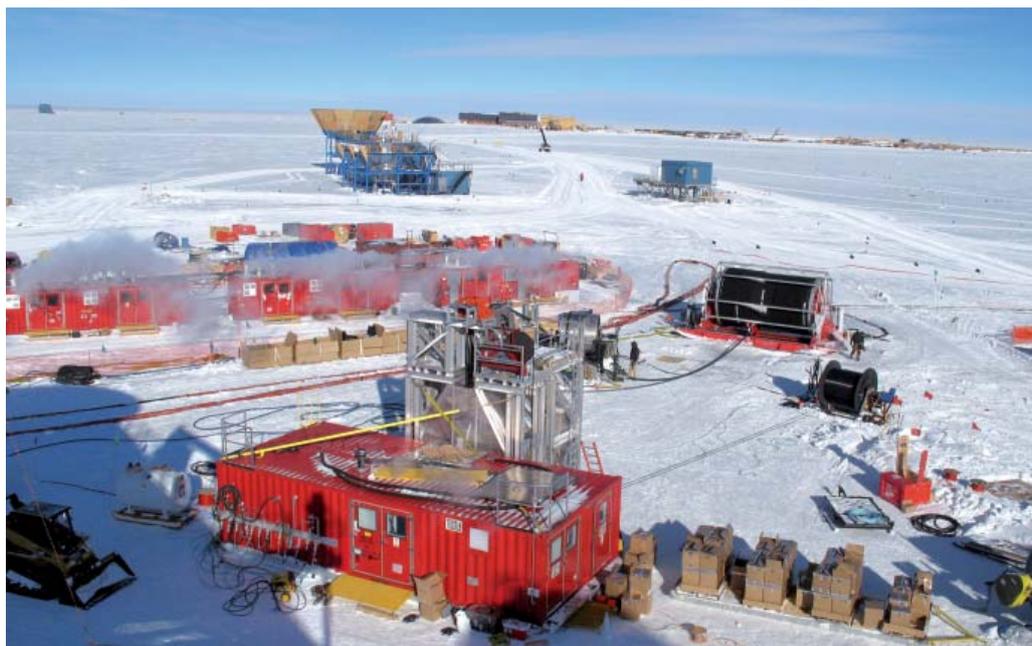


## 19 and 59 – this year's magical numbers

IceCube season completed with record result

by Christian Spiering

Nineteen and fifty-nine: taken together these numbers give the year DESY was founded. They will be with us through all this anniversary year. But they also play a special role in the just-finished season of the Antarctic neutrino telescope IceCube: nineteen IceCube strings have been deployed this Antarctic summer – as many as never before – propelling the total number of strings to 59. When IceCube will be completed in January 2011, it will consist of 86 strings. These are six more than originally planned because we will integrate a small sub-detector called “Deep Core” into IceCube. The sub-detector is tailored to detect neutrinos below the nominal IceCube threshold of roughly 50 Giga-electronvolts. Each string carries 60 Digital Optical Modules (DOM) – highly sensitive light sensors in pressure-resistant glass spheres (see info box on page 2). The spheres are lowered into holes melted into the polar ice crust with pressurised hot water, down to depths between 1450 and 2450 metres, where they freeze in. At the end of the construction phase, a full cubic kilometre of ice will be equipped with DOMs. In the extremely transparent ice, they “see” the light emitted by charged particles produced by high-energy cosmic neutrinos. Neutrinos may transmit information from cosmic regions from which no light but only the extremely elusive neutrinos can escape. A substantial amount of IceCube components and know-how comes from



The drilling station in the foreground melts holes into the ice that are 2.5 kilometers long and house the IceCube strings.

DESY: almost a quarter of altogether five thousand IceCube DOMs were assembled in Zeuthen and tested in a deep-freeze chamber over several weeks. Meanwhile, the final 233 of the DOMs produced in Zeuthen were shipped to Antarctica and are now waiting for their installation in the coming two Antarctic summer seasons. Moreover, DESY delivered the magnetic shielding and suspension elements for all DOMs. DESY also designed and tested the front-end electronics at the surface, which manages the entire communication with the DOMs. By now, DESY has delivered all components for the IceCube assembly – in total compliance

with the planned time and budget limit. Have we already “seen something”? Yes – nearly ten thousand neutrinos! However, their number, energy and angular distribution are compatible with the assumption that their origin is not extraterrestrial but that they are almost completely originating from collisions of charged cosmic particles with the Earth’s atmosphere. We wouldn’t be particle physicists if we didn’t use this largest statistic worldwide of “atmospheric neutrinos” to investigate interesting questions of particle physics; nevertheless, we haven’t yet reached our main goal: the clear evidence for extra-

**CONTINUED ON PAGE 2**

### We have a lot to tell you

Dear readers, welcome to the first eight-page issue of DESY inForm with some new features. Our articles have more space to breathe, and every issue will feature news from the Helmholtz Association. Another novelty is the calendar page on the centre spread listing important

dates and information for the coming months. We hope you will like our new DESY inForm. Feedback is always welcome! Send it to: [inform@desy.de](mailto:inform@desy.de)



## DIRECTOR'S CORNER

Dear colleagues,

with the pleasant and atmospheric event on 2 March I have assumed my new office as Director-General at DESY. For many of you this change in the top management is also a symbol for changes that have taken place at DESY in the past years. Today, DESY operates facilities primarily for photon science, a change which was not easy to digest for the particle physicists but which is the proper strategy to secure DESY's future. Nevertheless

particle physics is one of the three pillars of DESY, and it will be in future.

"You only persist if you change," this Darwinian principle has always been a guideline for my predecessors. With a continuous flow of new ideas they have made DESY one of the top international accelerator laboratories, and we will continue to follow this principle. This unfortunately also means that one has to end things even if they have been very successful. The financial resources

available for new projects are in fact limited.

One only needs to read the daily headlines to understand that the future will become tougher. In the contest for adequate funding and the best people, DESY will only achieve a good position if we all act in concert and jointly collaborate to further the project DESY.

The new DESY Directorate has already coined the leitmotif "DESY – One Lab". I strongly count on your com-

mitment, no matter in which position you are contributing to make the brand "Made at DESY" a warranty for highest quality in basic research.

Sincerely yours,  
Helmut Dosch

terrestrial neutrinos. This could change very soon. The sensitivity we have reached after one year with a quarter of the IceCube detector complete (22 strings, data of 2007) is already

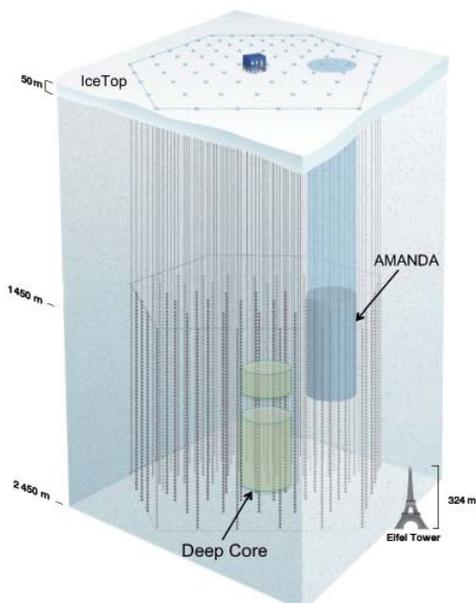
twice as high as that from seven years of data taking with the predecessor detector AMANDA. This is a real step into new territories, and the coming years will yield another factor of 20 to 30.

The identification of high-energy extraterrestrial neutrinos could solve one of the most exciting questions of astrophysics: what are the sources of "cosmic rays"? What is the origin of protons, light and heavy atomic nuclei which constantly bombard the Earth's atmosphere, some of them reaching energies more than a million times higher than the LHC beam energy? Cosmic rays were first recorded in 1912 by the Austrian physicist Viktor Hess, so only three years are left to the hundredth anniversary of this discovery. Wouldn't it be fantastic if we were able to solve the secret before that date?



### What is a DOM?

DOM stands for Digital Optical Module. The 31-centimeter-diameter pressure-resistant glass sphere houses a light sensor of 25 centimetres in diameter (PMT – Photo Multiplier Tube). It detects the light emitted from neutrino interactions in the ice. The signal is digitised and transmitted to the surface. Several circuit boards carry the PMT high voltage supply, the readout electronics, electronics for communication with the ice surface and light-emitting diodes for calibration signals. A mumetal grid reduces the disturbing influence of Earth's magnetic field.



Schematic of the IceCube Detector with AMANDA and Deep Core. IceCube has a volume of one cubic kilometre. Deep Core's strings sit in the deep, transparent ice.

# Helmut Dosch

## Pioneer and internationally renowned expert

The new DESY Director-General Helmut Dosch in short: after graduating in physics he obtained his doctorate and became professor in Munich. Helmut Dosch also worked as a scientist at the Institute Laue-Langevin in Grenoble and at Cornell University in Ithaca, New York. In 1993 he became professor at the University of Wuppertal and in 1997 Director of the Max Planck Institute for Metals Research in Stuttgart – and at the same time professor at Stuttgart University.

He obtained an important international position in the fields of phase transformation, surface physics and research with X-ray radiation. Helmut Dosch is known as a pioneer in the field of fluctuations and interactions at interfaces and nanomaterials. He authored more than 200 scientific publications and he is an internationally renowned expert, editor and advisor, for example as the vice-chair of the ESRF council and member of the SLAC advisory committee, Stanford University, United States – all proper qualifications to lead DESY from a successful past to an excellent future. (uw)

## LHC restart end of September 2009

On 9 February 2009, CERN published a restart schedule for the Large Hadron Collider LHC. The particle accelerator will resume operation at the end of September, with first collisions following at the end of October. A short technical stop is planned over the Christmas period 2009; the LHC will then run through to autumn 2010. Apart from proton-proton collisions, there are also plans for collisions of lead ion in 2010. This ensures that the four experiments ATLAS, CMS, LHCb and ALICE will have sufficient data for their first physics analyses.

This new schedule represents a delay of six weeks with respect to the previously announced restart date. The cause of this delay is due to several factors such as the implementation of a new enhanced protection system for the cable joints and magnet splices and the installation of new pressure-relief valves. (kv)



Scientists from the University of Stuttgart test the temperature sensors that are attached to the red wires in the foreground.

## HERA helps the European XFEL

### Tests in the tunnel reveal how much heat leaks the soil

Sometimes scientific projects require precision at points which don't seem obvious at first glance. The European XFEL, for example, needs high-precision technology for accelerator and undulators – and for its air conditioning. For successful “lasing” in the five undulator tunnels of the X-ray laser, the undulators must always be kept at a constant temperature over both running time and its length of up to 230 metres. If they want to achieve a temperature difference of less than  $\pm 0.1$  degrees centigrade per undulator module, the designers must consider not only how much heat is introduced into the tunnel by wires, magnets, motors, lights and water pipes, but also how much heat flows off to the soil through the tunnel wall – a factor depending on the soil properties. An obvious test bed is the existing HERA tunnel, which, naturally, was built in quite similar soil. To study the flow of heat into the soil in experiments, the HERA ring was tapped at two spots and five-metre-long measuring probes were inserted into the soil. “At one of our measuring spots, HERA is surrounded by ground water, at another by marly soil,” explains construction and climate technology engineer Carola Schulz, “it is exactly the same kind of soil that will

surround the undulator tunnels.”

Together with the University of Stuttgart she planned the experiment. A total of 36 probes measure the temperature profile in the HERA tunnel and in the surrounding soil in a distance of up to four metres – with an accuracy of a thousandth degree. During the first six weeks the HERA tunnel had been kept on temperature, in the following six weeks, all heat sources were turned off. The measurements have not yet been completely evaluated, but first results are surprising. “The thermal conduction in the soil depends more on the kind of soil than expected,” Schulz declares. “It might be possible that we have to design completely different climate concepts for each undulator tunnel stretch.” The climate control design for the European XFEL is scheduled for October. The sensitivity of the measuring system was unintentionally tested by a camera crew at the end of January. During shooting for a DESY film, the HERA tram with the cameraman drove along the accelerator just for a short time. Although the tram kept a distance of more than 100 metres to the measuring spot, the sensors recorded a temperature increase of one degree. (tz)

**DESY INFORM 03/2009**

The new DESY Directorate (from left to right):  
Edgar Weckert, Joachim Mnich,  
Ulrich Gensch, Reinhard Brinkmann,  
Helmut Dosch and Christian Scherf





## WHAT'S ON AT DESY

### March

- 2** Wechselwirkung - Gemeinsam in die Zukunft  
Ceremonial hand-over of office to Helmut Dosch and kick-off event for DESY's 50th Anniversary  
13.30 h, Hall 1 (Bldg. 26)
- 5** Science Café DESY (<http://sciencecafe.desy.de>)  
Looking into the universe with gravitational lenses (in German)  
Albrecht v. der Decken, 17 h, DESY Bistro
- 25** Public lecture  
Von der Vision zur Wirklichkeit – DESYs erste Beschleuniger  
Erich Lohrmann, 19 h, DESY, Hamburg, Auditorium
- 26** Science Café DESY (<http://sciencecafe.desy.de>)  
Hands-on experiments with cosmic rays (in German)  
Philip Bechtle, 17 h, DESY Bistro

**30-2 Apr.** Physics at the Terascale ([www.terascale.de/fitting2009](http://www.terascale.de/fitting2009))  
School on Statistic Tools  
DESY, Hamburg

### April

- 2** Science Café DESY (<http://sciencecafe.desy.de>)  
Imaging systems in medical science (in German)  
Martin Göttlich, 17 h, DESY-Bistro
- 2-3** Physics at the Terascale ([www.terascale.de/detws09](http://www.terascale.de/detws09))  
Workshop on Detector Development  
DESY, Hamburg
- 3** Wagner-Fest  
Farewell Colloquium Honoring Albrecht Wagner, his Achievements and his Leadership of DESY  
13.30 h, DESY, Hamburg, Hall 1 (Bldg. 26)  
<http://wagnerfest.desy.de>
- 6** Colloquium Professor Volker Soergel  
15 h, DESY, Hamburg, Auditorium
- 20-24** Physics at the Terascale ([www.terascale.de/mcs2009](http://www.terascale.de/mcs2009))  
Monte Carlo School  
DESY, Hamburg
- 22** Public lecture  
Hermann von Helmholtz – Zur Person und seiner Zeit  
Jost Lemmerich, 19 h, DESY, Hamburg, Auditorium
- 26-29** 430. Wilhelm und Else Heraeus-Seminar  
Accelerators and Detectors at the Technology Frontier  
Physikzentrum Bad Honnef  
<http://heraeus-technology.desy.de>

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11-15 May: PHOTON 09 +++ 6-10 July: PASCOS 2009 +++ 7 July: Hertz Lecture 2009 +++ 17-22 August: Lepton-Photon-09 +++ 20-23 September: GISAS 2009 +++ 7 November: DESYs Open Day

# Safety in two minutes

## New series to prevent accidents

Accidents happen – at projects and on construction sites on the DESY campus involving people who work at the projects and on the construction sites. Most of the accidents are not due to broken objects or faulty technology but are caused by people. The DESY safety and environmental department (D5), under the charge of Andreas Hoppe since October, makes sure that workplaces are always safe. But they want more: “We want to become the Helmholtz centre with the best safety statistics,” says Andreas Hoppe. “DESY people should become proud of the safety standards here.” They have initiated a large safety campaign all over DESY. Posters covering a “safety topic of the month” give advice on correct behaviour and information on possible hazards. The safety boards include reports on accidents on campus with an accident description, error analysis and suggestions on how to avoid such accidents. Following an American example, D5 also has a counter for accident-free working days on their website (Status at time of printing: 15) and starting this issue DESY inForm will regularly feature safety tips to make everyday life a little more secure. (baw)

This is the first one:

Your team only reaches the safety standard that you apply as an individual!



Andreas Hoppe, DESY's safety expert

## FLASH tests ATCA

### Telecommunications technology in the accelerator

What came first: the hen or the egg? This question has troubled philosophers for ages. The members of a group working on linear accelerator controls for the European XFEL face a very similar

problem: the control electronics must always get the optimum accelerating capacity from the superconducting modules. “For this, it would be necessary to provide the controlled variable in advance, which in fact can only be measured during operation,” group leader Stefan Simrock describes the dilemma. To stabilise the accelerating field to as much as one tenth per mill during a pulse, the controls must compensate all kinds of influences ranging from pump vibrations in the module to cavity deformations from high accelerating fields. For this purpose, about 100 signals are read out and evaluated within some 100 nanoseconds in each unit of four accelerator modules, and readjusted after another microsecond. For the quick electronics that support this, the group has recently found a new solution. It comes from the telecommu-

nications sector and its name is ATCA, acronym for “Advanced Telecommunication Computing Architecture”. “At first, we were a little afraid of the more than thousand-page description of the



An ATCA board is created on the infrared reflow station.

problem: the control electronics must always get the optimum accelerating capacity from the superconducting modules. “For this, it would be necessary to provide the controlled variable in advance, which in fact can only be measured during operation,” group leader Stefan Simrock describes the dilemma. To stabilise the accelerating field to as much as one tenth per mill during a pulse, the controls must compensate all kinds of influences ranging from pump vibrations in the module to cavity deformations from high accelerating fields. For this purpose, about 100 signals are read out and evaluated within some 100 nanoseconds in each unit of four accelerator modules, and readjusted after another microsecond. For the quick electronics that support this, the group has recently found a new solution. It comes from the telecommu-

standards,” Simrock says, “but the modular structure goes very well with the construction of our intelligent electronics.” With the support of Polish institutes and DESY machine control groups, the DESY team will now upgrade the standard of this system for the instrumentation of accelerator controls. They are closely watched by a number of accelerator institutes: this technology would also be very useful for the ILC, FAIR or CERN projects.

The testing of the electronics is done at the FLASH accelerator. All signals are read out from both the existing control electronics and the new ATCA system – the latter is not yet controlling during normal user operation though.

In January, however, the group achieved an important success: when they made the new system control the accelerator, it easily passed the test. (tz)

Hustle and bustle in the PETRA III hall: 48 firms presented their products at the industrial exhibition which took place at this year's HASYLAB Users' Meeting



## The Analysis Centre of the Terascale Alliance

### Support for physics analyses at LHC and ILC

by Thomas Schörner-Sadenius

With the beginning of the Helmholtz Alliance "Physics at the Terascale", the Analysis Centre was established at DESY in Hamburg in order to support the work of 21 Alliance institutes (18 universities, one Max Planck Institute and two Helmholtz centres, including DESY) in the field of physics analysis at the LHC and ILC. It offers training and support in analysis-related fields to particle physicists from the Alliance institutes and makes substantial contributions in the field of coordination. Altogether, it is to be the centre for all questions related to particle physics analysis in Germany.

An important part of the Analysis Centre are three groups concentrating on Monte Carlo generators for particle collisions simulation, on statistics tools for data analysis, and on further development of parton distribution functions. These three groups consisting mainly of DESY

colleagues represent the specific DESY expertise which last but not least was built up during the HERA years. Up to now, these groups for example have organised introductory schools in their field, elaborated a comprehensive research plan and successfully started with the networking of activities at all Alliance institutes.

The Analysis Centre has great plans for the future: several events for the years 2009 and 2010, an attractive working programme within the groups and the creation of additional thematically well defined "Analysis Working Groups" are only some of the projects the Centre will work out together with numerous colleagues from DESY and the universities.

There are plans for the next period of programme oriented funding (PoF) for DESY from 2010 to 2014 that central institutions of the Helmholtz Alliance like

the Analysis Centre are to play an important role in the further development of DESY as the prominent German particle physics centre. At the same time, DESY works towards a continuation of the Helmholtz Alliance and its institutions which nominally is to expire at the end of the year 2012.

The Helmholtz Alliance and the Analysis Centre establish new concepts for the organisation and collaboration within the German particle physics community. It certainly is a challenge and above all a great opportunity to fill these structures with life.

#### INFO

More on the Analysis Centre:  
<http://www.terascale.de/anacentre>  
Contact: Thomas Schörner-Sadenius  
[thomas.schoerner@desy.de](mailto:thomas.schoerner@desy.de)



Novosibirsk meets Hamburg at DESY.

## Guests at DESY

### First school exchange programme with Siberia

by Karen Ong

On 14 February, 12 pupils from more than 5000 kilometres away in Novosibirsk landed at Hamburg airport to participate in a very special exchange programme: the first between schools in Hamburg and Novosibirsk and the first time that German and Russian pupils jointly do experiments in school labs of the Helmholtz Association.

The pupils spent three days of their one-week stay in Hamburg at DESY. After a German-Russian guided tour of the research facilities, the youngsters did radioactivity and vacuum experiments at the DESY school lab, true to the motto "understanding both nature and environment", the theme of the project initiated by the Foundation German-Russian Youth Exchange and developed in collaboration with the Helmholtz Association.

To complete the programme, the Russian guests attended classes in Hamburg partner schools and participated in a multifaceted programme, including a reception at the Hamburg City Hall where DESY Director Albrecht Wagner gave a report on DESY and its programmes for young people.

For the next school year there are plans for an encounter at the Russian school in Novosibirsk. The school exchange has also been a Helmholtz pilot project: a successful result is to initiate similar projects between other German and Russian schools in cooperation with school labs of the Helmholtz Association in other German federal states.

## Helmholtz-Alliance Mem-Brain

### Technologies for clean coal-fuelled power plants

Novel membrane materials could in the future reduce the emission of the greenhouse gas carbon dioxide in fossil-fuelled power plants. The development of such membranes is the task of the Alliance Mem-Brain, with scientists from four Helmholtz centres collaborating with national and international partners from science and industry. The participating institutes are Forschungszentrum Jülich, GKSS Research Centre, DESY and Helmholtz Centre Berlin.

More information and more news are published in "hermann", the newsletter of the Helmholtz Association (in German). (uw)

<http://www.helmholtz.de/hermann>

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#### Reward for Peter Schmüser

Dr. Peter Schmüser, retired professor at the experimental physics institute of the University of Hamburg has been rewarded the "Wilhelm and Else Heraeus Senior Professorship". With this distinction, the Heraeus foundation acknowledges Schmüser's commitment to improve the

study of physics and teacher training, and his exceptionally successful linkage of excellence in international research and teaching. Peter Schmüser was honoured on 5 February during the traditional end-of-term ceremony of the physics department.