organizers: Thierry Coulhon, Cergy
Bruno Franchi, Bologna
Takashi Kumagai, Kyoto
Karl-Theodor Sturm, Bonn

ABSTRACT

The main focus of this workshop certainly was the study of heat kernels in various contexts: fractals, manifolds, domains of the Euclidean space, percolation clusters, infinite dimensional spaces, metric measure spaces. Some related aspects of geometric analysis were also considered such as L^p-cohomology and mass transportation. There was a stimulating exchange between probabilistic and analytic points of view, together with a geometric emphasis in most of the problems.

PARTICIPANTS

Auscher, Pascal (Orsay), Bacher, Kathrin (Bonn), Balogh, Zoltan (Bern), Barbieri, Davide (Bologna), Barlow, Martin T. (Vancouver), Bass, Richard F. (Storrs), Ben Ali, Besma (Orsay), Bendikov, Alexander (Wroclaw), Blache, Fabrice (Bonn), Bonciocat, Anca-Iuliana (Bonn), Bonforte, Matteo (Torino), Burdzy, Krzysztof (Seattle), Carlen, Eric (Atlanta), Carron, Gilles (Nantes), Chen, Zhenqing (Seattle), Christiansen, Tom (Bonn), Cordero-Erausquin, Dario (Marne la Vallee), Coulhon, Thierry (Cergy-Pontoise), Delmotte, Thierry (Toulouse), Dohmann, Judith M. (Bielefeld), Driver, Bruce K. (La Jolla), Eberle, Andreas (Bonn), Elworthy, Kenneth David (Coventry), Freiberg, Uta (Jena), Fukushima, Masatoshi (Osaka), Götze, Friedrich (Bielefeld), Gordina, Masha (Storrs), Hambly, Ben (Oxford), Hsu, Elton P. (Evanston), Juillet, Nicolas (St. Martin d'Heres), Kassmann, Moritz (Bonn), Kigami, Jun (Kyoto), Koskela, Pekka (Jyväskylä), Kumagai, Takashi (Kyoto), Kuwae, Kazuhiro (Kumamoto), Ledoux, Michel (Toulouse), Le Jan, Yves (Orsay), Mathieu, Pierre (Marseille), McCann, Robert J. (Toronto), Ohta, Shin-ichi (Kyoto), Pajot, Herve (Saint-Martin d'Heres), Philipowski, Robert (Bonn), Picard, Jean (Aubiere), Poupaud, Cesar (Talence), von Renesse, Max (Berlin), Röckner, Michael (West Lafayette), Roewer, Ann-Kathrin (Bonn), Rüschendorf, Ludger (Freiburg), Shioya, Takashi (Sendai), Sturm, Karl-Theodor (Bonn), Takeda, Masayoshi (Sendai), Tessera, Romain (Paris), Thalmaier, Anton (Futuroscope Chasseneuil), Villani, Cedric (Lyon), Woess, Wolfgang (Graz)

04.12.-10.12.05 Set Theory
Organizers:　　　　Sy Friedman, Vienna
　　　　　　　　　Menachem Magidor, Jerusalem
　　　　　　　　　Hugh Woodin, Berkeley

ABSTRACT
This meeting covered all important aspects of modern Set Theory, including large cardinal theory, combinatorial set theory, descriptive set theory, connections with algebra and analysis, forcing axioms and inner model theory. Several striking new results had been presented concerning combinatorial set theory, descriptive set theory, set-theoretic analysis and forcing axioms.

PARTICIPANTS
Abraham, Uri (Beer Sheva), Andretta, Alessandro (Torino), Aspero, David (Bristol), Bagaria, Joan (Barcelona), Bartoszynski, Tomek (Arlington), Blass, Andreas (Ann Arbor), Brendle, Jörg (Kobe), Camerlo, Riccardo (Torino), Castells, Neus (Barcelona), Claverie, Benjamin (Münster), Cummings, James W. (Pittsburgh), Dehornoy, Patrick (Caen), Dobrinen, Natasha (Wien), Dzamonja, Mirna (Norwich), Eerola, Tapio (Helsinki), Farah, Ilijas (Toronto), Feng, Qi (Beijing), Foreman, Matthew D. (Irvine), Friedman, Sy-David (Wien), Futas, Tomas (Wien), Gao, Su (Denton), Geschke, Stefan (Berlin), Goldstern, Martin (Wien), Hamkins, Joel David (New York), Irrgang, Bernhard (Bonn), Jackson, Stephen C. (Denton), Jensen, Ronald B. (Berlin), Koepke, Peter (Bonn), Kojman, Menachem (Beer Sheva), König, Bernhard (Paris), Krueger, John (Wien), Larson, Jean (Gainesville), Larson, Paul B. (Oxford), Liu, Andreas (Brookline), Lopez-Abad, Jordi (Paris), Louveau, Alain (Paris), Löwe, Benedikt (Amsterdam), Magidor, Menachem (Jerusalem), Mildenberger, Heike (Wien), Mitchell, William J. (Gainesville), Neeman, Itay (Los Angeles), Schimmerling, Ernest (Pittsburgh), Schindler, Ralf-Dieter (Münster), Schrittesser, David (Wien), Sharon, Assaf (Irvine), Solecki, Slawomir (Urbana), Soukup, Lajos (Budapest), Spinas, Otmar (Kiel), Steel, John R. (Berkeley), Thompson, Katherine (Wien), Todorcevic, Stevo (Paris), Väänänen, Jouko (Helsinki), Velickovic, Boban D. (Paris), Viale, Matteo (Paris), Walczak-Typke, Agatha (Wien), Welch, Philip D. (Bristol), Woodin, W. Hugh (Berkeley), Zapletal, Jindrich (Gainesville), Zoble, Stuart (Toronto)

11.12.-17.12.05 Mathematics in the Physical Sciences, 1650-2000

Organizers: Niccolo Guicciardini, Siena
Tinne Hoff Kjeldsen, Roskilde
David E. Rowe, Mainz

ABSTRACT

By focusing on the interplay between mathematics and the physical sciences, the aim of the workshop was to gain an insight into developments that had a crucial impact on modern mathematics. Three particular topics emerged as central themes:

1) The period 1650-1800 raises many issues related to the role of mathematics in natural philosophy during the Scientific Revolution and the Enlightenment. Discussing these issues can enhance our historical understanding of a period in which mechanics, astronomy, navigation, cartography, hydraulics, etc., constituted an important stimulus for advances in mathematics.

2) The period 1800-1920 centred on the problem of probing the geometry of space both mathematically and empirically after the advent of non-Euclidean geometry.

3) The twentieth century was focused on mathematical modelling and the question of a change in the conception of mathematical models in various disciplines after 1900.

PARTICIPANTS

Alberts, Gerard (Amsterdam), Andersen, Kirsti (Aarhus), Archibald, Thomas (Burnaby), Barrow Green, June (Milton Keynes), Bos, Henk J. M. (Utrecht), Bottazzini, Umberto (Milano), Chemla, Karine (Paris), Dahan-Dalmedico, Amy (Paris), van Dalen, Benno (Frankfurt/Main), Epple, Moritz (Frankfurt am Main), Erickson, Paul (Madison), Ferreiros, Jose (Sevilla), Fraser, Craig (Toronto, Ontario), Gingras, Yves (Montreal), Goenner, Hubert (Göttingen), Goldstein, Catherine (Paris), Grattan-Guinness, Ivor (London), Gray, Jeremy John (Milton Keynes), Guicciardini, Niccolo (Siena), Hauser, Nico (Frankfurt am Main), Heidelberger, Michael (Tübingen), Hoff Kjeldsen, Tinne (Roskilde), Jahnke, Hans Niels (Essen), Kent, Deborah A. (Burnaby), Loettgers, Andrea (Claremont), Lohne, Kristine (Kristiansand), Mawhin, Jean (Louvain-la-Neuve), Nabonnand, Philippe (Nancy Cedex), Niss, Martin (Cambridge), Peiffer, Jeanne (Paris), Pulte, Helmut (Bochum), Remmert, Volker (Mainz), Ritter, Jim (Saint Denis), Rowe, David E. (Mainz), Schneider, Martina (Wuppertal), Scholz, Erhard (Wuppertal), Shank, J.B. (Minneapolis), Siegmund-Schultze, Reinhard (Kristiansand), Sorensen, Henrik Kragh (Kristiansand), Steinle, Friedrich (Wuppertal), Stöltzner, Michael (Wuppertal), Volkert, Klaus (Köln), Walter, Scott (Nancy), Wußing, Hans (Leipzig)

2.4 Miniworkshops
MINIWORKSHOP 0508A

20.02.-26.02.05 Interface Problems in Computational Fluid Dynamics
Organizers: Eberhard Bänsch, Berlin
                     Lutz Tobiska, Magdeburg
                     Noel J. Walkington, Pittsburgh

ABSTRACT

Multiple difficulties are encountered when designing algorithms to simulate flows having free surfaces, embedded particles, or elastic containers. One difficulty common to all of these problems is that the associated interfaces are Lagrangian in character, while the fluid equations are naturally posed in the Eulerian frame. This miniworkshop explored different approaches and algorithms developed to resolve these issues.

PARTICIPANTS

Bänsch, Eberhard (Erlangen), Behr, Marek (Aachen), Burman, Erik (Lausanne), Ganesan, Sashikumaar (Magdeburg), Gastaldi, Lucia (Brescia), Kim, Yon Chol (Pyong Yang City), Knobloch, Petr (Prague), Krahl, Rolf (Erlangen), Matthies, Gunar (Bochum), Mehnert, Jürgen (Freiburg), Nobile, Fabio (Milano), Picasso, Marco (Lausanne), Reusken, Arnold (Aachen), Tobiska, Lutz (Magdeburg), Turek, Stefan (Dortmund), Walkington, Noel J. (Pittsburgh)

20.02.-26.02.05 Mathematical Methods and Models of Continuum Biomechanics

Organizers: Ray W. Ogden, Glasgow
Guiseppe Saccomandi, Lecce

ABSTRACT

The miniworkshop *Mathematical Methods and Models of Continuum Biomechanics* focused on skills and tools providing a rational approach for integrating data that reductionist and molecular approaches in modern biological and medical science has recently provided. The miniworkshop has provided contributions that brought together experts from the (bio-)mechanics and applied mathematics communities in order to highlight the mathematical needs and challenges especially in the fields of soft tissues and DNA mechanics.

PARTICIPANTS

Biscari, Paolo (Milano), Gao, Huajian (Stuttgart), Goriely, Alain (Paris), Heil, Matthias (Manchester), Huyghe, Jacques (Eindhoven), Kuhl, Ellen (Kaiserslautern), Maddocks, John H. (Lausanne), Malakpoor, Kamyar (Eindhoven), Menzel, Andreas (Kaiserslautern), Neukirch, Sebastien (Paris), Ogden, Ray W. (Glasgow), Saccomandi, Giuseppe (Lecce), Sgura, Ivonne (Lecce), Theodorakopoulos, Nikos (Athens)
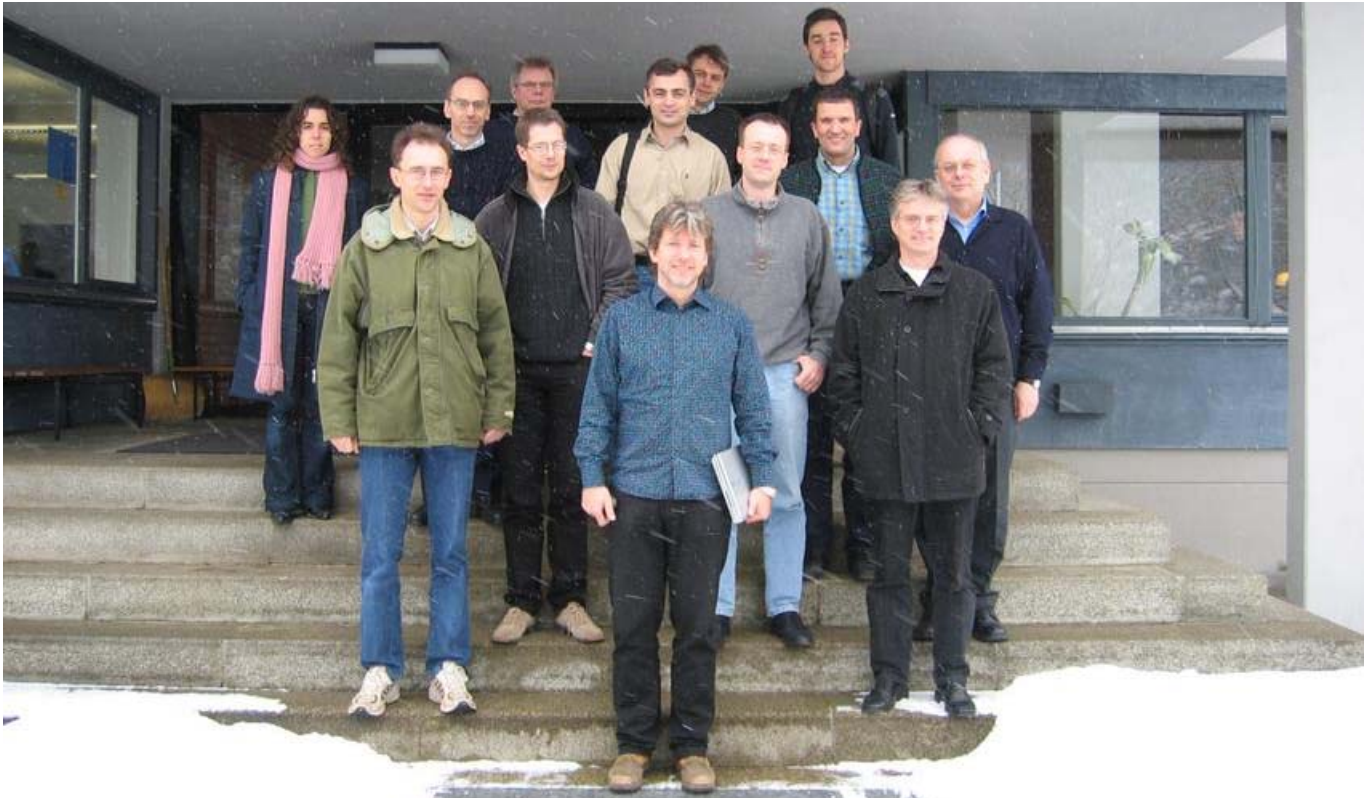
**20.02.-26.02.05 Analytical and Numerical Methods
in Image and Surface Processing**

Organizers: Gerhard Dziuk, Freiburg
Ulrich Reif, Darmstadt
Martin Rumpf, Duisburg-Essen
Peter Schröder, Pasadena

ABSTRACT

This miniworkshop successfully brought together researchers from mathematical analysis,numerical mathematics, computer graphics and image processing. The focus was on variational methods in image and surface processing such as active contour models, Mumford-Shah type functionals, image and surface denoising based on geometric evolution problems in image and surface fairing, physical modeling of surfaces, the restoration of images and surfaces using higher order variational formulations.

PARTICIPANTS

Bobenko, Alexander I. (Berlin), Cirak, Fehmi (Pasadena), Deckelnick, Klaus (Magdeburg), Droske, Marc (Duisburg), Dziuk, Gerhard (Freiburg), Elliott, Charles M. (Brighton), Fried, Michael (Erlangen), Haro, Gloria (Barcelona), Kobbelt, Leif (Aachen), Mößner, Bernhard (Freiburg), Paolini, Maurizio (Brescia), Reif, Ulrich (Darmstadt), Rumpf, Martin (Bonn), Schröder, Peter (Pasadena)

01.05.-07.05.05 Numerical Upscaling: Theory and Applications

Organizers: Achi Brandt, Rehovot
                      Richard Ewing, College Station
                      Oleg Iliev, Kaiserslautern

ABSTRACT

Numerical upscaling is often the only way in which various multiscale problems can be handled. Numerics related to solving auxiliary problems appearing in asymptotic homogenization, as well as numerical treatment of multiscale problems with non-separable scales, had been discussed in this miniworkshop. Main topics included the classification of multiscale problems and multiscale numerical algorithms; deriving coarse scale approximations via approximate truncations or based on variational principles; iterations over scales; accuracy and robustness of numerical upscaling algorithms; similarity and differences between different approaches (multigrid, multiscale FEM, heterogeneous multiscale method, etc.); convergence issues; area of applicability of the numerical upscaling, etc.

PARTICIPANTS

Arndt, Marcel (Bonn), Attinger, Sabine (Leipzig), Efendiev, Yalchin (College Station), Ewing, Richard E. (College Station), Farmer, Chris L. (Oxford), Helmig, Rainer (Stuttgart), Iliev, Oleg (Kaiserslautern), Laptev, Vsevolod (Esch-Sur-Alzette), Neunzert, Helmut (Kaiserslautern), Neuss, Nicolas (Heidelberg), Plechac, Petr (Coventry), Popov, Peter A. (College Station), Rybak, Irina (Kaiserslautern), Sviercoski, Rosangela (Tucson), Trottenberg, Ulrich (Sankt Augustin), Wienands, Roman (Sankt Augustin)

01.05.-07.05.05 Aspects of Ricci-Flow

Organizers: Klaus Ecker, Berlin
       Tom Ilmanen, Zürich
       Gerhard Huisken, Potsdam

ABSTRACT

This miniworkshop studies Hamilton-Ricciflow of Riemannian metrics on 3-manifolds. The participants give detailed technical lectures on recent work of G. Perelman concerning a priori estimates and surgeries during the flow. The miniworkshop was able to verify major sections of Perelman's work on Thurston's Geometrization Conjecture and identified points that need a more detailed exposition.

PARTICIPANTS

Cao, Huai-Dong (Bethlehem), Ecker, Klaus (Berlin), Huisken, Gerhard (Golm), Ilmanen, Thomas (Zürich), Knopf, Dan (Austin), LeFloch, Philippe G. (Paris), List, Bernhard (Golm), Loose, Frank (Tübingen), Metzger, Jan (Golm), Oliynyk, Todd (Golm), Simon, Leon M. (Stanford), Simon, Miles (Freiburg), Sinestrari, Carlo (Roma)

01.05.-07.05.05 Particle Systems with Several Conservation Laws: Fluctuations and Hydrodynamic Limit

Organizers: Christian Klingenberg, Würzburg
Gunter M. Schütz, Jülich
Balint Toth, Budapest

ABSTRACT

The miniworkshop was concerned on the large-scale description of microscopic many-particle systems with two or more conservation laws. This is topic of common interest for statistical mechanics, probability theory and PDE theory. The main difficulty lies in the proof of the hydrodynamic limit in terms of a system of (generically hyperbolic) PDE's which includes a proper treatment of shock and boundary discontinuities that result from the microscopic dynamics. Moreover, fundamental properties of current-carrying stationary states of such systems (which are not Gibbs states) are studied in terms of fluctuations of macroscopic quantities. Many powerful tools developed for particle systems (or PDE's respectively) with one conservation law have no obvious generalization to systems with two or more conservation laws and hence new mathematical ideas need to be developed.

PARTICIPANTS

Chen, Gui-Qiang (Evanston), Derrida, Bernard (Paris), Even, Nadine (Würzburg), Fritz, Jozsef (Budapest), Grosskinsky, Stefan (Garching), Hammond, Alan Michael (Berkeley), Jabin, Pierre Emmanuel (Nice), Klingenberg, Christian (Würzburg), Olla, Stefano (Paris), Popkov, Vladislav (Köln), Rakos, Attila (Jülich), Schütz, Gunter M. (Jülich), Stevens, Angela (Leipzig), Toth, Balint (Budapest), Tzavaras, Athanasios E. (Madison), Valko, Benedek (Budapest), Villani, Cedric (Lyon)

14.08.-20.08.05 Operators on Spaces of Analytic Functions

Organizers: Ernst Albrecht, Saarbrücken
                           Jean Esterle, Bordeaux
                           Raymond Mortini, Metz
                           Stefan Richter, Tennesse

ABSTRACT

During the last twenty years there has been considerable progress in the study of Banach spaces of analytic functions and their operators such as composition operators, multiplication operators and related natural classes of operators on these spaces. By use of the theory of analytic functions it is often possible to obtain very precise knowledge of the fine structure of these particular operators, and that has repercussions for our understanding of all bounded linear operators between Banach or Hilbert spaces. For example, the invariant subspace problem for separable Hilbert spaces can be reduced to the study of the invariant subspace structure of certain composition operators. Therefore, questions concerning invariant subspaces were one of the major topics in this mini-workshop. Questions related to composition operators were the second major subject of the meeting. Further topics included the ideal structure of H^∞, asymptotics for condition numbers of large matrices, and questions frequently hypercyclic operators, subnormal operators and generalized Cesàro operators.

PARTICIPANTS

Albrecht, Ernst (Saarbrücken), Aleman, Alexandru (Lund), Atzmon, Aharon (Tel Aviv), Borichev, Alexander (Talence), Feldman, Nathan S. (Lexington), Gallardo-Gutierrez, Eva (Zaragoza), Gamelin, Theodore W. (Los Angeles), Grivaux, Sophie (Villeneuve D'Ascq), Grosse-Erdmann, Karl-Goswin (Hagen), Jarchow, Hans (Zürich), Jury, Michael T. (Gainesville), Mortini, Raymond (Metz), Nikolski, Nikolai K. (Talence), Richter, Stefan (Knoxville), Ross, William T. (Richmond), Shimorin, Sergei (Stockholm), Smith, Wayne (Honolulu), Sundberg, Carl (Knoxville)

14.08.-20.08.05 Convergence of Adaptive Algorithms

Organizers: Mark Ainsworth, Glasgow
                 Carsten Carstensen, Berlin
                 Willy Dörfler, Karlsruhe

ABSTRACT

Adaptive refinement strategies are a key concept for the efficient numerical solution of partial differential equations. New findings allow the study of convergence and optimality of adaptive finite element methods. It was the aim of this miniworkshop to discuss necessary conditions for optimal convergence and to extend the theory to new areas of application.

PARTICIPANTS

Ainsworth, Mark (Glasgow), Becker, Roland (Pau), Binev, Peter G. (Columbia), Carstensen, Carsten (Berlin), Demkowicz, Leszek (Austin), Dörfler, Willy (Karlsruhe), Funken, Stefan A. (Middlesex), Heuveline, Vincent (Karlsruhe), Hoppe, Ronald H.W. (Augsburg), Jensen, Max (Berlin), Melenk, Jens Markus (Wien), Morin, Pedro (Santa Fe), Rannacher, Rolf (Heidelberg), Reininghaus, Jan (Berlin), Siebert, Kunibert G. (Augsburg), Stevenson, Rob (Utrecht), Veeser, Andreas (Milano), Wohlmuth, Barbara (Stuttgart)

14.08.-20.08.05 Gerbes, Twisted K-Theory and Conformal Field Theory

Organizers: Branislav Jurco, München
Jouko Mickelsson, Helsinki
Christoph Schweigert, Hamburg

ABSTRACT

The aim of the miniworkshop was to bring together people whose work in mathematics and mathematical physics centers around geometry and topology applicable in modern string theory. More specifically, whose interests are in one or another way connected to gerbes and twisted K-theory and their applications in topological field theory, conformal field theory and M-theory.

PARTICIPANTS

Aschieri, Paolo (Alessandria), Bouwknegt, Peter G. (Canberra), Braun, Volker (Philadelphia), Bunke, Ulrich (Göttingen), Carey, Alan (Canberra), Evslin, Jarah (Bruxelles), Gawedzki, Krzysztof (Lyon), Husemöller, Dale (Bonn), Jurco, Branislav (München), Mickelsson, Jouko (Helsinki), Murray, Michael (Adelaide), Pfeiffer, Hendryk (Cambridge), Sati, Hisham (Canberra), Schafer-Nameki, Sakura (Hamburg), Schreiber, Urs (Essen), Schweigert, Christoph (Hamburg), Stevenson, Danny (Riverside), Varghese, Mathai (Adelaide)

13.11.-19.11.05 Dynamics of Cocycles and One-Dimensional Spectral Theory

Organizers: David Damanik, Pasadena
               Russell Johnson, Firenze
               Daniel Lenz, Chemnitz

ABSTRACT

Many spectral questions about one-dimensional Schrödinger operators with quasi-periodic potentials can be reduced to dynamical questions about certain quasi-periodic SL(2,$\mathbb{R}$)-valued cocycles. This connection has recently been employed to prove a number of long-standing conjectures. The aim of this miniworkshop was to bring together people from both spectral theory and dynamical systems in order to further develop and exploit the dynamical approach to quasi-periodic Schrödinger operators. Among other things, there is now an improved understanding of analytic potentials with non-perturbatively small coupling, there are extensions of some results known for analytic potentials to certain classes of non-analytic potentials, while phenomena different from those in the analytic case may occur for potentials of low regularity, and there is improved understanding of the case of Liouville frequencies.

PARTICIPANTS

Avila, Artur (Paris), Bjerklöv, Kristian (Toronto), Chan, Jackson (Toronto), Damanik, David (Pasadena), Eliasson, Hakan (Paris), Fabbri, Roberta (Firenze), Jäger, Tobias (Erlangen), Jitomirskaya, Svetlana (Irvine), Johnson, Russell (Firenze), Klein, Silvius (Princeton), Klopp, Frederic (Villetaneuse), Krikorian, Raphael (Palaiseau), Lenz, Daniel (Chemnitz), Puig, Joaquim (Barcelona), Schumacher, Christoph (Erlangen), Thieullen, Phillippe (Talence)

13.11.-19.11.05 Analysis and Computation of Microstructures in Finite Plasticity

Organizers: Klaus Hackl, Bochum
Sergio Conti, Duisburg-Essen
Michael Ortiz, Pasadena

ABSTRACT

Plastic material behaviour is typically the result of the interaction of complex substructures on a microscopic scale. Common models of finite plasticity are based on macroscopic, phenomenological approaches and do not take into account any micro-structural information. The miniworkshop focuses on the application of methods from the calculus of variations to models for microstructures in plasticity. In particular, the investigation of the relaxation of the underlying functional, corresponding to quasi-convexification of the energy density, allows us to gain interesting microscopic as well as macroscopic information.

PARTICIPANTS

Carstensen, Carsten (Berlin), Conti, Sergio (Duisburg), Dolzmann, Georg (College Park), Francfort, Gilles (Villetaneuse), Garroni, Adriana (Roma), Govindjee, Sanjay (Berkeley), Hackl, Klaus (Bochum), Mielke, Alexander (Berlin), Müller, Stefan (Leipzig), Neff, Patrizio (Darmstadt), Ortiz, Michael (Pasadena), Roubicek, Tomas (Praha), Schröder, Jörg (Essen), Theil, Florian (Coventry)

13.11.-19.11.05 Heterotic Strings, Derived Categories, and Stacks

Organizers: Bjorn Andreas, Berlin
Emanuel Scheidegger, Wien
Eric Sharpe, Salt Lake City
Ping Xu, University Park

ABSTRACT

This miniworkshop brought together both mathematicians and physicists interested in mathematical aspects of heterotic strings and physical aspects of derived categories and stacks. These three topics in mathematics and physics are all involved in modern approaches to and extensions of mirror symmetry, and much of the technical machinery in understanding their physics and mathematics overlap, so by bringing together experts in these areas we hope to help spur further developments.

PARTICIPANTS

Andreas, Björn (Berlin), Andreini, Elena (Trieste), Bartocci, Claudio (Genova), Braun, Volker (Philadelphia), Bruzzo, Ugo (Trieste), Hernandez Ruiperez, Daniel (Salamanca), Horja, R. Paul (Stillwater), Lazaroiu, Calin I. (Dublin), Macri, Emanuele (Trieste), Ploog, David (Berlin), Scheidegger, Emanuel (Wien), Schlesinger, Karl-Georg (Wien), Sharpe, Eric (Salt Lake City), Tomasiello, Alessandro (Stanford)

03.04.-09.04.05 Algebraic Cobordism

Organizers:	Marc Levine, Boston
	Fabien Morel, Paris

ABSTRACT

Over the years, many different types and flavors of cohomology theories for algebraic varieties have been constructed. Theories like étale cohomology or de Rham cohomology provide algebraic versions of the topological theory of singular cohomology. The Chow ring and algebraic K_0 are other examples, more directly tied to algebraic geometry. The work of Voevodsky enabled a systematic construction of cohomology theories on algebraic varieties. The study of so-called *oriented cohomology theories* led to the notion of *higher algebraic cobordism*. For a better understanding of these, Levine and Morel constructed a theory of *algebraic cobordism* Ω^*, which found various applications. The aim of this Arbeitsgemeinschaft was to present the theory of Algebraic Cobordism through the lines of the original articles of Levine and Morel.

PARTICIPANTS

Amini, Omid (München), Ayoub, Joseph (Paris), Biglari, Shahram (Bielefeld), Blottiere, David (Villetaneuse), Böckle, Gebhard (Essen), Boissiere, Samuel (Mainz), Brünjes, Lars (Regensburg), Bunke, Ulrich (Göttingen), Calmes, Baptiste (Edmonton), Deninger, Christopher (Münster), Esnault, Helene (Essen), Faltings, Gerd (Bonn), Gerhardt, Teena (Cambridge), Gille, Stefan (München), Hanke, Bernhard (München), Heinloth, Franziska (Essen), Herz, Gabriel (Münster), Hornbostel, Jens (Regensburg), Huber-Klawitter, Annette (Leipzig), Husemöller, Dale (Bonn), Jannsen, Uwe (Regensburg), Kerz, Moritz Caspar (Regensburg), Klingler, Bruno (Chicago), Knebusch, Manfred (Regensburg), Krashen, Daniel (New Haven), Lecomte, Florence (Strasbourg), Lehn, Manfred (Mainz), Levine, Marc (Boston), Lieblich, Max (Providence), Malagon Lopez, Jose de Jesus (Boston), Morel, Fabien (München), Müllner, Daniel (Heidelberg), Nenashev, Alexander (Toronto), Nieper-Wißkirchen, Marc (Mainz), Otwinowska, Ania (Chicago), Panin, Ivan (Bielefeld), Pelaez-Menaldo, Jose Pablo (Boston), Petras, Oliver (Mainz), Pimenov, Konstantin I. (St. Petersburg), Quick, Gereon (Münster), Riou, Joel (Paris), Röndigs, Oliver (Bielefeld), Rülling, Kay (Essen), Schmidt, Alexander (Regensburg), Schröer, Stefan (Düsseldorf), Schürmann, Jörg (Münster), Serpe, Christian (Münster), Skoda, Zoran (Zagreb), Spitzweck, Markus (Göttingen), Stienstra, Jan (Utrecht), Viehweg, Eckart (Essen), Wendt, Matthias (Leipzig), Wildeshaus, Jörg (Villetaneuse), Witte, Malte (Leipzig), Yagunov, Serge A. (St. Petersburg)

02.10.-08.10.05 Modern Foundations for Stable Homotopy Theory

Organizers: John Rognes, Oslo
                Stefan Schwede, Bonn

ABSTRACT

Stable homotopy theory started out as the study of generalized cohomology theories for topological spaces, in the incarnation of the stable homotopy category of spectra. In recent years, *spectral algebra* or *stable homotopical algebra* over structured ring spectra has become an important new direction in stable homotopy theory. This workshop provided an introduction to structured ring spectra and applications of spectral algebra, both within homotopy theory and in other areas of mathematics.

PARTICIPANTS

Ayoub, Joseph (Ivry sur Seine), Bauer, Stefan (Bielefeld), Brüning, Kristian (Paderborn), Brünjes, Lars (Regensburg), Bunke, Ulrich (Göttingen), Chernysh, Vladislav (Göttingen), Ebert, Johannes (Bonn), Elmendorf, Anthony D. (Hammond), Eppelmann, Thorsten (Heidelberg), Fausk, Halvard (Oslo), Giansiracusa, Jeffrey H. (Oxford), Gutierrez, Javier Jose (Barcelona), Hess, Kathryn P. (Lausanne), Hollander, Sharon (Jerusalem), Hornbostel, Jens (Regensburg), Husemöller, Dale (Bonn), Jannsen, Uwe (Regensburg), Jimenez-Esparza, Ramon (Strasbourg), Karamanov, Nasko (Strasbourg), Klingler, Bruno (Chicago), Kuessner, Thilo (Siegen), Kuhr, Johannes (Bochum), Kurke, Herbert (Berlin), Langer, Martin (Bonn), Milinkovic, Darko (Beograd), Müllner, Daniel (Heidelberg), Naumann, Niko (Regensburg), Nieper-Wißkirchen, Marc (Mainz), Panin, Ivan (Bielefeld), Quick, Gereon (Münster), Reich, Holger (Münster), Reinhard, Philipp (Glasgow), Rognes, John (Oslo), Roitzheim, Constanze (Bonn), Roth, Fridolin (Bonn), Schwede, Stefan (Bonn), Serpe, Christian (Münster), Singer, Julia (Bonn), Spitzweck, Markus (Göttingen), Szymik, Markus (Bochum), Valqui, Christian (San Miguel, Lima), Wahl, Nathalie (Chicago), Wang, Juan (Bonn), Weber, Julia (Bonn), Wiethaup, Moritz (Göttingen), Wüthrich, Samuel (Sheffield), Xicotencatl, Miguel A. (Bonn), Yudin, Ivan (Göttingen)

2.6 Oberwolfach-Seminare
OBERWOLFACH-SEMINAR 0520A

15.05.-21.05.05 Finite Group Schemes and p-divisible Groups
Organizers: Fabrizio Andreatta, Padova
Brian Conrad, Michigan
Rene Schoof, Rome

ABSTRACT
Finite group schemes and p-divisible groups are key notions in number theory and arithmetic algebraic geometry. They play an important part in the theory of abelian varieties. The proofs of important number theoretic results such as the Mordell Conjecture (Faltings' Theorem) and the Shimura-Taniyama conjecture make extensive use of the theory of group schemes and p-divisible groups.

In this seminar, we gave several applications to the theory of abelian varieties. We deduced Tate's local proof of a formula of Shimura-Taniyama that is fundamental in the theory of complex multiplication, and we obtained a p-adic version of Tate's isogeny theorem on abelian varieties over finite fields. In addition we show how p-divisible groups are used to understand the p-part of the Honda-Tate classification of simple abelian varieties over finite fields (up to isogeny).

PARTICIPANTS
Andreatta, Fabrizio (Padova), Arnold, Trevor (Ann Arbor), Baran, Burcu (Ankara), Berbec, Ioan (Berkeley), Brochard, Sylvain (Rennes), Cais, Bryden (Ann Arbor), Caruso, Xavier (Paris), Conrad, Brian (Ann Arbor), David, Agnes (Strasbourg), Hattori, Shin (Tokyo), Kass, Jesse (Cambridge), Kroll, Björn (Münster), Marigonda, Nicola (Milano), Nuccio, Filippo A.E. (Rom/I), Pottharst, Jonathan (Cambridge/USA), Rabinoff, Joseph (Stanford/USA), Sasaki, Shu (London), Schein, Michael (Cambridge), Schoof, Rene (Rom), Shin, Sug Woo (Cambridge), Stalder, Nicolas (Zürich), Tossici, Dajano (Rom), Viviani, Filippo (Rom), Volpato, Michael (Princeton), Weinstein, Jared (Berkeley), Wiech, Stefan (Münster), Yu, Yih-Jeng (Paris)

15.05.-21.05.05 Topological K-Theory for Non-commutative Algebras and Applications

Organizers: Joachim Cuntz, Münster
                 Ralf Meyer, Münster
                 Jonathan Rosenberg, Maryland

ABSTRACT

The first aim of the seminar was to introduce the ideas of topological K-theory for noncommutative algebras. After studying the ordinary (monovariant) K-theory for Banach and C^*-algebras, we introduced bivariant K-theories. A second aim was the discussion of some typical applications of these techniques, such as bivariant versions of the Atiyah-Singer index theorem containing significantly more information than the classical index theorem. Another topic, "twisted K-theory" has received much attention recently among mathematical physicists, and has a very natural interpretation using the K-theory of certain noncommutative C^*-algebras.

PARTICIPANTS

Aastrup, Johannes (Hannover), Carillo, Paulo (Paris), Carlsen, Toke (Trondheim), Cuntz, Joachim (Münster), Gomez-Aparicio, Maria P. (Paris), Grensing, Martin (Kiel), Grimstrup, Jesper (Kopenhagen), Hajac, Piotr M. (Warschau), Jawdat, Jamila (Manchester), Kyed, David (Bronshoj), Maldonado, Osmar (Neuchatel), Maszczyk, Tomasz (Warschau), Mendes, Sergio (Manchester), Mesland, Bram (Amsterdam), Meyer, Ralf (Münster), Mitchener, Paul (Göttingen), Norouzizadeh, Behnam (Göttingen), Otgonbayar, Uuye (University Park), Prudhon, Nicolas (Neuchatel), Rosenberg, Jonathan (College Park), Savin, Anton (Potsdam), Scholl, Matthew (Austin), Serie, Emmanuel (Paris), Solleveld, Maarten (Amsterdam), Soltan, Piotr (Warschau), Ypma, Fonger (Oxford)

09.10.-15.10.05 Bioinformatics Approaches for Finding cis-regulatory Motifs and Modules

Organizers: Wolfgang Huber, Cambridge, UK
Xiaole Shirley Liu, Cambridge, Mass.
Terry Speed, Melbourne/Berkeley

ABSTRACT

The process leading to a gene being transcribed in a cell involves one or more proteins called transcription factors binding to the genome near the "transcription start site". This aspect of the process is called cis-regulation and the proteins involved are called regulatory elements. The general theme of this seminar was finding these regulatory elements and the associated binding sites. In carrying out the task, a wide range of statistical methods have been found to be fruitful. The statistical topics discussed in this context included: robust linear models for microarray data, scan and related statistics, pairwise and multiple DNA and protein sequence alignment, probability models for motifs and modules (including HMMs), phylogenetic inference, product multinomial and dictionary models for DNA sequence, MCMC and Gibbs samplers, and linear models connecting sequence, expression and chromatin immunoprecipitation data.

PARTICIPANTS

Bais, Abha Singh (Berlin), Birmele, Etienne (Evry), Fried, Claudia (Leipzig), Geier, Florian (Freiburg), Huber, Wolfgang (Cambridge), Kirkilionis, Markus (Warwick), Klein, Holger (Berlin), Liu, Xiaole Shirley (Cambridge), Meier, Lukas (Zürich), Pape, Utz (Berlin), Prohaska, Sonja (Leipzig), Sbano, Luca (Warwick), Schwarz, Roland (Würzburg), Sklyar, Oleg (Cambridge), Speed, Terry P. (Berkeley)

09.10.-15.10.05 Deformations of Algebraic and Analytic Structures

Organizers: Ragnar-Olaf Buchweitz, Toronto
                  Hubert Flenner, Bochum

ABSTRACT

It was Riemann's insight that smooth compact complex curves of fixed genus g depend on 3g-3 complex parameters. Ground breaking work in deformation theory of higher dimensional complex manifolds was done by Kodaira and Spencer in the late 50s of the last century. They introduced the concept of a "versal deformation", which in a certain sense is a local moduli space. In its beginnings, this theory was basically concerned with variations of complex structures on a given complex manifold, and the theory of elliptic differential operators played a central role. Using ideas of Grothendieck, modern deformation theory was soon formalized, and, as a consequence, gained a much wider range of application, e.g., on singularities, vector bundles, and modules.

The seminar aimed at introducing the methods of deformation theory as tools for concrete problems in complex analytic and algebraic geometry, e.g.: formal deformation theory, versal and semi-universal deformation, criteria for smoothness and unobstructedness of the base space of a versal deformation, determination of the components of the semi-universal deformation, openness of versality, moduli spaces, cotangent complexes.

PARTICIPANTS

Alper, Jarod (Stanford), Bodnarchuk, Lesya (Kaiserslautern), Böhm, Janko (Saarbrücken), Brochard, Sylvain (Rennes), Buchweitz, Ragnar-Olaf (Toronto), Burban, Igor (Mainz), Buss, Guy (Leipzig), Caspar, Alexander (Zürich), Chatzistamatiou, Andr (Essen), Easton, Robert W. (Stanford), Flenner, Hubert (Bochum), Hauzer, Marcin (Warszawa), Hendler, Markus (Freiburg), Hengelbrock, Harald (Bochum), Hovinen, Bradford (Toronto), Kerber, Michael (Kaiserslautern), Kunte, Michael (Saarbrücken), Ledesma-Hernandez, Oscar (Essen), Liedtke, Christian (Düsseldorf), Petersen, Lars (Berlin), Ploog, David (Berlin), Ruddat, Helge (Freiburg), Rülling, Kay (Essen), Sachse, Christoph (Leipzig), Schlickewei, Ulrich (Bonn), Schruff, Stephan (Bochum), Seem, Ingrid (Oslo), Sevenheck, Christian (Mannheim), Stoppino, Lidia (Pavia), Thier, Christian (Freiburg), Vollmert, Robert (Berlin)

20.11.-26.11.05 Hemodynamical Flows: Aspects of Modeling, Analysis and Simulation

Organizers: Anne M. Robertson, Pittsburgh
Giovanni P. Galdi, Pittsburgh
Rolf Rannacher, Heidelberg
Stefan Turek, Dortmund

Abstract

The term "Hemodynamics" denotes fluid and structural mechanical processes occuring in the human blood circuit. Modeling, mathematical analysis and numerical simulation of these processes pose several peculiar problems: particle versus continuum mechanical description, determination of appropriate boundary conditions for micro-flows, choice of suitable liquid and wall models, fluid-structure interaction, particle transport in channels and pipes, in- and outflow boundary conditions, multi-model approaches, etc.

Accordingly, this seminar addressed the following topics connected to modeling, theoretical analysis as well as computational aspects: Continuum mechanical description of blood flow, Mechanical models of blood vessel walls, Analysis of Newtonian and non-Newtonian fluid models, Numerical methods for flow simulation, Aspects of mesh and model adaptivity, Particle transport in viscous flows, Flows through systems of pipes, Fluid-structure interaction in blood vessels.

Participants

Bastaninejad, Mahzad (Pittsburgh), Birken, Philipp (Kassel), Bodnar, Tomas (Praha), Bönisch, Sebastian (Heidelberg), Carpio, Jaime (Madrid), Coscia, Vincenzo (Ferrara), Cytowski, Maciej (Warszawa), Duell, Wolf-Patrick (Karlsruhe), Dunne, Thomas (Heidelberg), Galdi, Giovanni Paolo (Pittsburgh), Gonzalez, Sergio (Quito/Ecuador), Hesse, Helke Karin (Heidelberg), Hron, Jaroslav (Dortmund), Janela, Joao Paulo (Lisboa), Köster, Michael (Dortmund), Lorenz, Thomas (Heidelberg), Mazaheri, Ali (Pittsburgh), Rademacher, Andreas (Dortmund), Rannacher, Rolf (Heidelberg), Robertson, Anne M. (Pittsburgh), Ruzicka, Martin (Praha), Stiemer, Marcus (Dortmund), Surulescu, Christina (Heidelberg), Turek, Stefan (Dortmund), Volchek, David (Pittsburgh), Weller, Frederic (Heidelberg), Winkelmann, Christoph (Lausanne), Zakaria, Hasballah (Pittsburgh)

19.11.-25.11.05 Sphere Packings: Exceptional Geometric Structures and Connections to other Fields

Organizers: Henry Cohn, Seattle
Robert Griess, Ann Arbor
Achill Schürmann, Magdeburg

ABSTRACT

Going back to a booklet of Kepler in 1611, the problem of packing identical spheres as densely as possible in Euclidean space has a history of almost 400 years. Nevertheless, the problem in arbitrary dimensions is far from being solved. Attempts to solve it have led to the discovery of a wealth of mathematics, and the theory of sphere packings today is an active field of research providing many challenging open problems. It has connections to various mathematical areas, including number theory, coding theory, group theory, and harmonic analysis. The aim of this seminar was to introduce the participants to some of these mathematical flowers and to leave them with many loose ends for further study.

Topics included: Exceptional structures, lattices, codes, groups, designs, two-point homogeneous spaces, linear programming bounds, spherical codes, hyperbolic sphere packings, positive definite quadratic forms, reduction theories.

PARTICIPANTS

August, Ralph (Magdeburg), Bowert, Frank (Dortmund), Cohn, Henry (Seattle), Creignou, Jean (Bordeaux), Cuntz, Michael (Kaiserslautern), Darte, Alain (Lyon), Diet, Herve (Bordeaux), Fodor, Ferenc (Szeged), Frey, Darrin (Cedarville), Garcia, Natalia (London), Griess, Robert L. (Ann Arbor), Hentschel, Michael (Aachen), Houriet, Julien (Lausanne), Kirschmer, Markus (Aachen), Margulies, Susan (Davis), Meyer, Bertrand (Talence), Middleton, Ivan (Ann Arbor), Pache, Claude (Genf), Riener, Cordian (Leutkirch), Schürmann, Achill (Magdeburg), Sikiric, Mathieu Dutour (Jerusalem), Späth, Britta (Kaiserslautern), Tagami, Makoto (Fukuoka), Teider, Maria (Aachen), Vallentin, Frank (Jerusalem), Voigt, Ina (Dortmund), van Zwam, Stefan (Eindhoven)

2.7 Research in Pairs

Die folgenden Forscher nahmen 2005 am Research in Pairs Programm teil.

The following researchers attended the Research in Pairs Programme in 2005

Oliver, Marcel / Bremen Gottwald, Georg / Sydney	02.01.-30.01.2005
Pushnitski, Alexander / Loughborough Filonov, Nikolai / St. Petersburg	10.01.-04.02.2005
Schlenker, Jean-Marc / Toulouse Springborn, Boris / Berlin	16.01.-29.01.2005
Hajduk, Boguslaw / Olsztyn/War. Tralle, Aleksy / Olsztyn	23.01.-12.02.2005
Arslanov, Marat / Kazan Omanadze, Roland / Tbilisi	30.01.-26.02.2005
Fierro, Francesca / Mailand Siebert, Kunibert / Augsburg Veeser, Andreas / Mailand	13.02.-05.03.2005
Klawonn, Axel / Essen Wohlmuth, Barbara / Stuttgart	20.02.-05.03.2005
Filo, Jan / Bratislava Pluschke, Volker / Halle	06.03.-19.03.2005
Campillo, Antonio / Valladolid Lossen, Christoph / Kaiserslautern	07.03.-19.03.2005
Wellner, Jon / Washington Banerjee, Moulinath / Ann Arbor Balabdaoui, Fadoua / Seattle Maathuis, Marloes / Washington	13.03.-01.04.2005
Burban, Igor / Bonn Kreussler, Bernd / Limerick	29.03.-09.04.2005
Levenshtein, Vladimir / Moskau Konstantinova, Eva / Nowosibirsk	20.03.-02.04.2005
Barlet, Daniel / Nancy Magnusson, Jon / Island	03.04.-16.04.2005
Diblik, Josef / Brno Khusainov, Denys / Kiev	10.04.-23.04.2005
Roehrle, Gerhard / Birmingham Goodwin, Simon / Aarhus	17.04.-30.04.2005
Bochnak, Jocek / Amsterdam Kucharz, Wojcie / New Mexico	17.04.-11.06.2005
Neufang, Matthias / Ottawa Runde, Volker / Edmonton	01.05.-20.05.2005
Khavinson, Dmitry / Fayetteville Putinar, Mihai / Santa Barbara Shapiro, Harold / Stockholm	08.05.-28.05.2005
Hagedorn, Peter / Darmstadt Dasgupta, Anirvan / Kanpur Spelsberg-Korspeter, Gottfried / Darmstadt Hochlenert, Daniel / Darmstadt	15.05.-28.05.2005

Liese, Friedrich / Rostock Miescke, Klaus / Chicago	22.05.-04.06.2005
Polini, Claudia / Notre Dame Ulrich, Bernd / West Lafayette / USA	05.06.-18.06.2005
Gramlich, Rolf / Darmstadt Hoffman, Corneliu / Bowl. Green State Shpectorov, Sergey / Bowl. Green State	12.06.-25.06.2005
Muehlherr, Bernhard / Brüssel	12.06.-17.06.2005
Kauffmann, Louis / Chicago Lampropoulou, Sofia / Athen	19.06.-03.07.2005
Schmidt, Ralf / Norman Roberts, Brooks / Moscow	26.06.-09.07.2005
Tabachnikov, Serge / Pennsylania Fuchs, Dmitry / Davis	19.06.-09.07.2005
Hofmann, Thomas / Brown Univ. Schoelkopf, Bernard / Tübingen Smola, Alex / Australien	10.07.-23.07.2005
Shapiro, Michael / Michigan Vainshtein, Alek / Haifa	03.07.-30.07.2005
Gil, Juan B. / Altoona Krainer, Thomas / Potsdam Mendoza, Gerardo / Philadelphia	10.07.-23.07.2005
Deloera, Jesus / Davis Rambau, Jörg / Berlin Santos, Francisco / Santander	31.07.-13.08.2005
Saxl, Jan / Cambridge Van Bon, John / Calabria	24.07.-06.08.2005
Inglis, Nick / Cambridge	24.07.-28.07.2005
Bizon, Piotr / Krakau Wassermann, Arthur / Ann Arbor	31.07.-13.08.2005
Dimitrov, Ivan / Kingston Penkov, Ivan / Bremen	14.08.-27.08.2005
Geschke, Stefan / Berlin Kojman, Menachem / Ben Gurion Uni	14.08.-27.08.2005
Eichelsbacher, Peter / Bochum Reinert, Gesine / Oxford	14.08.-27.08.2005
Reissig, Michael / Freiberg Hirosawa, Fumihiko / Miyashiro	28.08.-10.09.2005
Macheras, Nikolaos / Piräus Musial, Kazimierz / Warschau Strauss, Werner / Stuttgart	28.08.-10.09.2005
Knöpfel, Holger / Chile Löwe, Matthias / Münster	11.09.-01.10.2005
Buchweitz, Ragnar Olaf / Toronto Flenner, Hubert / Bochum	18.09.-08.10.2005

Martini, Horst / Chemnitz	25.09.-08.10.2005	Hutter, Kolumban / Darmstadt	30.10.-26.11.2005
Spirova, Margarita / Sofia		Luca, Ioana / Bucharest	
Hedberg, Lars Inge / Linköping	25.09.-08.10.2005	Juyumaya, Jesus / Chile	30.10.-19.11.2005
Kruglyak, Natan / Lulea		Kannan, Senthamarai / Chennai	
Dziuk, Gerhard / Freiburg	18.09.-24.09.2005	Royston, Patrick / London	13.11.-26.11.2005
Elliot, M. / Brighton		Sauerbrei, Willi / Freiburg	
Deckelnick, K. / Magdeburg			
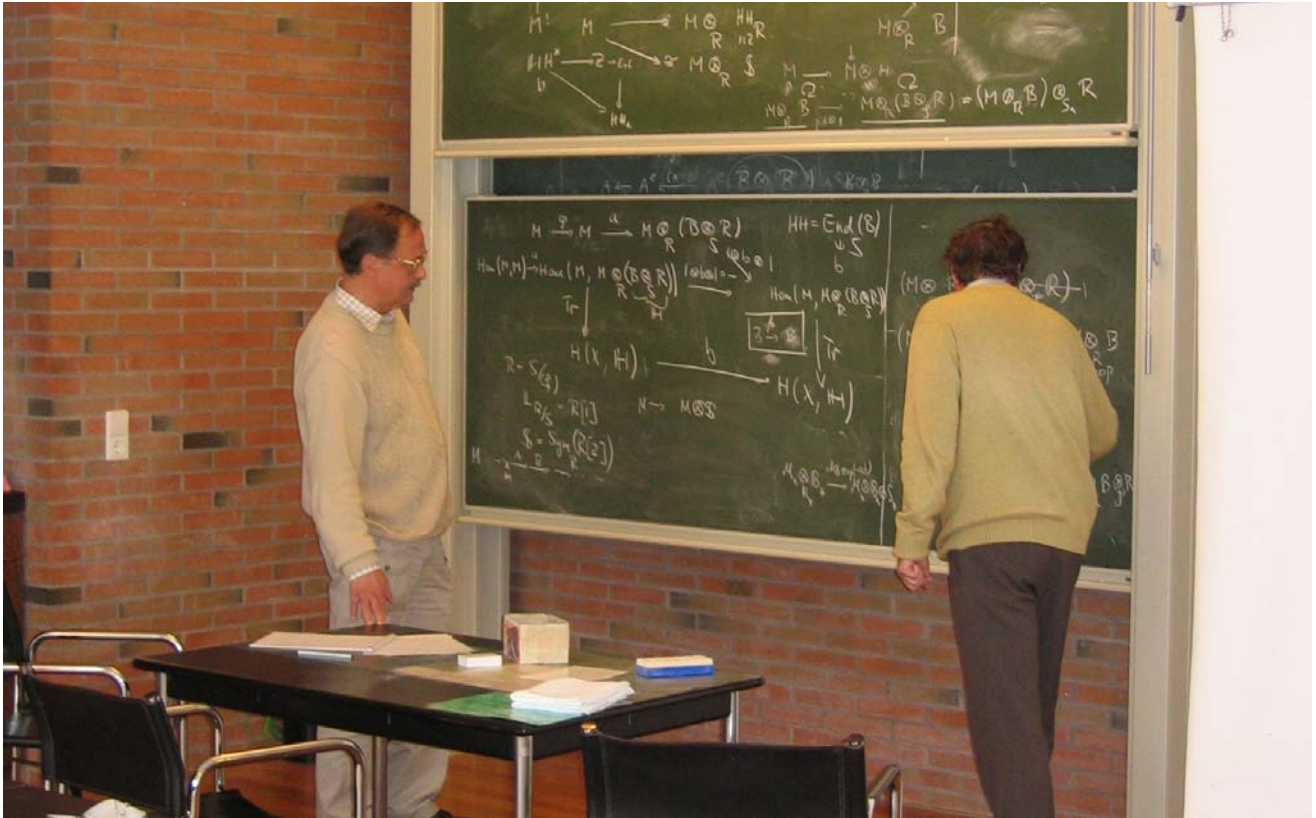
RiP guests at work: R.-O. Buchweitz and H. Flenner (2005)

3. Sachlicher und Finanzieller Teil

3.1 Übersicht der Bereiche

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

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

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

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

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

3.2 Bibliothek

Die Bibliothek ist und bleibt für die Wissenschaftler in Oberwolfach das wichtigste Arbeitsmittel. Die Bibliothek wird sowohl von den Teilnehmern der Workshops wie auch von den RiP-Forschern intensiv genutzt. Immer wieder kommen Mathematiker nach Oberwolfach, um Literatur zu bearbeiten, die für sie sonst nicht zugänglich ist. Die Bibliothek des MFO ist eine Präsenzbibliothek und für Institutsgäste rund um die Uhr geöffnet. Neben dem hohen internationalen Standard des wissenschaftlichen Programms und den exzellen-

3. General and financial statements

3.1 Overview on the divisions

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

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

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

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

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

3.2 Library

The library has been and will be the most important working tool for scientific research at Oberwolfach. It is intensely used by scientists participating in the workshops as well as in the RiP-programme. Repeatedly mathematicians are visiting Oberwolfach in order to use literature to which otherwise they would have no access. The Oberwolfach library is a reference library and can be used by the Institute's guests 24 hours a day. Besides the high international standard of the scientific programme and the excellent conditions for

ten Rahmenbedingungen für den persönlichen Gedankenaustausch ist die Bibliothek ein wichtiger Grund für das hohe Ansehen des MFO weltweit. Angesichts dramatisch steigender Preise bei den wissenschaftlichen Zeitschriften war es schwierig, dieses Niveau zu halten. Dies war nur möglich durch die Erhöhung der Landeszuwendung und durch Spenden des Fördervereins, der Oberwolfach-Stiftung, der Volkswagen AG und durch Sachspenden von Verlagen.

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

3.2.1 Bestandsüberblick

Zum Jahresende 2005 belief sich der im elektronischen Katalog nachgewiesene Gesamtbestand an Büchern auf etwa 41.000 Bände. Hinzu kamen ca. 25.000 Zeitschriftenbände.

Darüber hinaus standen den Institutsgästen ca. 3.500 Dissertationen, 499 laufende Zeitschriftenabonnements sowie 361 lizenzierte elektronische Zeitschriften zur Verfügung.

3.2.2 Bestandsentwicklung

Der Bestand an Büchern wurde im Jahr 2005 um insgesamt fast 1.700 Bände vermehrt. Davon wurde etwa ein Drittel von den wichtigsten internationalen wissenschaftlichen Verlagen für die ständige Buchausstellung gestiftet. Die ständige Buchausstellung gibt interessierten wissenschaftlichen Verlagen die Möglichkeit, ihre Neuerscheinungen im Bereich Mathematik am MFO über einen längeren Zeitraum zu präsentieren. Einige der bedeutendsten wissenschaftlichen Verlagshäuser weltweit beteiligen sich daran, teilweise mit ihrem gesamten mathematischen Programm.

Rund 200 Bücher wurden mit Hilfe spezieller Drittmittel angeschafft (Deutsche Forschungsgemeinschaft, Oberwolfach-Stiftung, Einzelspenden). Die Förderung durch die Deutsche Forschungsgemeinschaft (DFG) erstreckt sich über den Zeitraum 2004 bis 2007 im Rahmen der Förderprogramme „Spezialbibliotheken von besonderer Bedeutung" bzw. „Literaturerwerbungen der DFG-Sondersammelgebiete und Spezialbibliotheken" und dient speziell der Anschaffung von Büchern und Zeitschrif-

personal discussions and mutual exchange of ideas, it is the library that is responsible for the high reputation the MFO enjoys worldwide. In times of dramatically increasing prices of scientific journals it was difficult to keep up this level, but this was made possible by increased support from the federal state, by donations from the Förderverein, from the Oberwolfach-Stiftung, from the Volkswagen AG and by book donations from publishing houses.

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

3.2.1 Overview on the inventory

By the end of 2005 the stock of books included in our electronic catalogue totalled approx. 41,000 volumes and approx. 25,000 volumes of bound journals.

In addition to that, approximately 3,500 dissertations, 499 current subscriptions to journals as well as 361 licensed electronic journals are available.

3.2.2 Development of inventory

The book inventory increased in 2005 by nearly 1,700 volumes. One third of these were donated by the most important international publishing houses for our permanent book exhibition. The permanent book exhibition offers the possibility to interested scientific publishers of presenting their latest issues in the fields of mathematics for a longer period at the MFO. Some of the most important scientific publishing houses worldwide participate in this programme, some of them with their complete mathematical programme.

The purchase of about 200 volumes was realized with special third-party funds (Deutsche Forschungsgemeinschaft, Oberwolfach-Stiftung, special donations). The support given by the Deutsche Forschungsgemeinschaft (DFG) covers the period from 2004 to 2007 with the special programmes "Spezialbibliotheken von besonderer Bedeutung" respectively "Literaturerwerbungen der DFG-Sondersammelgebiete und Spezialbibliotheken" and is particularly intended for the purchase of

ten aus dem asiatischen und osteuropäischen Raum.

Eine umsichtige Haushaltsführung in allen Bereichen und zahlreiche Drittmittel ermöglichten es, den Zeitschriftenbestand zu sichern und sogar leicht auf knapp 500 Abonnements zu erhöhen. Gut ein Viertel davon wird im Rahmen von Spenden oder im Tausch gegen Institutspublikationen wie der Oberwolfach Reports bezogen.

Neben den konventionellen gedruckten Medien spielen elektronische Medien eine ständig wachsende Rolle. Das MFO hatte zum Jahresende 2005 insgesamt rund 360 elektronische Zeitschriften lizenziert.

3.2.3 Fotosammlung

Das MFO verfügt über eine sehr große Sammlung an Fotografien von Mathematikern. Unter denen, die zur Fotosammlung beitrugen, ist Herr Prof. Konrad Jacobs, Erlangen, besonders hervorzuheben. Die Fotosammlung ist im Jahr 2004 durch die großzügige Unterstützung des Springer Verlags Heidelberg digitalisiert worden. Regelmäßig kommen Gruppenfotos der Tagungen, Fotos einzelner Gäste des Instituts sowie uns von anderen überlassene Fotos hinzu. Aufgrund der speziellen Anforderungen erwies es sich als vorteilhaft, die zur Verwaltung der Fotos benötigte Software am Institut zu entwickeln.

Im Jahr 2005 konnte eine Datenbank zur Verwaltung der gesamten Sammlung in Betrieb genommen und über die Webseiten des Instituts verlinkt werden. So wurden unsere Fotos über das Internet einer breiten Öffentlichkeit zugänglich gemacht. Ende 2005 waren ca. 6.900 Fotos in der Datenbank enthalten.

3.2.4 Etikettierung und Bestandsrevision

Zum Jahresabschluß 2005 wurde eine Inventur durchgeführt. Zugleich wurden die Bücher mit einheitlichen Etiketten versehen. Der Vergleich mit der letzten Inventur vor ca. 10 Jahren ergab erfreulicherweise nur einen sehr geringen Fehlbestand.

books and journals from Asian and Eastern European countries.

Careful budgeting and numerous third-party funds made it possible to secure the stock of journals and even to slightly increase it to nearly 500 subscriptions, of which about 25 % come from donations or from the exchange of publications like the Oberwolfach Reports.

Besides the printed media electronic media are playing an increasing role, so that by the end of 2005 about 360 electronic journals were licensed by the MFO.

3.2.3 Photo collection

The MFO owns a large collection of photographs of mathematicians. Among those who have contributed to this photo collection should be mentioned in particular Professor Konrad Jacobs, Erlangen. The digitalization of this photo collection was realized in 2004 with the generous help of Springer Verlag Heidelberg. The Oberwolfach photo collection is extended regularly by photos taken from the weekly workshop groups, from individual guests, and by photos we receive from others. Due to the special requirements, the software needed for the administration of the photos was developed at the Institute.

In 2005 a database for this photo collection was implemented and linked with the Institute's webpage. This made it possible to give access to our collection – which totalled by the end of 2005 approx. 6,900 photos - to a wide public via the internet.

3.2.4 Labelling and stock revision

At the end of 2005 a stock revision and a uniform labelling of the books was undertaken. Compared with the last stock revision about 10 years ago, there was just a little stock shortage.

3.2.5 Bibliothekserweiterung

Da die Kapazität des nun fast 30 Jahre alten Bibliotheksgebäudes mittlerweise nahezu ausgeschöpft war, stellte das zweifellos wichtigste Projekt des Jahres 2005 die Planung und Beantragung der Erweiterung des Bibliotheksgebäudes dar. Für die Bewilligung und Finanzierung dieses Projektes, das eine Kapazitätserweiterung für die nächsten 20-25 Jahre bereitstellen wird, ist das MFO der Klaus Tschira Stiftung und VolkswagenStiftung zu großem Dank verpflichtet. Das Projekt soll bis Anfang 2007 abgeschlossen werden.

3.2.5 Enlargement of the library

Since the capacity of the now almost 30 years old library building is nearly reached, planning and application for the enlargement of the library building has been the most important project in 2005. Due to the generous support of the Klaus Tschira Stiftung and the VolkswagenStiftung, to which the MFO is very much obliged, the enlargement has been made possible and will provide capacity for the next 20-25 years. The project will be completed at the beginning of 2007.

Tagungs- und Bibliotheksgebäude vor der Erweiterung

3.3 IT-Bereich

Zweck der IT am MFO ist, den Gastforschern und den Verwaltungsmitarbeitern effektive Arbeitsmöglichkeiten zu bieten. Neben den üblichen Kommunikationsmittel (Web, E-Mail, Remote Login, Dateitransfer, Office-Produkte) beinhaltet dies Literaturrecherche und Zugriff auf online verfügbare Fachzeitschriften, die Nutzung mathematischer Software auf einem Computeserver, sowie die technische Ausstattung von Vortragssälen und Bibliothek (Beamer, Kopierer, Scanner). Darüber hinaus stehen die Webdienste des MFO der gesamten Scientific Community zur Verfügung.

Die Verwaltungsmitarbeiter können auf datenbankgestützte Softwareinstallationen für die Bereiche Tagungsverwaltung, Bibliothek und Finanzbuchhaltung zugreifen.

Die Webdienste des Instituts umfassen die „normalen" Webseiten, die Oberwolfach References on Mathematical Software, die Fotosammlung, den Bibliothekskatalog, den Zugang zu elektronischen Abonnements (nur intern) und die Oberwolfach Reports.

3.3.1 Bestand Ende 2005

Hardware

- Internetanbindung über das Deutsche Forschungsnetz (DFN-Verein) mit 2 Mbit/s Standleitung
- LAN mit Gigabit Ethernet Backbone und Fast Ethernet Peripherie, in 3 Gebäuden 5 Knoten mit ca. 100 Twisted Pair Anschlüssen und 2 WLAN Access Points
- Ca. 10 Server, teils für zentrale Dienste, teils als Terminal Server für die Arbeitsplätze
- Im Wissenschaftsbereich 18 fest installierte Arbeitsplätze, 6 Laptoparbeitsplätze, 13 Zimmer mit Netzwerkanschluß, wireless LAN
- Im Verwaltungsbereich 13 Arbeitsplätze

Software

Auf dem für alle Gastforscher zugänglichen Computeserver sind etwa 10 der am meisten nachgefragten wissenschaftlichen Softwaresysteme installiert, sowohl kommerzielle wie Maple, Mathematica, Matlab, Magma, MuPad und Reduce als auch freie wie Singular, Macaulay2, GAP und Cocoa.

3.3 IT Division

The purpose of the IT at the MFO is to provide guest researchers and administrative staff with effective working conditions. Besides the usual communication media (web, e-mail, remote login, file transfer, office products), this comprises retrieval of literature and access to online scientific journals, the use of mathematical software on an application server, and finally the technical equipment of lecture rooms and library (beamer, copier, scanner). In addition, the web services of the MFO are at the disposal of the whole scientific community.

Administrative staff members use databased software systems for the administration of conferences, library and financial accounting.

The web services of the Institute comprise the standard web pages, the Oberwolfach References on Mathematical Software, the photo collection, the library catalogue, access to subscribed electronic journals (only internally), and the Oberwolfach Reports.

3.3.1 Stock by the end of 2005

Hardware

- Internet connection via the Deutsches Forschungsnetz (DFN-Verein) with 2 Mbit/s leased line
- LAN with Gigabit Ethernet Backbone and Fast Ethernet Periphery, in 3 buildings 5 nodes with about 100 Twisted Pair connectors and 2 WLAN access points
- Ca. 10 servers, partly for central services, partly as terminal server for the workplaces
- In the scientific subnet 18 fixed terminals, 6 workplaces for laptops, 13 rooms with network connection, wireless LAN
- In the administrative subnet 13 workplaces

Software

On the application server, accessible to all guest researchers, about 10 of the most demanded mathematical software systems are installed, both commercial ones such as Maple, Mathematica, Matlab, Magma, MuPad, and Reduce, and freely distributed ones such as Singular, Macaulay2, GAP and Cocoa.

Schon Ende der achtziger Jahre wurde wegen der speziellen Anforderungen des Tagungsbetriebs am MFO eine datenbankgestützte Software entwickelt. Ferner wird die Finanzbuchhaltungs- und Finanzplanungssoftware OfficeLine 100 der Firma Sage sowie mit Unterstützung des Bibliotheksservicezentrums des Südwestdeutschen Bibliotheksverbundes die Bibliothekssoftware Horizon am MFO eingesetzt.

3.3.2 Entwicklungen und Neuerungen im Jahr 2005

Prägende Merkmale der IT sind das Vordringen in immer neue Aufgabenbereiche und der rasante technische Fortschritt. Damit geht am MFO die Umstellung der Server- und Clientlandschaft von Sparc-basierten Solarissystemen zu Intel/AMD-basierten Linux- und einigen Windowssystemen einher. Der älteste Server wurde vollständig abgelöst und die Ablösung von Firewall und Bandsicherung begonnen. Im Hinblick auf die zunehmende Nutzung mitgebrachter Laptops mit WLAN-Technologie wurde WLAN-Angebot des Instituts erweitert und seine Qualität verbessert, was sehr starken Zuspruch unter den Gastforschern findet. Es wird jedoch darauf geachtet, dass sich in den Gästezimmern (mit Ausnahme von RiP) kein Internetzugang befindet, um den persönlichen Gedankenaustausch, auch am Abend, zu fördern.

Am auffälligsten dürfte der komplette Austausch der Gästearbeitsplätze gewesen sein: Seit Februar 2005 stehen an den Arbeitsplätzen Thin Clients, die lediglich Sitzungen auf Linuxservern vermitteln. Jedem Gastforscher steht ein persönlicher Account zur Verfügung. Die Gäste sind mit den neuen Arbeitsplätzen sehr zufrieden; die Verwaltung der Arbeitsplätze ist einfacher und effektiver geworden. Seit Mai 2005 betreibt das MFO einen Computeserver mit der oben beschriebenen Ausstattung an mathematischer Software.

Already in the late 1980s a databased software was developed for the special requirements of organising the scientific programme at the MFO. The financial accounting and planning software Sage OfficeLine 100, and, supported by the Bibliotheksservicezentrums of the Südwestdeutscher Bibliotheksverbund, the librarian software Horizon is used at the MFO.

3.3.2 Developments and innovations in 2005

A characteristic of IT is the approach to ever new scopes of function and the rapid technical progress. Here, this development comes with the migration of the server and client scenery from Sparc-based Solaris systems to Intel/AMD-based Linux and some Windows systems. One of the oldest servers could be removed completely, and the replacement of firewall and tape backup has begun. As the guests increasingly bring along their own laptops with WLAN technology, the WLAN facilities of the Institute had been extended and its quality improved, which is very heavily used by the guest researchers. In order to encourage the personal exchange of ideas, especially in the evenings, the guest rooms do not have internet access (with the exception of the RiP-apartments).

The complete changeover of the workplaces has probably been the most obvious change for guests: Since February 2005, the workplaces have been equipped with thin clients that merely provide sessions on Linux servers. A personal account is available to every guest researcher. The guests are thoroughly contented with the new workplaces; the administration of the workplaces has become easier and more effective. Since May 2005, the MFO has been running an application server equipped with mathematical software as described above.

3.3.3 ORMS

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

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

Die ORMS befinden sich noch in der Entwicklung. Die Fortschritte im Jahr 2005 erlaubten jedoch bereits einen experimentellen Betrieb. Anfang 2006 wurden die ORMS offiziell freigegeben und auf Konferenzen präsentiert. Die Entwicklung der ORMS wurde durch die Deutsche Forschungsgemeinschaft und das Land Baden-Württemberg unterstützt.

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

Der wissenschaftliche Beirat des ORMS-Projekts hat sich 2005 konstituiert und besteht zur Zeit aus den folgenden sieben international führenden Experten für mathematische Software:

3.3.3 ORMS

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

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

The ORMS project is still under development. However, progress in 2005 allowed an experimental use of ORMS. In the beginning of 2006, ORMS was officially released and presented at conferences. The development of the ORMS was supported by the Deutsche Forschungsgemeinschaft and the land Baden-Württemberg.

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

The scientific advisory board of the ORMS project was constituted in 2005. At the moment, it is formed by the following seven leading international experts for mathematical software:

ORMS advisory board:

Arjeh Cohen
   (computational algebra, Lie groups, OpenMath)
Iain S. Duff
   (numerical linear algebra, sparse matrices)
Andreas Griewank
   (nonlinear optimization, algorithmic/automatic differentiation)
Wolfgang Härdle
   (statistics, econometrics)
Michael Joswig
   (geometric combinatorics, polyhedral computation, computational
geometry,
    discrete and linear optimization)
Erich Kaltofen
   (straight-line program/black-box representation, symbolic linear algebra,
   symbolic-numeric computation, generic software)
Nobuki Takayama
   (computational algebraic analysis, integration of mathematical software
   systems)

Neue Arbeitsplätze / New workplaces (thin clients)

3.4 Verwaltung und Hauswirtschaft

Das Mathematische Forschungsinstitut Oberwolfach wird seit dem 01.03.2005 als gemeinnützige GmbH geführt. Die Umstrukturierung wurde durch die Aufnahme des Instituts in die gemeinsame Bund-Länder-Förderung nötig.

Aufgrund der Beschlüsse der Bund-Länder-Kommission für Bildungsplanung und Forschungsförderung hat das MFO als Mitglied der Leibniz-Gemeinschaft für das Haushaltsjahr 2006 erstmals ein Programmbudget erstellt. Dazu war die Einführung einer Kosten-Leistungsrechnung erforderlich, die gleichzeitig mit der Gründung der gGmbH und der Umstellung von Kameralistik auf kaufmännische Buchhaltung eingeführt wurde. Das MFO nutzt für die Finanzbuchhaltung die Software „Office Line 100" der Firma Sage.

Der Verwaltungsbereich umfasst derzeit 8,25 besetzte Stellen für die wissenschaftliche Verwaltung (Planung und Organisation der wissenschaftlichen Programme, Drittmitteleinwerbung), die Bibliothek, die IT sowie für die allgemeine Verwaltung (Finanzverwaltung, Beschaffungswesen, Personalsachbearbeitung, Vertragswesen, Öffentlichkeitsarbeit, Drittmittelverwaltung usw.).

Der Hauswirtschaftsbereich des Instituts unterstützt die Durchführung der wissenschaftlichen Programme, indem die Gastforscher im Gästehaus des Instituts Unterkunft und Verpflegung erhalten. Das Gästehaus wurde mit Mitteln der VolkswagenStiftung erbaut und 1967 eingeweiht. Die Wissenschaftler sind überwiegend in Einzelzimmern untergebracht, jedoch gibt es auch 8 größere Appartements sowie 5 Bungalows. Dadurch sind längere Aufenthalte im Rahmen des RiP-Programmes möglich. Der Hauswirtschaftsbereich umfasst insgesamt 12 Stellen für Küche und Zimmerservice sowie für die Pflege von Gebäuden und Grundstück. Aufgrund des Alters der Gebäude stellt der Erhalt der Bausubstanz eine wichtige Aufgabe dar.

Das Tagungsgebäude liegt dem Gästehaus direkt gegenüber und wurde ebenfalls mit Mitteln der VolkswagenStiftung erbaut. Es ersetzte das frühere Tagungsgebäude (den „Lorenzenhof") und wurde 1975 eingeweiht. Es bietet den Forschungsgästen exzellente Arbeitsmöglichkeiten und umfasst die Bibliothek, mehrere Vortragsräume und Computerarbeitsplätze. Ferner ist die wissenschaftliche Verwal-

3.4. Administration and housekeeping

Since March 1st, 2005, the Institute has been registered as a non-profit GmbH. Since the Institute has been accepted in the Bund-Länder Förderung, this restructuring became necessary.

According to the resolution of the Federal state-Länder-committee for education and research the MFO has established a budget-plan for the first time in the fiscal year 2006. The foundation of the gGmbH made it necessary to set up cost accounting. At the same time fiscal accounting has been replaced by commercial accounting. Software "Office Line 100" by Sage is used for accounting.

The administration holds at the moment 8.25 positions, covering scientific administration (planning and organisation of the scientific programme, third-party funding), library, IT-services and general administration (financial management, purchasing, marketing, personnel administration, contracts, third-party funds, etc.)

Since board and lodging is provided by the Institute, housekeeping is also part of the MFO's structure. The guest house was built with financial funding of the Volkswagen-Stiftung and was inaugurated in 1967. Accommodation is mainly provided in single rooms, as well as in 8 bigger appartments and 5 bungalows, so that also longer stays within the RiP-programme are possible. In housekeeping there are 12 positions for room and kitchen service as well as for the maintenance of buildings and premises. Due to their age, the maintenance of the buildings is of greatest importance.

The library building is located immediately downhill from the guest house and was erected with funds of the VolkswagenStiftung as well. It has replaced the former building (called "Lorenzenhof") and was inaugurated in 1975. Hosting the library, several lecture halls, and numerous computer places it offers excellent working conditions for scientific research. The offices of the scientific administration are also part of this

tung dort untergebracht. Die Nähe von Tagungsgebäude und Gästehaus erweist sich als sehr effizient, bietet sie den Wissenschaftlern doch rund um die Uhr die Möglichkeit zu kreativer Arbeit, was intensiv genutzt wird.

building. The short distance between the guest house and the library building is very convenient and offers scientists the possibility to work at any time, which is eagerly taken up.

3.5 Finanzielle Übersicht 2005

3.5.1 Gesamtübersicht

3.5 Financial overview 2005

3.5.1 General overview

Erlöse 2005
(gerundet auf 1.000 Euro)

Revenues 2005
(rounded)

Zuwendung des Landes Baden-Württemberg (inklusive Zuschuss für Bausanierungsmaßnahmen)	Benefits from the land Baden-Württemberg (incl. Subsidy for remedial actions)	1.600.000
Drittmittel (ohne die Drittmittel mit Zweckbindung für 2006)	Third party funds (without those dedicated to the fiscal year 2006)	402.000
Spenden	Donations	52.000
sonstige Einnahmen	Other income	93.000
zweckgebundene Reste aus 2004	Earmarked surpluses	100.000
Summe Erlöse:	**Total Revenues**	**2.247.000**

Aufwendungen 2005
(gerundet auf 1.000 Euro)

Expenses 2005
(rounded)

Personalausgaben	Personnel department	894.000
Materialaufwand	Purchases	269.000
Aufwand für bezogene Leistungen (inklusive Bausanierungsmaßnahmen)	Expenses for drawn benefits (including remediation of buildings)	279.000
Abschreibungen	Consumption of fixed capital	10.000
sonstige Aufwendungen (inklusive Sachausgaben Bibliothek)	Other expenses (with material expenses for the library)	646.000
Rückstellungen für zweckgebundene Reste (ohne Drittmittel mit Zweckbindung 2006)	Provisions for earmarked surpluses (without third party funds dedicated to the fiscal year 2006)	59.000
Investitionen	Investment	90.000
Summe Aufwendungen:	**Total expenses**	**2.247.000**

Erläuterungen:
Die angeführten Zahlen sind eine Zusammenfassung des gesamten Geschäftsjahres 2005, beinhalten also auch Januar und Februar 2005, als das Institut noch als Teil der Gesellschaft für mathematische Forschung e.V. geführt wurde.
Bei der Position ‚Drittmittel' (Erlöse) und bei den ‚Rückstellungen für zweckgebundene Reste' (Aufwendungen) wurden die EU-Mittel ausgeklammert, die dem MFO bereits im Dezember 2005 mit Zweckbindung für das Haushaltsjahr 2006 überwiesen wurden.

Der Anteil nichtöffentlicher Mittel (eigene Einnahmen, Drittmittel und Spenden) an der Ge-

Explanations
The quoted figures summarize the fiscal year 2005, so January and February 2005 are included as well, the Institute still being part of the Gesellschaft für mathematische Forschung e.V during this period of time.

In the sections 'third-party funds' (revenues) and 'provisions for earmarked surpluses' (expenses), the funds from the EU which the Institute had already received in December 2005 for the fiscal year 2006, are excluded.

The proportion of private resources (own income, third-party funds and donations) in the total sum

samtsumme der Erlöse liegt im Haushaltsjahr 2005 bei 26,6%. Hierbei ist zu bedenken, dass Drittmittelprojekte immer zeitlich befristet sind und sich die Bedingungen der Einwerbung im Bereich der Grundlagenforschung stets ändern. Beispielsweise ist das Marie-Curie-Konferenzprogramm der EU im siebten Rahmenprogramm ab 2008 nicht mehr vorgesehen.

Ganz besonders hervorzuheben ist im Haushaltsjahr 2005, dass ein Antrag der MFO gGmbH bei der VolkswagenStiftung und der Klaus Tschira Stiftung für die Erweiterung des Bibliotheksgebäudes in vollem Umfang bewilligt wurde. Die Bewilligung beträgt 816.000 Euro. Die Baumaßnahme wird im Haushaltsjahr 2006 durchgeführt.

3.5.2 Öffentliche Mittel

Das MFO erhielt im Haushaltsjahr 2005 insgesamt 1,6 Mio. Euro Zuwendung vom Land Baden-Württemberg. Darin enthalten ist eine großzügige Sonderzuwendung in Höhe von 210.000 Euro mit der die akuten Schäden am Flachdach sowie an den Fenstern, den Terrassenbelägen und den Regenabflüssen im 3. OG des Gästehauses beseitigt werden konnten.

3.5.3 Drittmittel

Die projektbezogenen Drittmittel rekrutierten sich im Haushaltsjahr 2005 insbesondere aus Mitteln der Europäischen Union (EU), der Deutschen Forschungsgemeinschaft (DFG), der Japan Association of Mathematical Sciences (JAMS) und der National Science Foundation (NSF). Durch die umfangreiche Förderung der EU im Rahmen des Marie-Curie Programms wurden in 2005 364 Teilnehmer in 18 Tagungen unterstützt. Die DFG unterstützte die Bibliothek und das ORMS-Projekt sowie insgesamt 10 osteuropäische Forscher, die an 6 Workshops am MFO teilnahmen. Die Mittel der JAMS wurden für Aufenthaltskosten von 24 japanischen Gästen verwendet. Wie in 2004 ist hervorzuheben, dass die NSF Mittel für „US Junior Oberwolfach Fellows" für den Zeitraum März 2005 bis Februar 2006 gewährt hat. Mit diesen Geldern konnte der Aufenthalt von 92 jungen US-Amerikanern unterstützt werden. Die Fortsetzung dieses Projekts wurde inzwischen für weitere 5 Jahre bewilligt.

of revenues was 26.6% in the fiscal year 2005. In this context, it has to be considered that third-party funded projects always have a time limit, and that conditions for application of funds in the area of fundamental research are constantly changing. For example, the Marie Curie Actions of the EU do not appear any more in the 7th EC Framework programme for the year 2008.

It is especially important to mention that in the fiscal year 2005 the VolkswagenStiftung and the Klaus Tschira Stiftung have decided to sponsor the extension of the library building. The sponsorship amounts to 816.000 Euro. The construction work will take place in the fiscal year 2006.

3.5.2. Public funding

In the fiscal year 2005 the MFO received 1.6 million Euro funding from the state of Baden-Württemberg. This amount includes a generous special fund of 210.000 Euro in order to repair structural damages to windows, balcony-floorings and drains on the top floor of the guesthouse.

3.5.3. Third-party funds

Earmarked third-party funds in the fiscal year 2005 are mainly composed of the grants from the European Union (EU), the Deutschen Forschungsgemeinschaft (DFG), the Japan Association of Mathematical Sciences (JAMS) and the National Science Foundation (NSF). The substantial grant of the 7th EC Framework programme for the year 2005 made it possible to support 364 participants in 18 workshops. The DFG kindly supported the library as well as the ORMS project and also 10 scientists from Eastern European countries who participated in 6 workshops at the MFO. The funds from JAMS financed board and lodging of Japanese participants. Like in 2004, the National Science Foundation (NSF) has granted the financial support for "US Junior Oberwolfach Fellows" for the period from March 2005 to February 2006. With these funds it was possible to support 92 young US-American scientiests staying at the MFO. In the meantime this project has been granted for another five years.

3.5.4 Förderverein und Oberwolfach Stiftung

Zweckgebundene Spenden erhielt das MFO vom Förderverein und der Oberwolfach-Stiftung. Die Gelder wurden für Reisekostenzuschüsse für 12 osteuropäische Wissenschaftler, die Unterstützung der Bibliothek (Bücher und Zeitschriften) sowie als Zuschuss zu den Bausanierungsmaßnahmen (Flachdach und 3. OG) verwendet. Weitere Gelder von Stiftung und Förderverein ermöglichten es der Gesellschaft für mathematische Forschung e.V., das zum Institut gehörende Grundstück zu erweitern. Dies war insbesondere für den Anbau am Bibliotheksgebäude notwendig.

Besonders hervorzuheben ist auch, dass die Amerikanerin Rosemary Lonergan der Oberwolfach-Stiftung 50.000 US-Dollar als Spende zur Verfügung stellte, um an den Einsatz des Mathematikers John Todd für seine Fachkollegen in Deutschland nach Ende des Zweiten Weltkrieges zu erinnern. Ein Teil des Geldes wird zur Finanzierung einer "John Todd Fellowship" am MFO verwendet, die alle drei Jahre verliehen werden soll. Aus diesem Anlass fand am 17. Mai 2005 eine Feierstunde in Oberwolfach statt.

3.5.5 Sonstige Spenden

Weitere Unterstützung erhielt das Institut von der Württembergischen Versicherung für die Erneuerung des Rechnernetzes für die Gäste. Das MFO erhielt zahlreiche weitere Einzelspenden und bedankt sich, auch im Namen aller Gäste des MFO, bei allen Spendern sehr herzlich.

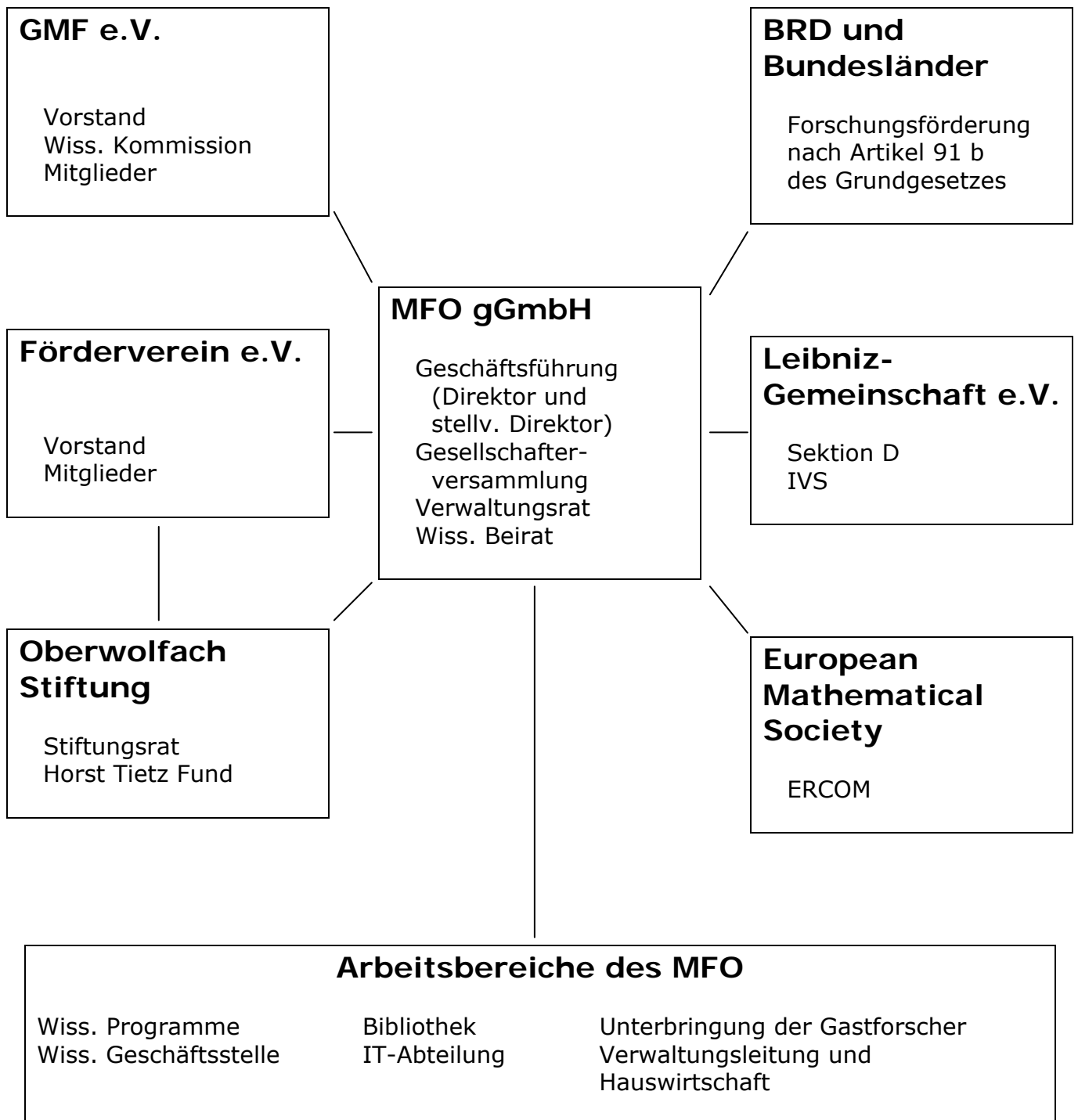### 3.5.4 Förderverein and Oberwolfach Stiftung

Earmarked donations have been received by the Förderverein and the Oberwolfach Stiftung. These funds have been used to support Eastern European scientists, the library (books and journals) and as additional support for renovation measures (the flat roof and top floor of the guest house). Further financial support through the Stiftung and the Förderverein enabled the Gesellschaft für mathematische Forschung e.V. to expand the property of the Institute, required for the extension of the library building

It also has to be particularly emphasized that Ms Rosemary Lonergan (a US-citizen) provided the Oberwolfach foundation with a donation of 50,000 U.S. dollars in order to commemorate the efforts of the mathematician John Todd on behalf of his German colleagues after the end of the second World War. A part of the money is used for financing the "John Todd Fellowship" at the MFO, which will be awarded every three years. On this occasion a ceremony took place in Oberwolfach on May 17th, 2005.

3.5.5. Other donations

The Institute received further financial support from the Württembergische Versicherung, which has been used for the renewal of our computer network for our guests. The MFO expresses its gratitude for numerous individual donations, and would like to thank, also in the name of its guests, its kind donors.

3.6 Organigramm
Mathematisches Forschungsinstitut Oberwolfach

GMF e.V.

Vorstand
Wiss. Kommission
Mitglieder

BRD und Bundesländer

Forschungsförderung
nach Artikel 91 b
des Grundgesetzes

MFO gGmbH

Geschäftsführung
(Direktor und
stellv. Direktor)
Gesellschafter-
versammlung
Verwaltungsrat
Wiss. Beirat

Förderverein e.V.

Vorstand
Mitglieder

Leibniz-Gemeinschaft e.V.

Sektion D
IVS

Oberwolfach Stiftung

Stiftungsrat
Horst Tietz Fund

European Mathematical Society

ERCOM

Arbeitsbereiche des MFO

Wiss. Programme	Bibliothek	Unterbringung der Gastforscher
Wiss. Geschäftsstelle	IT-Abteilung	Verwaltungsleitung und Hauswirtschaft

Erläuterungen:

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

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

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

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Prof. Dr. Gert-Martin Greuel, Director
Prof. Dr. Horst Knörrer, Vice Director
Dr. Stephan Klaus, Assistant to Director

Administration
Silke Okon and Andrea Schillinger, Secretaries (Prearrangement of Workshops)
Petra Bäsell, Secretary (Prearrangement of Research in Pairs and Oberwolfach Seminars)
Verena Franke and Renate Schmid, Library Staff
Helmut Kastenholz, System Administrator
Michael Brickenstein, System Administrator/Software Developer
Annette Disch, Guest Office (Gästebüro)
Ingeborg Pietzko, Guest Office (Gästebüro)
Susanne Riester, Head of Administration (Verwaltungsleiterin)

Housekeeping
Luitgard Ilg, Housekeeping Manager (Hauswirtschaftsleiterin)
Helmut Breithaupt, Caretaker (Hausmeister)
and further housekeeping staff

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(Members 2005)

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Sabine Hieber, Bundesministerium für Bildung und Forschung, Bonn (Vice Chair)
Prof. Dr. Jean-Pierre Bourguignon, Director of the Institut des Hautes Études Scientifiques, Bures-sur-Yvette
Prof. Dr. Dr. h.c. mult. Willi Jäger, Interdisziplinäres Zentrum für wiss. Rechnen und Institut für angewandte Mathematik, University of Heidelberg
Prof. Dr. Hanspeter Kraft, Mathematisches Institut, University of Basel
Dr. Wilhelm Krull, Generalsekretär der VolkswagenStiftung, Hannover
Friedrich Simson, Ministerium für Bildung, Kultur und Wissenschaft, Saarbrücken

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(Appointed members at the end of 2005)

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(Members 2005)

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Prof. Dr. Hanspeter Kraft (Basel), Chair of the Scientific Board
Prof. Dr. Friedrich Götze (Bielefeld), Treasurer

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(Members 2005)

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Prof. Dr. Joachim Cuntz, Münster
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