

Guests in Düsseldorf

The Max Planck Society holds its Annual General Meeting in North Rhine-Westphalia



Conversing in a relaxed setting: North Rhine-Westphalia's Minister President Hannelore Kraft and Max Planck President Peter Gruss.

“As the home of 12 of its institutes, North Rhine-Westphalia is an extremely important location for the Max Planck Society,” said Peter Gruss at the Society’s Annual General Meeting, which was attended by around 650 guests from the fields of science, politics, business and society. The NRW institutes, in particular, set a good example when it comes to the transfer of findings from basic research to practical applications. Hannelore Kraft, Minister President of NRW, praised the contribution made by science to structural change in the region at her reception.

The federal state of North Rhine-Westphalia will contribute 45 million euros to the conversion of the Max Planck Institute for Bioorganic Chemistry in Mülheim to an institute for chemical energy conversion – a solid investment, as noted by the newspaper *WESTDEUTSCHE ALLGEMEINE ZEITUNG*: “The realization that the answer to a key question concerning Germany’s energy turnaround will be found in the Ruhr area can only be a matter for celebration.” Moreover: “We would wish that many more of the millions allocated to traditional subsidies would be re-dedicated to the promotion of this kind of research.” The high point of the Annual Meeting was the festive gathering at the Rheinterasse event venue in Düsseldorf, which was also addressed by Annette Schavan, Federal Minister of Education and Research, and Sylvia Löhrmann, Deputy Minister President of NRW.

Photos: Frank Vincken (top); MFS – Susanne Schauer using originals from iStockphoto

What is Beautiful?

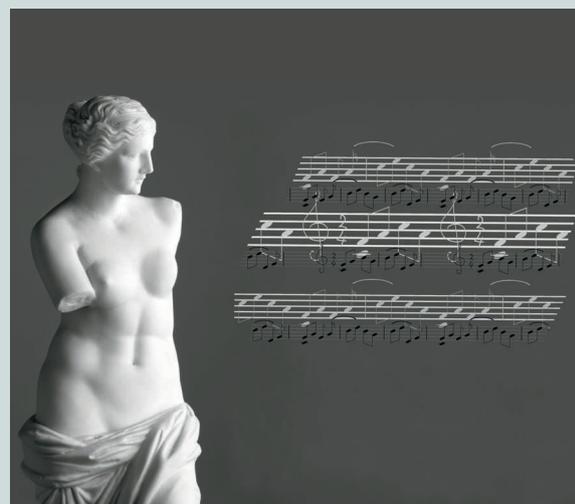
Senate approves the establishment of a Max Planck Institute for Empirical Aesthetics in Frankfurt am Main

The new institute, for which co-financing of 45 million euros is being provided by the federal state of Hesse, aims to use scientific methods to explain the psychological, neuronal and socio-cultural basis of aesthetic perceptions and assessments in humans. Why, for example, do people perceive music and literature as varying in beauty depending on such factors as culture, society, historical era and individual taste? “In accordance with the mission of the Max Planck Society, the Max Planck Institute for Empirical Aesthetics will establish a completely new research field in Germany. Up to now, no institute in the world has focused on the topic of aesthetics in

this form and used empirical methods to research it,” says Max Planck President Peter Gruss.

The new institute will be managed by a Board of Directors consisting of four scientists from the fields of literature, music, and empirical cognitive and social sciences. The institute’s research program will focus on music and literature and – in cooperation with the Max Planck art historical institutes in Florence and Rome – the visual arts.

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The research carried out at the new Max Planck Institute for Empirical Aesthetics will focus on music, literature and the visual arts.



Of Tapping Woodpeckers and Digital Rainbows

Max Planck Society donates prize money for the physics division of “Jugend forscht”



They are the researchers of tomorrow: Almost 11,000 young people took part in this year’s “Jugend forscht” science competition. After having supported the biology division of the competition for years, the Max Planck Society sponsored all of the prizes in this year’s physics division, totaling 50,000 euros. Wilhelm Boland, Director at the Max Planck Institute for Chemical Ecology in Jena, presented the prize certificate to Timm Piper, national winner and the competition’s youngest participant. “It was great fun. I’ve never been so happy to work on a Sunday. The professionalism with which young people approach research today is simply incredible,” says Boland, who was once a participant in a “Jugend forscht” competition himself. Piper (16) impressed the jury with his understanding of the principles of microscopy and the rigorous application of his ideas. The high school student has already filed a patent application for a new form of microscopic illumination that combines phase contrast with bright and dark field imaging.

Proud junior researcher: Max Planck Director Wilhelm Boland presents Timm Piper with the winner’s certificate for physics.

Zooming in on the Sun

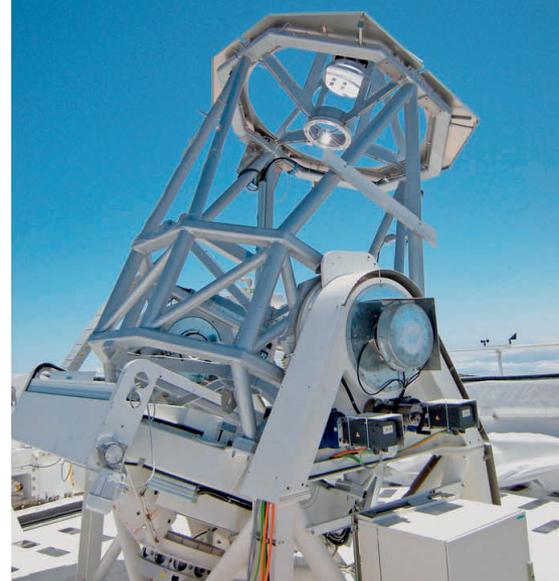
New solar telescope *GREGOR* to observe the Sun from Tenerife in unprecedented detail

Nighttime is the astronomer’s daytime. After all, if you want to see the stars, you must wait until it gets dark. However, there is one exception to this rule: the Sun. Close up, it can be used to study not only the characteristics of a typical star, but also its relationship to the planets. Observing eruptions of matter, sunspots, and even the solar magnetic field requires telescopes with large apertures. *GREGOR*, which was inaugurated on the island of Tenerife in May, is just such an instrument. With a mirror diameter of 1.5 meters, the telescope shows structures on the Sun on spatial scales as small as 70 kilometers, making it one of the world’s three most powerful instruments for observing the Sun.

At the site of *GREGOR*’s installation – the plateau at the foot of the 3,718-meter-high Teide volcano – conditions are

ideal for observing the skies. A consortium of researchers from the Kiepenheuer-Institut für Sonnenphysik, the Leibniz Institute for Astrophysics Potsdam (AIP), the Institute for Astrophysics Göttingen, the Max Planck Institute for Solar System Research and other international partners commenced work on the construction of the solar telescope on Tenerife ten years ago. *GREGOR* has a completely open structure to prevent air turbulence in the optical path. Thanks to the main mirror, which is constructed from the heat-sensitive glass-ceramic Zerodur, and an adaptive lens, which uses a system of actuators and mirrors to compensate for the schlieren within the Earth’s atmosphere, *GREGOR* promises to deliver particularly clear images of the Sun.

Focus on the Sun: With a mirror diameter of 1.5 meters, adaptive lens and various instruments, including spectrographs and cameras, *GREGOR* is one of the world’s three most powerful solar telescopes.



“The most important discovery of recent decades”

Sandra Kortner from the Max Planck Institute of Physics on the discovery of what is thought to be the Higgs particle

The report made more headlines than almost any other discovery in the field of physics: On July 4, researchers from CERN near Geneva announced that they had found a new particle. Its mass lies just within the predicted range for the Higgs boson particle. The discovery is not only of interest for the media; its enormous significance for science is explained below by Sandra Kortner from the Max Planck Institute for Physics in Munich. Kortner is the head of a Minerva junior research group that carries out research on the ATLAS experiment at the Large Hadron Collider, and the coordinator of an international team.

Ms. Kortner, what is your reaction to the latest findings?

Sandra Kortner: I am very excited and enthusiastic. The measurement results from two detectors are very close. This is really phenomenal. It's the most important discovery in particle physics of recent decades. This is a dream come true for me.

Do you believe that the long-sought Higgs particle has been found?

We have definitely discovered a new particle. At the moment, the data would suggest that it is the Higgs particle as predicted by

the Standard Model. However, we will have to measure the properties of this particle in greater detail to clarify its identity.

Why are there still doubts about the identity of the particle?

We are unable to detect the Higgs particle directly. It arises in the course of a proton collision and decays into different components in mere fractions of a second. The theory predicts that a Higgs particle can decay in several different ways. The decay rates depend on the mass of the Higgs particle. This mass isn't clearly predicted by the theory. We now have an approximate measured value of 125 to 126 gigaelectronvolts (GeV), but this will become more precise when we have more data. In ATLAS, we have thus far investigated only two of all of the possible decay channels with sufficient statistical significance. These results support the fact that this is a Higgs particle. However, we will have to investigate the other decay possibilities and rates to determine the properties more accurately.

Which other particles might also be possible?

Other particles could also exist that are, in a sense, messengers of a new physics beyond the Standard Model. These include, for



Sandra Kortner

example, the particles of the so-called theory of supersymmetry. Therefore, it could also be a supersymmetric Higgs boson. However, based on the currently available data, it isn't yet possible to say whether this is the case.

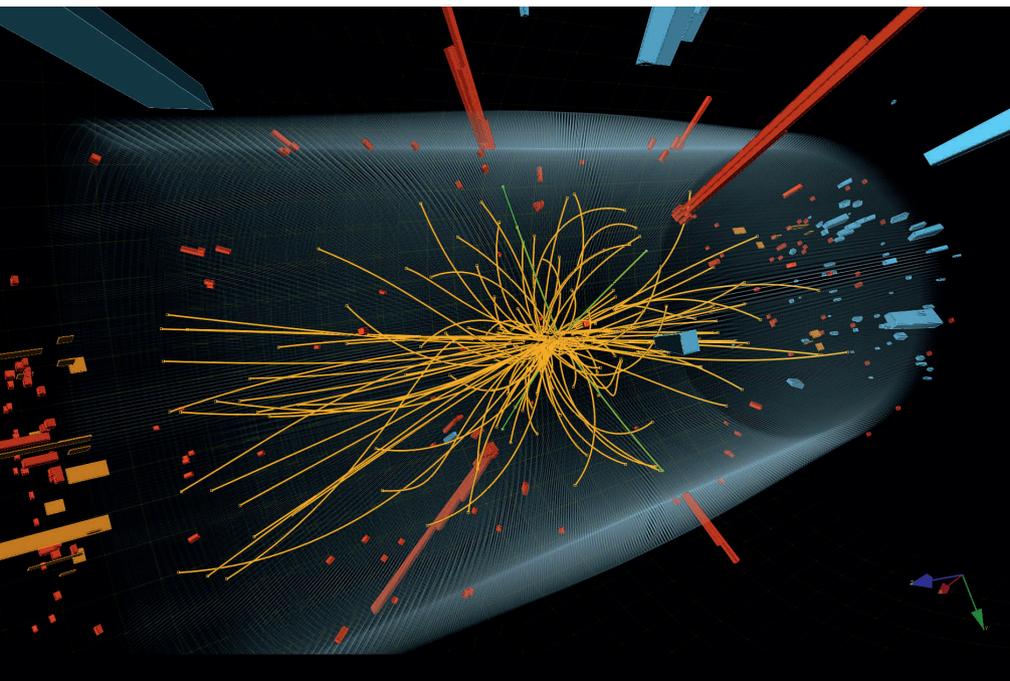
Which properties of the particle will you and your colleagues measure in the future?

In addition to the mass, we want to measure, for example, the spin. In very simplified terms, this can be imagined as the rotation of the particle. The Standard Model predicts a zero value for the spin. These and other parameters are important because they will enter into the Standard Model. Their measurement will still take years.

Physicists today know an entire array of elementary particles. What's so special about the Higgs boson?

The Standard Model has two types of particles: one type forms the building blocks of matter, while the other mediates the forces between them. These particles have very different masses. There are even massless particles, such as the photon. The Higgs mechanism, which also predicts the existence of the Higgs particle, explains how the particles attained their mass. In this respect, it is something special. It is the key

Colliding knowledge: The new particle can't be observed directly – it is created during the collision of protons and decays into different components within mere fractions of a second.



particle for understanding matter. However, the Higgs particle doesn't explain the magnitude of the mass of particular particles. It doesn't even predict the mass of the Higgs particle itself.

Assuming the identity of the particle is confirmed as Higgs, what's the next step?

We're all convinced that, above a certain energy, a new physics that goes beyond the Standard Model must arise. The theory of supersymmetry is such an extension. It would explain why there are two different types of particles, namely the fermions, with half-integral spin, and the bosons, with integral spin. Supersymmetry predicts the existence of a large number of as yet undiscovered particles. The Large Hadron Collider (LHC) is ideal for finding these particles. In addition, the lightest predicted supersymmetry particle is a prime candidate for the mysterious dark matter. This search will also take us many more years to complete.

If it emerges that this discovery is, in fact, the Higgs particle, will it be awarded the Nobel Prize in Physics?

I think so. However, I don't think the prize will be awarded to CERN or the experiment collaborations, but to the scientists who proposed the Higgs mechanism. This could prove difficult, as several people made an important contribution to this process: In addition to Peter Higgs from the University of Edinburgh, Robert Brout and François Englert in Brussels, and Carl Hagen, Gerald Guralnik and Thomas Walther Kibble at Imperial College London also developed the theory almost simultaneously. Brout is dead, so there are five physicists who should still be honored. But the statutes of the Nobel Committee don't allow this.

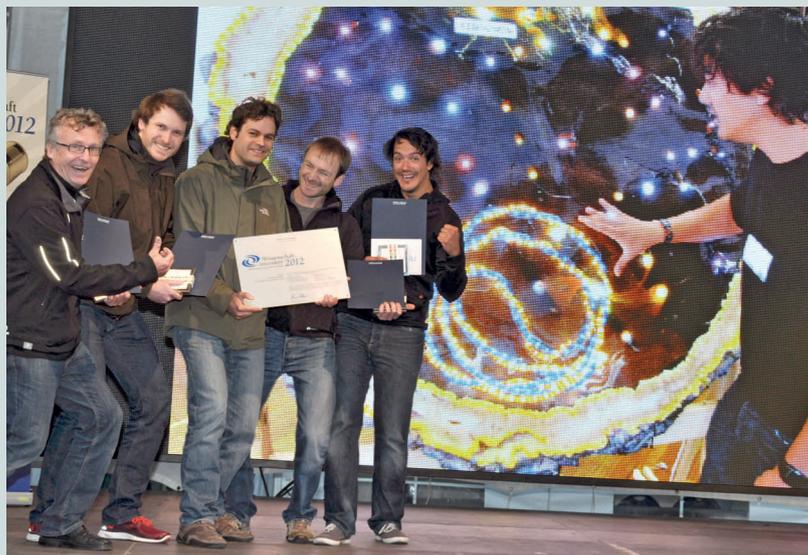
Could at least a few experimental physicists from the LHC or the detectors hope for a Nobel Prize?

No, it isn't possible to single out three people who played an outstanding role. This discovery was achieved through international collaboration, in which absolutely all of the participants contributed to the success. This is why none of us has any hope of being awarded the prize. Nevertheless, we are all very proud and overjoyed at the moment – today's achievement alone is prize enough for us.

Interview: Thomas Bührke

Victory with the Sulfur Pearl

The audience-awarded prize for the "Science Summer" event in Lübeck went to a team from the Max Planck Institute for Marine Microbiology



And the winners are: Manfred Schlösser, Andreas Krupke, Wolfgang Hankeln, Lorenzo Franceschinis and Dennis Fink (left to right) photographed in front of the cross-section of a bacterium enlarged by a factor of one million.

Good research alone isn't enough to win the "Wissenschaft interaktiv" competition; the content of the research must also be communicated very effectively. Which of the finalists selected by a jury of experts will go home with the 10,000 euros in prize money is decided by the audience of the "Science Summer" event, which was held in Lübeck this year. And this year's audience opted for a contribution by the team from the Max Planck Institute for Marine Microbiology. Using an oversized model of a bacterial cell, videos and film clips about special species, such as the giant sulfur pearl, the winners presented a guided tour through the world of microorganisms (see also "On the Net," page 12). Audience members with a particular interest in the topic were able to access more detailed material using their smartphones.

As is always the case with the Science Summer event, the main priority was facilitating direct dialogue between the researchers and the audience: "It's very important that we also learn how to communicate about the science that inspires us. We had enormous fun doing this," said Dennis Fink at the award ceremony. Upon completing their doctorates, Fink and his colleague Wolfgang Hankeln from the winning team expect their future at the Max Planck Institute in Bremen to involve science communication. Their idea for an agency that would support researchers in communicating their research topics to the public has already been approved for an EXIST Business Start-Up Grant by the Federal Ministry of Economics and Technology and the EU.

This is the second time in the five-year history of the "Wissenschaft interaktiv" competition that a team from the Max Planck Society has won: Carla Cederbaum and Elke Müller from the Max Planck Institute for Gravitational Physics claimed victory in 2001 with the project "From Newton to Einstein: A Journey through Space and Time."