# *News from the* INSTITUTES

PLASMA PHYSICS

## Four Decades of Research into Energy for the Future

**Staff at the Max Planck Institute for Plasma Physics (IPP) in Garching celebrated four anniversaries at once in October – fusion of a very special kind. For the past 40 years the Institute has been dedicated to nuclear fusion research for energy production on earth. The celebrations also marked IPP's 30-year membership of the Max Planck Society, and commemorated the world's first demonstration of a purely stellarator-operated fusion experiment 20 years ago, as well as 10 successful years of operating ASDEX Upgrade, Germany's largest fusion facility. The festivities were held in the company of Edmund Stoiber, Premier of Bavaria, Hubert Markl, president of the Max Planck Society, and representatives of the German Federal Research Ministry, the European Union and many guests of honour.**


Prominent birthday guests, from left: Karl Tichmann, IPP administrative manager, Fritz Vahrenholt, chairman of the board of REpower Systems AG, Hermann Schunck, Federal Ministry for Education and Research, Hubert Markl, president of the Max Planck Society and the Bavarian Premier Edmund Stoiber – seen here on the left whilst giving his address.

PHOTOS: MPI FOR PLASMA PHYSICS, IPP

In the late forties nuclear fusion research was begun with the aim of developing power plants, which, like the sun, would produce energy by fusing atomic nuclei. In order to ignite the flames of fusion. a thin plasma made up of deuterium and tritium hydrogens must first be confined in heat insulated magnetic fields, and then heated to more than 100 million degrees. In 1960 the Max Planck Society in partnership with Werner Heisenberg founded IPP as the Institut für Plasmaphysik GmbH, and in 1961 it was integrated into the European fusion programme through an association with Euratom. In 1971 it became the Max Planck Institute for Plasma Physics. With around 1,000 employees it is currently one of Europe's largest and most successful nuclear fusion centres. Alexander Bradshaw, the Institute's Scientific Director, declared that the cause for celebration was provided by the important milestones achieved by IPP's advances in stellarator and tokamak technologies for the confinement of plasmas. He added, "Just before the end of the 20th century, the global fusion community was able to demonstrate the feasibility of nuclear fusion as a source of energy by conducting experiments which proved that fusion reaction produced considerable power."

When first established, IPP's scope was very broad, and the performance of plasma was studied through a variety of magnetic plasma confinement methods. The first stellarator, WENDELSTEIN 1a, went into operation in 1961. Globally, the experimental results of the sixties remained unsatisfactory despite major advances in knowledge. However, the small stellarator in Garching, the 'Munich mystery', worked well. Furthermore, WENDELSTEIN 2a proved in 1969 that, just as theory would lead one to expect, it is in fact possible to confine plasma effectively in stellarators with relatively cool, low-density model plasmas. Nevertheless, international research took a different direction. In 1968 Soviet fusion scientists publicised their outstanding T3 tokamak results. Their invention was said to be a considerable improvement on the confinement and stabilisation characteristics of all preceding systems and triggered a global 'tokamak fever'. However, since their results had been so encouraging, IPP's work on the stellarator continued, and in 1970 planning also began on the first tokamak, Pulsator, which was put into operation in 1973. Since then the Institute is the only place in the world where both are subjected to comparative investigation.

Tokamaks produce a magnetic cage by means of both magnetic coils outside the plasma and by current flowing through the plasma. Since the current also produces the initial heat for the plasma, the tokamak principle is considered particularly effective. On the other hand, stellarators enclose the plasma with magnetic fields produced solely by external magnetic coils.

In 1980, IPP put their new tokamak ASDEX (Axially Symmetric Divertor EXperiment) into operation, which, by 1982, had helped them discover the so-called H Regime (high confinement regime), which made it possible to double the heat insulation available. This was achieved by means of a special configuration of magnetic fields, known as the divertor. However, stellarators also proved a success, and in 1980 the first demonstration in the world of the pure stellarator principle – confinement without plasma current – took place in Garching using a hot plasma. Building on these successes, IPP began operating the additionally developed WENDELSTEIN 7-AS stellarator in 1988. Since then it has broken every record for its size group.

In parallel, the European JET (Joint European Taurus) tokamak went into operation in 1983 as a joint experiment with the participation of IPP. Because JET achieved excellent plasma values during the initial operational stage, the heads of the Soviet, French and US governments agreed in 1985 to conduct the ITER (International Thermonuclear Reactor) fusion experiment. The aims of this experiment were to demonstrate that it was possible to gain energy from the fusion of atomic nuclei, and to produce for the first time plasma that could burn for an extended period of time and generate energy. In addition, it would serve to test major technical functions of power plants. Between 1988 and 1990 the European-Japanese-American-Russian ITER planning group worked on the design of the test reactor at IPP in Garching.

In 1991, the European JET tokamak achieved the reaction foreseen for power plants for the first time in the history of fusion research: more than a megawatt of thermal fusion power was released in a 'diluted' deuterium-tritium plasma. In 1997, JET was able to produce 14 megawatts of thermal fusion power for two seconds; hence 65 percent of the power required to ignite the plasma was regained by each fusion. The prerequisite for these results was a conversion to divertor operation following the model provided by IPP's ASDEX. Given the requirements of the European fusion programme, the new and improved ASDEX Upgrade divertor construction seemed particularly suitable for ITER. Sure enough, the designs for ITER, completed three years ago, essentially resemble an enlarged replica of the system in Garching. A site is currently being sought for the construction of the test reactor. However, IPP also continued its stellarator studies, and the next stellarator, WENDELSTEIN 7-X, is currently under construction at IPP's sub-institute at Greifswald. This sub-institute was established in 1994 as a contribution to the development of the research sector in eastern Germany.

Following the closure of the GDR's Central Institute for Electron Physics two years earlier, the Plasmadiagnostics division was established in Berlin. "Thanks to this we were able to maintain the former GDR's research potential in the field of plasma science and to involve them in new projects for the future", the president of the Max Planck Society Hubert Markl said during the anniversary celebrations. He added that today's IPP had "both feet securely on the ground". ●


There's nothing like starting young when it comes to science: this Beijing schoolboy was clearly delighted by his visit to the Science Tunnel and enjoyed being interviewed by Chinese state television.

SCIENCE-TUNNEL

## Crowd-Puller in the Middle Kingdom

**The Max Planck Society Science Tunnel was all the rage in the Middle Kingdom in 2001. The multi media exhibition, which is approximately 170-metres long and guides visitors into the world of research, visited Beijing and Shanghai on its tour of China. The Max Planck Society first showed the Science Tunnel at EXPO 2000's theme park in Hannover.**

Between 29th April and 10th October 2001 over one million visitors came to see the exhibition held at Beijing's Science and Technology Museum. With the assistance of the Shanghai Association for Science and Technology and the City Council of Shanghai, the 'tunnel of discovery' was subsequently transported on two trucks from Beijing to Shanghai where it was exhibited from 8th November to 4th December 2001. The Science Tunnel provides something akin to a 'zoom' for insights into the micro- and macrocosms. The exhibition route is divided into twelve stages ranging from the smallest particles to the largest structures of the universe. This holistic depiction of modern research into micro- and macrocosms is both in tune with traditional Chinese thought, and the perfect tool for communicating Germany's international capabilities and research appeal.

The Science Tunnel will be visiting various European cities throughout 2002 . For a 'virtual tour' of the exhibition please visit www.sciencetunnel.de/ or, if you would like to leaf through the Max Planck Society's 'Research Perspectives 2000+' see http://2000plus.mpg.de/ ●

PHOTO: ARCHIMEDES

MAX PLANCK RESEARCH AWARD

# Achieving Excellence with International Partners

**Max Planck Society and Alexander von Humboldt Foundation honor 12 scientists with the Max Planck Research Award / gala ceremony in Berlin.**
**On November 28, 2001, the Max Planck Society and the Alexander von Humboldt Foundation awarded 4 scientists working outside Germany and 8 scientists working in Germany with the Max Planck Research Award 2001. The award, which is endowed with 125,000 Euro respectively, goes to 12 scientists from 6 different disciplines. The Max Planck Research Awards for exceptional international scientific achievements were presented by the President of the Max Planck Society, Prof. Hubert Markl, in a ceremony at the Harnack Haus in Berlin-Dahlem.**

The twelve award-winners (from left): Matthias R. Scheffler, Andreas Griewank, Benedict Moldovanu, Adolf Hoffmann, Felix Otto, Arthur Konnerth, Igor Kukushkin, Gérard A. Maugin, Frank Arnold, Alexander J. Varshavsky, Horst Kessler, Frans Carl de Schryver.

PHOTO: MPS / BILDSCHÖN

Dr. Uwe Thomas, the Secretary of State in the Federal Ministry for Education and Research, gave an address, and Prof. Adolf Hoffmann, Director of the German Archaeological Institute in Istanbul, gave a talk on the tasks involved in researching the architectural construction of ancient monuments.
This is the 12th time the Max Planck Research Award for International Cooperation has been awarded to foreign and German scientists alike for exceptional internationally-recognized scientific research achievements. Each award is doted with 125,000 Euro and enables German researchers to initiate, deepen or expand research cooperation with partners outside of Germany. Similarly, the award enables foreign recipients to establish a basis for cooperation with German partners. These long-term and intensive co-operations are aimed to lead to new first rate international achievements in science. The award is primarily used to finance short-term research-related stays, research seminars or workshops as well as the necessary material, equipment and personnel.
The Ministry for Education and Research provides the Max Planck Society and the Alexander von Humboldt Foundation with the necessary funds for the programme, which has been in place since 1990.
This year, the selection committee chose 12 award recipients from a total of 51 nomination proposals, 23 of which were for researchers working outside Germany.

**Further @ information about the award-winners and their fields of expertise can be optained from http://www.mpg.de/preise/fp2001/english/**

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|---|---|---|
| LIFE SCIENCES AND MEDICINE | Prof. Arthur Konnerth | Physiological Institute of the Ludwig-Maximilians-Universität in Munich, Germany |
| | Prof. Alexander J. Varshavsky | Division of Biology at the California Institute of Technology in Pasadena, USA |
| CHEMISTRY | Prof. Horst Kessler | Institute for Organic Chemistry and Organic Biochemistry at the Technische Universität in Munich, Germany |
| | Prof. Frans Carl de Schryver | Department of Chemistry at the K.U. Leuven in Heverlee, Belgium |
| HUMANITIES | Prof. Adolf Hoffmann | German Archaeological Institute in Istanbul, Turkey |
| | Prof. Benedict Moldovanu | Faculty of Economic Sciences A5 at the Universität Mannheim, Germany |
| ENGINEERING | Prof. Gérard A. Maugin | Centre National de la Recherche Scientifique, Laboratoire de Modélisation en Mécanique at the Université Pierre et Marie Curie in Paris, France |
| MATHEMATICS AND COMPUTER SCIENCES | Prof. Andreas Griewank | Institute of Scientific Computing at the Technische Universität Dresden |
| | Prof. Felix Otto | Institute for Applied Mathematics at the Universität Bonn, Germany |
| PHYSICS | Prof. Frank Arnold | Max Planck Institute for Nuclear Physics in Heidelberg, Germany |
| | Prof. Igor Kukushkin | Laboratory of Non Equilibrium Processes within the Institute of Solid State Research at the Russian Academy of Sciences in Moscow, Russia |
| | Prof. Matthias Robert Scheffler | Department of Theory at the Fritz Haber Institute of the Max Planck Society in Berlin, Germany |





GRAVITATIONAL WAVE ASTRONOMY

# New Sub-Institute to open in Hannover

**A new sub-institute of the Max Planck Institute for Gravitational Physics (Golm, near Potsdam) is to be established. This decision was taken during a session of the senate of the Max Planck Society held on 23rd November in Düsseldorf. The sub-institute will serve as an experimental research centre and so supplement the main institute's theoretical work. The Max Planck Society, in close cooperation with the Laser Centre at the University of Hanover, is looking forward to operating this new sub-institute as an international centre for gravitational wave astronomy in the capital city of Lower Saxony.**

More than 80 years ago Albert Einstein predicted the existence of gravitational waves. However, the technology required to confirm the existence of these small curvatures of space and time, and to observe the dark side of the universe, has only now become available. Since the pioneering days of the 1970s the Max Planck Society has been at the international forefront of experimental gravitational wave research. In 1994 the Max Planck Institute for Quantum Optics in Garching and the University of Hanover jointly set up a branch for experimental work in Hanover. Since then, the two organisations have collaborated closely to launch the GEO600 project for experimental research in gravitational waves. The gravitational wave detector constructed for this project is six times smaller than the US and Italian detectors under construction, but thanks to the deployment of state-of-the-art technology its capabilities compare well with those of the larger facilities. What is more, it has already completed its first test run.
1994 also saw the establishment in Golm of the Max Planck Institute for Gravitational Physics. The research programme of this theoretically oriented institute spans the entire spectrum of gravitational physics. The respective chief interests of its three divisions are as follows: general theory of relativity, astrophysical applications of the theory of relativity, quantum gravity and unified theories. Large-scale, in-house computer simulations are as much part of its scientific routine as are collaboration with other groups and participation in several international projects like the above mentioned gravitational wave detectors GEO600 and LISA. Moreover, the institute coordinates a EU network on the theoretical foundations for gravitational wave astronomy and is a partner of another two EU networks on quantum gravitation and string theory.
The University of Hanover continues to be closely involved in the research concept: A cooperation agreement provides for the establishment of two experimental divisions within the sub-institute. The Max Planck Society will contribute one of these departments under the leadership of a full-time director, and the University of Hanover will provide a part-time director for the second department in the person of Prof. Karsten Danzmann (born 1955) who has held the university's Chair for Nuclear and Molecular Physics since 1993. In 1990 Danzmann became the head of the Gravitational Wave Group at the Max Planck Institute for Quantum Optics in Garching. As the leading scientist at GEO600 – this being a joint project with the Universities of Glasgow and Cardiff in the UK – Karsten Danzmann has been successfully coordinating the design and construction of the gravitational wave detector since 1994. For the last seven years or so, he has also been the chief scientist for LISA, the gravitational wave experiment, and has now taken over its direction on behalf of ESA, the European Space Agency. A joint project between ESA and the US space agency NASA is due to commence in the year 2011.
Both these divisions of the Max Planck Institute for Gravitational Physics in Hanover will move to university premises that are scheduled to become vacant soon. The Land of Lower Saxony has promised to finance the conversion costs of approximately 25 million Marks; in return, the Max Planck Society will pay a proportional rent. ●

PHOTO: WOLFGANG FILSER

These mirrors form part of the GEO600 gravitational wave detector's measuring system.

INTERNATIONAL PROJECTS

# Connections with Latin America and Russia


Luis Gómez Colomer from Castellón University gives his lecture.

@ The project on the internet:

www.iuscrim.mpg.de/de/forsch/straf/projekte/ambos.html

www.iuscrim.mpg.de/de/forsch/straf/projekte/ambos3.html

PHOTO: MPI FOR NATIONAL AND INTERNATIONAL CRIMINAL LAW

**To conduct research not only in Germany, but to be involved internationally, make global contacts and further the next generation of scientists: these aims have been realised by employees of the Max Planck Institute for Foreign and International Criminal Law in Freiburg and the Max Planck Institute for History in Göttingen who have begun work on two new research projects. The lawyers' project relates to 'Policing and the Rule of Law in Latin America', while the historians, following a successful debut this year, are sending out invitations for a second German-Russian summer school for doctoral students of history and the history of science to be held in 2002 on the subject of, 'Historical Anthropology – History of Household, Family and Kinship'.**

Kai Ambos and Teresa Manso of the Max Planck Institute for Foreign and International Criminal Law have already begun work on the new project in consultation with two External Assessors, Luis Gómez Colomer (Castellón University, Spain) and Richard Vogler (University of Sussex, UK). They presented the project at a workshop with numerous colleagues from 14 Latin American countries, which took place in August alongside a conference on current topics relating to criminal proceedings held in Sao Paolo (Brazil). This event was hosted by the Max Planck Institute in cooperation with the Federal State of Sao Paolo's Public Prosecutor's office (Ministerio Público). The conference's four main lectures were about preliminary inquiries in criminal procedures, control of the police (by the prosecution), remand in custody, and forms of consensual settlement of disputes. Each lecture was accompanied by the commentaries of two Brazilian participants.
During the project workshop on 'Policing and the Rule of Law in Latin America', participants from Argentina, Bolivia, Brazil, Chile, Columbia, Ecuador, El Salvador, Guatemala, Mexico, Nicaragua, Paraguay, Peru, Uruguay, and Venezuela discussed a structuring proposal for the National Reports, which was agreed in a considerably modified and expanded form. By the end of March 2002, all 16 National Reports – Cuba and Costa Rica will also be participating – will have to be drafted and forwarded to the Freiburg Institute, where they will be reviewed by the editorial team, including External Assessors, and subsequently evaluated.
The project of compiling National Reports succeeds a joint research project with the Konrad Adenauer Foundation (KAS) entitled 'Procedural Reforms in Latin America', which was completed last year. The subject matter of the new project relates to this earlier project, its participants having unanimously agreed on the need for such a project – partly because of the arbitrary character of policing in Latin America, with its associated human rights abuses, and partly because of inefficiencies and corruption of police forces. Project leader Kai Ambos added that the quality and effectiveness of police investigation practices has a decisive influence on the success or failure of criminal justice reform in Latin America.
As yet, not all the financing for the research project, which is partly self-funded, has been agreed. The Ministerio Público and the Foreign Ministry have given financial support to both conference and workshop. The Friedrich Ebert Foundation (FES) contracted the services of three national experts from Guatemala, El Salvador and Columbia, and the Association for Cooperation and Technology ((Gesellschaft für technische Zusammenarbeit) (GTZ)) facilitated the participation of colleagues from Paraguay. In addition to drafting National Reports, the Project Leaders and National Representatives intend to set in motion an intra-continental discussion process by means of similar events at national level. Naturally, this will require improved networking and the assistance of international and national institutions with local infrastructures, which would necessitate a higher level of commitment from FES and GTZ.
Göttingen's Max Planck Institute for History has also been active on the international stage. The first Russian-German summer school for doctoral students of history and the history of science took place this year thanks to the joint organisational efforts of the Institute and the European University at St Petersburg. The Volkswagen Foundation sponsored the summer school, which ran under the title 'Micro History – Microcosms of Knowledge'. Thirty doctoral students from German-speaking countries and Russia – from St Petersburg through to Barnaul in Siberia – spent two weeks intensively studying new trends in micro and everyday history, as well as the history of science. Three German lecturers, Jürgen Schlumbohm from the Max Planck Institute for History, Michael Hagner from the Max Planck Institute for the History of Science and Thomas Sokoll from the Open University in Hagen ran the event with three professors, Daniel Alexandrov, Elena Campbell and Michail Krom from the new European University at St Petersburg. Every trainee scientist presented his or her research project. The doctoral students and lecturers then discussed each project exhaustively, thereby crossing the boundaries of national scientific cultures. A lively dialogue also ensued between the disciplines of history and history of science, whereby the wide variety of topics included the tension between the Catholic and Jewish inhabitants of a Swiss village, the implementation of time-keeping in a Soviet factory during the 1930s, the effect of science on 19th century attitudes towards death, and the consideration of history in a Siberian provincial town around 1900.
However, their activities were not confined to the rooms of the 19th century palace where the European University at St Petersburg is housed. The students received expert guidance to investigate the relations of power, science and urban planning during the foundation of St Petersburg in the early 18th century. They visited a museum that has held collections from every field of knowledge since the time of Peter the Great. Whilst standing against a backdrop of items conserved in ethanol, Michael Hagner spoke on the importance of monstrous newborns for science in the 18th century.
Thanks to the success of this event, the next summer school in St Petersburg is already planned for August 2002. This time it will be dedicated to historical anthropology – the history of household, family and kinship. ●

German and Russian doctoral students admire the 'Great Globe of Gottorp', constructed in Germany in 1664 and presented in the early 18th century to Tsar Peter the Great by the Duke of Holstein. It measures more than three metres in diameter.
The internal surface of the globe features a starry sky, and inside the globe are a table and bench, which allowed diners to admire the artificial night sky as it was rotated by means of an ingenious mechanism.

PHOTO: A. KUPRIJANOV

PRIVATE LAW

# 75 Years in the Tradition of Ernst Rabel

Founding Director Ernst Rabel, 1924.

**The Max Planck Institute for Foreign Private and International Private Law in Hamburg can look back on a long history of research: In 2001 it celebrated 75 years since its foundation. The Institute was originally set up to conduct research, which would assist in dealing with the legal consequences of the First World War. German judges and lawyers had little knowledge of legal developments abroad during the war, but the Treaty of Versailles was shaped by the terms of foreign legal norms. Mixed arbitration tribunals with German assessors were established to settle private law issues arising from prewar agreements.**

The tribunals' German lawyers had difficulties in keeping up with their foreign colleagues to whom the principles of interpretation of the Common Law and the French legal system were familiar. As early as 1924, therefore, the founding director of the Institute of Private Law, Ernst Rabel, asserted, "It seems to me that the chief requirement is that there be a sufficient core of German lawyers who have an understanding of the legal mentality abroad."

In view of the growing interconnection of the world economy during the 1920s, the 'Reichsverband der deutschen Wirtschaft' (Reich Association of German Industry - Germany's equivalent of the US Chamber of Commerce) also developed an interest in researching foreign and international private law; questions such as identifying the legal system that would apply if a German businessman and an Italian national signed a contract in London, or the legal collisions that may result from such a scenario, required clarification. For this reason, the Association contributed to the funding organisation of the Institute for Foreign Private and Private International Law, as well as being involved in the Kaiser Wilhelm Society. In return for this financial support, the Institute provided the Reich Association with reports on general issues pertaining to private law. For financial reasons, the original intention had been merely to establish a department for international private law under the auspices of the 'Kaiser Wilhelm Institute for Comparative Public Law and International Law'.

On 1st April 1926, however, an independent 'Institute for Foreign Private and Private International Law' did in the end commence work in Berlin's City Palace.

The man who shaped the Institute's character was its founding director Ernst Rabel. It was he who combined basic legal research with practical consultation to legislators and industry, as is still practised today. Rabel was involved in setting up the International Institute for the Unification of Private Law (UNIDROIT) in Rome. His treatise 'The Law and the Sale of Private Goods' continues to be a major foundation of the UN Sales Law. Rabel also founded the Institute's 'Journal for International and Foreign Private Law'. Because of his Jewish ancestry, Ernst Rabel was forced to leave his post as Director of the Institute in 1937; two years later he emigrated to the USA. However, after the war Rabel – by then 66 years old – returned to 'his' Institute as a scientific consultant and guest scientist.

Under Rabel's successor Ernst Heymann, the Institute conformed to the politics of the day thereby avoiding any further direct political interference by the National Socialists. Thanks to the Institute's evacuation to Tübingen in 1944, the substantial library – which today contains around 400,000 books – survived the war. In 1949 the Institute became part of the Max Planck Society and in early 1950 it found temporary rented accommodation in a former fraternity house. However, this soon proved too small to house the Institute's staff and library. Although Frankfurt and Munich tried to woo the Institute, Hamburg became its new base in 1956. The Hanseatic city took on the funding and construction of a new building, which the Max Planck Society rented on very favourable terms. The city's global trade links also made Hamburg a particularly apt choice of location for the Institute. The Institute's first postwar director Hans Dölle (1946 to 1963) was succeeded by Konrad Zweigert (1963 to 1979).

Over the years the Institute has broadened its research spectrum: in addition to private law, a new focus of work has been found in foreign and international commercial law. Since 1979, therefore, the Institute has been directed by a directorial team, currently made up of Prof. Klaus J. Hopt and Prof. Jürgen Basedow. They have intensified research in the fields of company and banking law, as well as capital market, transport, haulage and insurance legislation. A current research topic is the harmonisation of European private law, company law and foundation law. However, the Institute also functions to foster the next scientific generation – following Ernst Rabel's tradition: A postgraduate school has been established in collaboration with the Max Planck Institute for Comparative Public Law and International Law, the Max Planck Institute for Meteorology, and Hamburg University. The jointly run International Max Planck Research School for Maritime Affairs in Hamburg has an interdisciplinary approach to matters regarding the oceans' use, protection, and security. The importance of the sea as habitat, transportation route, and as a source of natural resources will grow in the future. The Research School aims to link scientific and economic findings with the legal aspects that pertain to the uses of the sea. ●

PHOTO: MPS

SPIN-OFF

# iOnGen AG Trains its Sights on Cancer

**iOnGen AG in Göttingen has begun work with a starting capital of around 7.2 million Marks. Scientists Walter Stühmer and Luis Pardo from the Max Planck Institute for Experimental Medicine in Göttingen founded the company with the aim of developing new kinds of detection systems for the early diagnosis of particular types of cancer and to develop appropriate drugs.**

With the growing number of fundamental research findings on the complex characteristics of cancer cells comes the prospect of developing new and targeted therapies. This has also been iOnGen AG's committed aim since its establishment in May 2001. The company is the fourth 'spin-off' enterprise to come out of one of Göttingen's Max Planck Institutes. Garching Innovation GmbH, a subsidiary of the Max Planck Society, supervised its conceptual and foundation stages. iOnGen was provided with 7.2 million Marks start-up costs and also receives support from the BioChance programme of the Federal Ministry for Education and Research.

The founding scientists are Walter Stühmer, Director of the Max Planck Institute for Experimental Medicine, and Luis Pardo, who left his post as scientific director of the Institute to join iOnGen AG.

The founders' scientific expertise lies in the structure and function of ion channels. Ion channels are membrane proteins that control the exchange of ions on both sides of a cell membrane, and they participate in the processing and transmission of signals. They are particularly suitable therapeutic targets because their cell membranes are easily accessible to therapies, and their function on the level of individual molecules can be precisely observed in real time.

iOnGen AG's focus is on the human EAG ion channel, which Stühmer's Max Planck Institute department identified and characterised as a new 'tumor protein'. It is uniquely suited as an objective of new cancer diagnostics and therapy. In healthy organisms the EAG ion channel is found almost exclusively in the central nervous system, and occurs in increased numbers in almost 90 percent of human tumors tested so far. Under cell culture conditions, the EAG ion channel turns cells into cancer cells and also contributes to an aggressive growth of tumor cells in mice. "We observed that we could even considerably impair tumor cell growth in vitro by specifically blocking the EAG ion channel or preventing its expression. Put together, these observations mean that, with the help of the EAG ion channel, we should be in a position to recognise a majority of human tumors at an early stage. Moreover, therapy targeted at the ion channel should also enable us to combat the tumor", says Luis Pardo. ●

WERNER HEISENBERG CENTENARY

# An Exhibition, a Symposium and a Postage Stamp

**A commemorative ceremony, a scientific symposium, and an exhibition were the events with which the Max Planck Society celebrated Werner Heisenberg's centenary, and the German Post Office paid its own tribute by issuing a commemorative stamp. Heisenberg was the father of quantum mechanics, and his later pioneering work on the theories of solid state physics, atomic nuclei, and elementary particles had a major influence on the development of physics in the 20th century. From 1942 until 1970 he was the Director of the Max Planck Institute for Physics.**

Werner Heisenberg was born on 5th December 1901 in Würzburg. He completed his schooling in Munich with flying colours, and then studied physics, mathematics, and astronomy at the universities of Munich and Göttingen. Arnold Sommerfeld, Niels Bohr und Max Born were among his teachers.

His work in July 1925 became the foundation of a new atomic theory: the scientist had discovered laws of nature in which terms like position and speed of nuclear particles lost their meaning. According to the 'uncertainty principle', the momentum and position of particles cannot be determined simultaneously with arbitrary accuracy. Heisenberg thereby touched on the fundamental principle of causality of all phenomena in nature. For this work he was awarded the Nobel Prize in 1933.

Despite National Socialist hostility towards him and tempting offers from the USA, Werner Heisenberg remained in Germany even after 1933. Following the outbreak of the Second World War, he worked on the industrial production of energy by means of nuclear fission. Until 1942 he held the post of Professor of Theoretical Physics at Leipzig, from 1942 until 1945 he was the Director of the Kaiser Wilhelm Institute of Physics in Berlin where he also worked on a new theory of elementary particles.

After the war Heisenberg contributed substantially to the scientific reconstruction of West Germany in his roles as Director of the Max Planck Institute for Physics in Göttingen (from 1946), President of the German Research Council (1949-1951), and President of the Alexander von Humboldt Foundation (from 1953). In his final years the scientist sought to find a unified theory of elementary particles and the fundamental forces that operate between them. Yet his dream was not to be: Werner Heisenberg died on 1st February 1976 in Munich.


The Werner Heisenberg centenary commemorative stamp.

On the occasion of Heisenberg's centenary, an exhibition of the scientist's life and work was organised by Helmut Rechenberg (Max Planck Institute for Physics) and held at the Max Planck House in Munich from 4th December to 7th January.

In addition, the Max Planck Institute for Physics and the Bavarian Academy of Sciences jointly organised a commemorative ceremony on 5th December, and ran a 'Werner Heisenberg Centennial Symposium' entitled 'Developments in Modern Physics'.

The German Post Office also issued a commemorative stamp (issue date: 8th November 2001), which features a picture of Werner Heisenberg and, in the top right hand corner, his famous 'uncertainty principle'. The postage stamp's value is three Marks or 1.53 Euros, and was designed by Ingo Wulff from Kiel in Germany. ●

MPR SCIENCE PUBLICATION

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We hope this synergy with the Internet has made MaxPlanckResearch an even more attractive publication. ●





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