

## “Like living on a sheet of paper”

First part of the IceCube neutrino telescope goes into operation at the South Pole

In February, the 1000th optical module for IceCube was assembled at Zeuthen. Only last year, 480 of these glass spheres with optical sensors have been built. This year's South Pole season exceeded all expectations. The IceCube team upgraded the neutrino telescope by 18 new strings. Now there are 40 strings – half of the detector. Each string carries 60 optical modules, which detect cosmic neutrinos with their sensors. Compared to AMANDA, IceCube's predecessor, the sensitivity of the present configuration has improved by a factor of 15. Deploying a string down to 2.4-kilometre depth takes the scientists twelve hours. This year, Delia Tosi and Stefan Klepser from Zeuthen have experienced the days of hard work.

From Stefan's notes: “The South Pole is no holiday camp. Everybody works ten to twelve hours a day, also on Saturdays. “It's like living on a sheet of paper” – that brings it to the point. It's like a theatre stage. There is nothing but the people and the things they put up. The environment is just as if it wasn't there, monotonous, white and always bright. In general, a never-say-no-philosophy is effective: If someone asks you for help, you just help, (almost) no matter how occupied you are. That automatically leads to full-day employment. Every day follows the same pattern: alarm clock at 6:30 h, work from 7:30 h to 19:00 h, some relaxing time, retire at 22:00 h. Work progresses, but would it change the course of the day? The weather is



Workplace ice desert: During four weeks, Stefan Klepser commissioned ice tanks (left on the picture) which record charged particles at the ice surface.

mostly sunny, and if not there is always very bright light.

Anyway, what else is there to do? Go skiing on the sheet of paper, where everything looks the same, with thin air and a temperature of  $-33^{\circ}$  Celsius. One day, the crew celebrated the South Pole International Film Festival. Seven movies were shown that were produced along the summer season. Every appearance of important people of the station gave shout and laughter. Important people being the ones that make living possible up here. These are not the scientists in the first place but carpenters, mechanics, kitchen staff and electricians. Living

at the South Pole is a real experience. For many – also for us – it means hard work with hands and tools, out in the field, at the cable winch, at the drilling hole, with heavy clothing in the thin high-altitude air”. (*she*)

### INFO

More information on IceCube:  
[http://nuastro-zeuthen.desy.de/experiments→IceCube](http://nuastro-zeuthen.desy.de/experiments/IceCube)  
<http://icecube.wisc.edu/>

### Panofsky Lecture

From 14 to 16 March the XVII. International Amaldi Conference will take place at DESY, dealing with scientific questions of peace and global security and supported by Academies of Sciences from the whole world. At this conference, Richard Garwin will give a public lecture on arms control, disarmament and relevant contributions of

physicist Wolfgang Panofsky who deceased recently. The series of the Amaldi conferences owe their existence to Panofsky. Garwin, a physicist himself and an expert in this field, used to be national security advisor to several US Administrations. Friday, 14 March, 9.a.m., main auditorium, (in English). More information: <http://amaldi2008.desy.de>



## DIRECTOR'S CORNER

After the official go-ahead for the European XFEL in mid-2007, a considerable part of the activities is now focused on establishing the international project organisation. The signing of the intergovernmental convention between the partner countries is being prepared. Furthermore, the creation of the XFEL company (GmbH), which will be in charge of general supervision of the project, is advancing. The organisation of the consortium that will execute the construction of the entire

accelerator complex is also making progress.

The institutes participating in the consortium from France, Italy, Poland, Russia, Sweden, Switzerland and Spain will provide more than 40 percent of the accelerator as so-called in-kind contributions, such as accelerator components, sub-systems and personnel. Contributions from China and Denmark are under discussion. DESY will contribute in-kind close to 60 percent of the accelerator and act as the coordinating insti-

tute in the consortium. The distribution of tasks among the partners builds to a large extent on the TESLA collaboration. The vision to build a large superconducting linear accelerator in broad international cooperation thus becomes reality – although at this point in time first for the “smaller” part of the original TESLA project.

The coordination of the consortium and the integration of all in-kind contributions presents a significant technical and organisational chal-

lenge for DESY. Many colleagues are already strongly involved and work closely together with the partner institutes. Despite one or the other organisational hurdle that still needs to be overcome, I am strongly convinced that the collaboration will do its job successfully – and that working jointly in a multinational environment will be a lot of fun.

Yours,  
Reinhard Brinkmann

# Between Data Flood and User Run

## The LHC start-up – A great challenge for the Grid

by Jan Dreyling-Eschweiler

A standard computer today is often sufficient for data recording and processing in many scientific experiments. However, to meet the requirements of the LHC experiments, a much more powerful computer is required. Thus, in the past years experts have built up the LHC Computing Grid (LCG): a computer network that links resources – memory capacity and computing power – over the internet worldwide.

With the LHC start-up, a tremendous amount of data will be stored in the network for scientists to process later. “A great variety of user applications will be possible, ranging from simply reading pre-processed data to complex detector

simulation,” said Andreas Gellrich, responsible for Grid Computing at DESY IT. While reading data requires fast connections and memory capacities, computing power is decisive for simulations. Gellrich emphasises that these two Grid applications are the easiest examples. “Once the data of the LHC experiments are recorded, many scientists will access and analyse the distributed data simultaneously and this may be quite chaotic.” In order to balance the expected data flood and users’ run, an efficient data management is essential. “Otherwise, data have to be copied each time to the location where a job has just found free computing capacities,” said Gellrich.

On the one hand, an appropriate network tier structure will be used: The data will be distributed among resource centres like DESY. On the other hand, the main task of the experts now is to develop and optimise programs which competently process the numerous requests of the users – thus tapping the full potential of the LCG computer capacity.

In the past years, experts at DESY have built up a Grid infrastructure of their own. Currently DESY has resources of nearly 1000 processors and 250 terabytes of disk space. The Grid resources are available to members of the following virtual organisations: ATLAS, CMS and ILC as well as H1, ZEUS, IceCube, ILDG and BIOMED. The

Grid at DESY is part of the LCG since 2004 and DESY is a regional centre (Tier-2), following national centres like Forschungszentrum Karlsruhe (Tier-1) and the main centre CERN (Tier-0). More Information: <http://grid.desy.de>  
Talk on Grid at Science Café DESY: 3. April, 17 Uhr, Bistro

## DESY's EU Projects

# EUROTeV

by Jan Dreyling-Eschweiler

At the end of last year European accelerator scientists received some pleasant news: The term for the EUROTeV project was extended from three to four years. This meant that the scientists have time to conclude their projects and R&D work until the end of 2008.

The EUROTeV (European Design Study Towards a Global TeV Linear Collider) Collaboration consists of 28 European universities and research laboratories and is coordinated by DESY. EUROTeV started in 2004 when the project was approved by the European Commission with a grant of 9 million Euros.

At the time of project proposal the fundamental question of accelerator technology – superconducting or normal conducting – for the future linear collider had not yet been decided. EUROTeV therefore concentrates on separate and independent aspects like beam dynamics, damping rings, beam quality, positron production or testing of new diagnosis and detection methods.

Many results of the study went directly into the ILC Reference Design Report. "However, the overlap with other linear collider projects like CLIC was obvious," said EUROTeV coordinator Eckhard Elsen from DESY. For him the collaboration has established itself by now as an institution worldwide.

### INFO

[www.eurotev.org](http://www.eurotev.org)

This is the first part of a series on EU projects coordinated by DESY.



The cryomodules will be built in international collaboration.

## A Tour of Europe in 2.1 Kilometres

### Many different countries contribute to building the European XFEL

The European X-Ray Free-Electron Laser, or European XFEL for short, will not only be a major new contribution to European science. It has been conceived, planned and is being built as a European effort, with crucial contributions coming from countries like France, Italy, Russia, Poland, Spain and of course Germany.

These contributions are research activities that have been going on for as long as 15 years. "I bet our partners who emerged from the TESLA Technology Collaboration cannot wait for the constructions start and finally see their product in action," says Reinhard Brinkmann, Director of the Accelerator Division at DESY. Fourteen countries have signed the memorandum of understanding, the latest one being the Slovak Republic. Russia has just declared its commitment to become shareholder of the XFEL company (GmbH) with 250 million Euros.

As is the tradition with large-scale science projects, many of the partners' contributions will be in kind rather than

in cash. The assembly of the 101 cryomodules for the superconducting accelerator, for example, will take place at Saclay in France. Russia and Poland will play a major role in equipping the cooling system, and Spain and China are considering to participate in building the complex undulators.

Italy also plays a major role in many components and was one of four partners in the design and construction of FLASH, working on photocathodes, the photocathode radiofrequency gun, cavities and cryomodules. Carlo Pagani from INFN Milan is thus an XFEL man of the first hour. He was key in re-establishing the team that had designed and built FLASH, the TESLA Technology Collaboration for the new free-electron laser. "I think the project is going very well," Pagani says with the start of XFEL construction almost in sight. "All team members are very willing, happy and ready to start." (baw)

### Open Space for New Ideas

Typical DESY: If you want to know something, just ask ... everybody. The directorate and the staff association invited all of DESY to join an 'Open Space' meeting to develop ideas for more efficient working processes and possibilities to save money at DESY. On 5 February, about 100 DESY staff met in the canteen annex. 'Open Space'

starts with no fixed agenda, thus not limiting the creativity of all participants. Many ideas emerged from the meeting, like the utilisation of solar energy or better time and resources management. Currently, practicability is tested; first results will be presented mid-April. More information (in German): [www.desy.de/verborgene-schaetze](http://www.desy.de/verborgene-schaetze)



Tiny yellow sensors (e. g. bottom right) record the vibrations. When someone walks past them in two metres distance the deformation of the concrete slab is less than one micrometre – exactly as planned.

## Testing the Ground

### Sensors measure deformation of the PETRA III experimental hall floor

Around the end of 2008, researchers will install the first high-precision measuring instruments on the PETRA III hall floor. As the smallest mechanical vibrations would already disturb the future experiments and the tiny X-ray beam, the construction engineers developed many tricks for the 280-metre long and one-metre thick concrete slab. The hardening phase took about two months. Now, first tests revealed whether this special construction method paid off.

The moment of truth came, when on 7 January the winter insulation covering was removed. More than 6000 square metres, perfectly smooth and free of cracks put a smile on the faces of the construction firms' employees, expert consultants and involved DESY people. The team already had two points of orientation: the temperature develop-

ment that had been recorded at twelve spots during concrete hardening corresponded to the predictions. A laser interferometer had measured the hardening velocity of the concrete slab: at 30 to 40 nanometres per second, these measurements also being within the given limits. Even when on 8 January a tiny crack was detected, probably resulting from the thermal shock, nobody was particularly alarmed.

First preliminary measurements of vibration behaviour now reveal that the slab's stability is not affected by the crack.

In general, the planned tolerances were kept: the deformation of the slab was less than one micrometre. Next the surface will be coated with epoxy resin. This will cover the crack and turn it into history. (she)

## Surveyed

With DESY inForm we want to show all the different facets of life at DESY. With a survey on our newsletter's content, format and frequency we wanted to find out if our readers enjoy it. In the period from mid November to the beginning of January, 296 DESY inForm readers participated in the survey: many thanks to all for this! Eighty-four percent answered that they regularly read DESY inForm, and most prefer the print version over an electronic one. The most popular articles are the lead story, reports on current projects and Director's Corner. Less favoured are portraits or articles on science policy. Other comments suggested that articles should be written in an easily comprehensible manner and also asked for a more frequent presentation of groups and projects. We will take care of all this in the future.

The majority of the participants like DESY inForm the way it is which, of course, pleases us very much. If you want to have a look at the complete survey, go to:

[www.desy.de/desy\\_inform](http://www.desy.de/desy_inform) (she)

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#### Time Lapse

Three time-lapse films sum up the construction progress of the PETRA III site. One film gives an overview of all developments, starting from the first preparation work. The other two films show 3-minutes documentations of the pouring of the concrete slab.

Website: <http://petra3.desy.de/buildings→films>

#### European XFEL in New Premises: AER9

The preparations for the European XFEL foundation are running at full speed; some practical steps have already been taken, including the rental of an office complex in the neighbourhood: Albert-Einstein-Ring 19 (AER19). It is fully linked up with DESY and can be extended gradually if needed.