ThyssenKrupp Ideas Park Attracts Record Numbers

Celebration of superlatives delights over 320,000 visitors in Essen

With displays spread across an area of 60,000 square meters, more than 400 hands-on exhibits and around 1,500 scientists, engineers, students and trainees manning the stands, the ThyssenKrupp Ideas Park was once again a resounding success. Max Planck scientists also enjoyed the 13-day event that was packed with meetings and discussions. The stand hosted by the Max Planck Institute for Plasma Physics showed children and grown-ups how to make magnets out of nails, copper wire and batteries while teaching them all about the function and importance of magnets in a fusion power station. The Max Planck Institute für Eisenforschung allowed visitors to try their strength and test the forming capabilities of a variety of steels, while the Max Planck Institute of Colloids and Interfaces used Lego bricks to simulate nature's construction principles. The building project in particular aroused the ambitions of visitors, many of whom invested several hours in creating models based on the principle of hierarchical structures.

The ThyssenKrupp Ideas Park fires the imagination with a host of hands-on opportunities to interact with science.

Photos: ThyssenKrupp AG (top), Jonas Steengaard (bottom)

First Max Planck Research Groups in Africa

Alex Sigal and Thumbi Ndung'u have been appointed to lead two new research groups at the Max Planck Institute for Infection Biology. The groups will operate for between five and a maximum of nine years, conducting basic research into HIV and tuberculosis. They will also benefit from close proximity to centers of infection. "In southern Africa, tuberculosis and HIV are life-threatening issues. If we want to cure these diseases, we need to work in the countries in which they are most prevalent. In this way, laboratory and clinical studies can proceed successfully hand in hand, with information passing from the sick bed to the test tube and back again, as it were," emphasized Max Planck Society President Peter Gruss. The two research groups will be located at the newly established KwaZulu-Natal Research Institute for Tuberculosis and HIV in Durban, South Africa. The institute is a joint project of the University of KwaZulu-Natal and the Howard Hughes Medical Institute in the US, and is dedicated exclusively to the study of HIV and tuberculosis.

Stefan H. E. Kaufmann, Director at the Max Planck Institute for Infection Biology in Berlin, is the driving force behind the Max Planck Society's research efforts in South Africa.

"We can offer a different perspective"

Max Planck Director Jos Lelieveld on the risk of nuclear contamination

A team of scientists headed by Jos Lelieveld triggered an animated controversy with a study into the risk of nuclear contamination following accidents at nuclear power plants. The researchers at the Max Planck Institute for Chemistry in Mainz calculated that the probability of a meltdown that leads to widespread nuclear contamination is 200 times higher than previously assumed. Accordingly, a fatal accident at one of the world's 440 nuclear reactors is to be expected every 10 to 20 years.

How does your approach to risk assessment differ from that of the US Nuclear Regulatory Commission, whose findings also underpin Germany's studies into the risk of nuclear power stations?

Jos Lelieveld: The authorities follow a bottom-up approach – they look at the technology and estimate how often a failure is likely to happen. In this way, they come up with a meltdown every 10,000 reactor years, which take into account the service lives of all reactors. We, on the other hand, looked at how often a fatal accident has happened in the 14,500 years in which all of the world's reactors have so far collectively been operating. With the four meltdowns in Chernobyl and Fukushima, this yields a probability of one accident in 3,625 reactor years. In view of the uncertainty that prevails, we rounded this up to 5,000 reactor years. This actually differs from the NRC's results by just a factor of two.

So how do you arrive at a 200 times greater risk of nuclear contamination as a result of an accident?

The authorities have assumed far too high a probability of getting the problem under control. They are far too optimistic in their estimate of the effects of the weather. And particularly in this field, we are experts. Of course, the few figures available make for some very lean statistics, but we shouldn't entirely ignore them.

You assume in your analysis that the risk of a catastrophic meltdown is just as high at a German nuclear station as it was in Chernobyl or in earthquake-prone Japan. Aren't you over-simplifying the picture?

Certainly there are differences. But the Fukushima disaster shows that we simply can't foresee all of the risk factors. There are also new risks, like the threat of terrorist attacks, or the fact that it has become more difficult for German nuclear power plant operators to find good staff.

Why is it justified to include the meltdowns in Fukushima in your calculations as three independent events?

This is in accordance with the procedure adopted by the competent authorities: The safety systems at multiple reactors within the same power station must be independent of one another. If something happens at one reactor, it mustn't affect the others. If the risks presented by the reactors are assessed independently of one another, we can consider the Fukushima meltdowns as three events.

Your study also anticipates that a large number of people would be affected. Accordingly, an accident in Western Europe on the scale of the Chernobyl disaster would spread radioactive contamination across an area populated by 28 million people. How did you arrive at these figures?

Using our atmospheric transport models, we calculated how far radioactive caesium-137 and iodine-131 would spread under various wind and weather conditions: Precipitation would carry around half the radioactive particles down into the soil at a range of up to 1,000 kilometers. A quarter would be carried more than 2,000 kilometers. Add in the population density in the relevant regions, and we have the number of people who would be affected.

According to your calculations, in East Asia – so including Japan – a meltdown that releases as much radioactivity as Chernobyl would affect up to 21 million people. However, initial investigations by UNO and WHO indicate that, in the case of Fukushima, the number was far lower.

There is as yet no unambiguous data on the amount of radioactive particles and gases that escaped from Fukushima, but it is likely to have been far less than after the accident in Chernobyl. And given the westerly airflow during the weeks when the accident occurred, most of the contamination was blown out into the Pacific. Also, we mustn't forget that the reactors were flooded with sea water, which absorbed a large part of the radioactivity. So measurements of how much radioactive material escaped into the air and was deposited on land don't reflect the amount that was actually released. Nevertheless, the CTBTO provided us with measurement data on how badly the environment was contaminated. We are now feeding this data into our high-resolution model in order to calculate the actual emissions and the spread of radioactive material.

Jos Lelieveld

Some nuclear physicists have been particularly critical of your risk assessment of a meltdown. How have your fellow scientists reacted to the study?

My colleagues have all been highly positive in their response to this work. It was even welcomed by nuclear safety experts because it takes a new approach. Of course this study can't provide any final and conclusive figures. But we can initiate a discussion and offer a different perspective. We also want to bring experts in nuclear safety and atmospheric research together and encourage them to collaborate in the future.

Interview: Peter Hergersberg

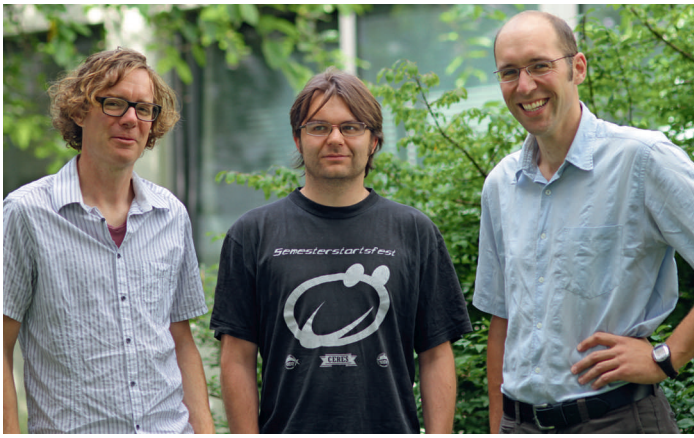
Photo: MPI for Chemistry – Carsten Costard

21 Starting Grants for Max Planck Scientists

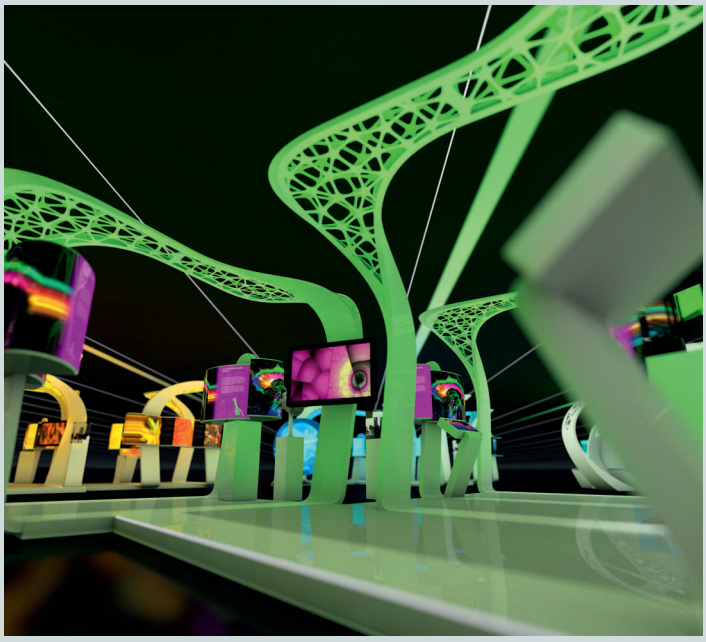
Success for 4 women and 17 men from 15 Max Planck Institutes

The European Research Council (ERC) has been sponsoring top-notch basic research in Europe since 2007. Once a year, following a strict selection procedure, the ERC awards what are known as Advanced and Starting Grants. While the Advanced Grants go to renowned top scientists, the Starting Grants are aimed at male and female scientists just setting out on their careers. The funding gives them the financial independence to work on research projects of their own for a period of five years. The ERC received 4,741 applications this time around, of which only 11 percent were approved. By this standard, with a success rate of 32 percent, the Max Planck Society leads the field among German universities and research organizations.

After five award rounds, the French scientific organization Centre National de la Recherche Scientifique (CNRS) heads the list of winners with a total of 109 grants. The MPS is in third place with 57 grants to date, just behind the University of Cambridge with 61 grants. No other German institutions feature among the top ten.



Three of the 21 award winners: Frank Schnorrer, Esben Lorentzen and Andreas Pichlmair (from left) from the Max Planck Institute of Biochemistry.



Max Planck Science Tunnel 3.0

The premiere of the new "Max Planck Science Tunnel – Creating Knowledge, Shaping the Future" is taking place in Paderborn. The Max Planck Society's multimedia exhibition will be on display from October 17, 2012 to February 24, 2013 at the Heinz Nixdorf MuseumsForum (HNF) before heading for destinations abroad, including Russia.

Award-Winning Magazine

MaxPlanckResearch receives the Best of Corporate Publishing silver award for 2012

With its very first attempt, our MaxPlanckResearch magazine made it onto the shortlist in Europe's largest corporate publishing competition. The Max Planck Society's science magazine went on to win the Best of Corporate Publishing silver award for 2012 in the Non-profit/Associations/Institutions category. This is one of the categories that attracts the most submissions, with a total of more than 700 publications taking part. The jury was comprised of around 140 prominent experts in the fields of journalism, art direction, marketing, corporate and internal communications, print and direct marketing. They assessed such criteria as journalistic quality and design, as well as how effective the publications were in meeting their goals and measuring their impact. Other factors included credibility and overall concept. "MaxPlanckResearch has a good feel for its target audience. This is reflected not only in the texts, but also in the layout," the jury decided. And they concluded that: "The magazine is on the right path for further nominations, because it is strong on communication."

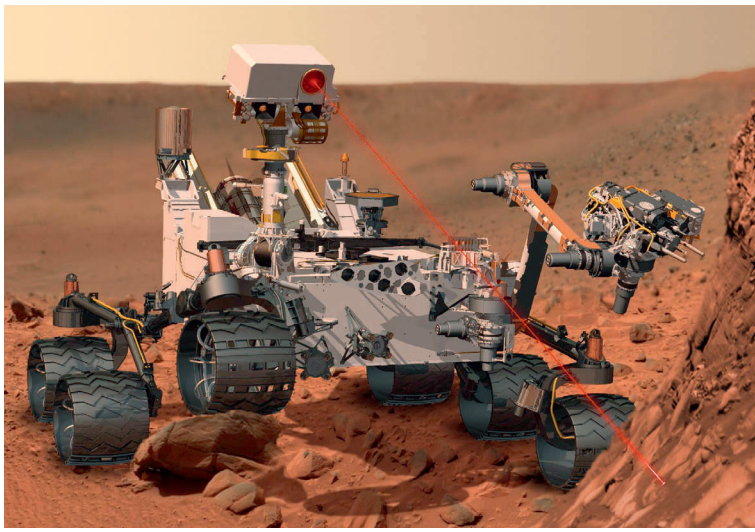
Photos: MPI for Chemistry (top) Archimedes (bottom)

Signals from the Red Planet

Max Planck Institute for Solar System Research participates in the Mars rover *Curiosity* mission

After a wild ride through the atmosphere and some complex maneuvering, the 900-kilo Mars rover *Curiosity* landed safely on the red planet right on schedule on August 6. The team at NASA wasn't the only one breathing a sigh of relief. "The joy was tremendous," says Walter Goetz at the Max Planck Institute for Solar System Research in Katlenburg-Lindau. Goetz will mainly be making use of the Mars Hand Lens Imager (MAHLI) camera. The instrument offers a resolution of 20 to 30 micrometers per pixel, and enables geologists to closely inspect individual grains of the planet's sandy soil. He is also looking forward to receiving data from the Chemistry & Mineralogy (CheMin) spectrometer, which uses X-rays to analyze soil samples.

While Walter Goetz will be spending the coming three months at the Jet Propulsion Laboratory (JPL) in Pasadena, California, Fred Goesmann will be supporting the mission from Katlenburg-Lindau. As a physicist, he is involved with the Sample Analysis at Mars (SAM) instrument. "Actually, it's not a single instrument, it's more like a complex, automated laboratory," Goesmann explains. The sophisticated array of screens, ovens, spectrometers and other measuring devices is designed to provide comprehensive analyses of gas and soil samples. Weighing in at 38 kilos, its task is to search for organic compounds.



Curious about Mars: *Curiosity* is the heaviest and most efficient rover ever dispatched to the red planet. When its instruments explore the area around the Gale crater during the coming months, scientists from the Max Planck Institute for Solar System Research will once again be involved: since 1996, the institute has participated in five Mars missions undertaken by the US and European space agencies.

Photo: NASA/JPL-Caltech

On the Net

Science Slam in Berlin-Kreuzberg
How do you bring research results alive on stage in the most entertaining and imaginative way possible? This was the challenge at the Science Slam 2012 in Berlin. Three Max Planck junior scientists took up the challenge: The evening's winner, Simon Barke from the Max Planck Institute for Gravitation Physics in Hanover, enthralled even non-physicists with his presentation of the invisible fourth dimension, spacetime. Sebastian Bathiany from the Max Planck Institute for Meteorology in Hamburg explored the three-way relationship between plants, rain and climate. And for those who find dice games too uncertain, Jan Nagler of the Max Planck Institute for Dynamics and Self-Organization provided the necessary reassurance: the outcome is (almost) foreseeable. **www.youtube.com/watch?v=CkU-eE2NoSY&feature=plcp** (video in German)

Brain Art
Scientists and artists from around the world gathered in Linz between August 30 and September 3 for the Ars Electronica festival. This year's theme was "The Big Picture – Images of the Future." Among those attending were imaging researchers from the Max Planck Institute for Human Cognitive and Brain Sciences in Leipzig. Daniel Margulies showed some of the entries from the Brain Art Competition, which he initiated; Gabriele Lohmann talked about the opportunities and limits of neuroscientific imaging; and doctoral students David Moreno-Dominguez and Christoph Leuze explained visualization techniques at a variety of interactive stations. The pictures and videos can be viewed on the Web at: **www.neurobureau.org**

The Paparazzo of Electrons
Ferenc Krausz is regarded as the founder of attosecond physics. His goal is to develop new laser techniques to track the movement of electrons in atoms, molecules and solid bodies in real-time and observe quantum-mechanical processes directly. Two new films in German help explain the work of this scientist, who works at the Max Planck Institute for Quantum Optics in Munich. They portray the researcher himself, and illustrate just how brief an attosecond is and how a laser is created. **www.mpg.de/films**