

## Speedy TULA

Tunnel boring machine for the European XFEL completes first tunnel section

by Frank Poppe

On 30 August at 3:00 h in the morning, the giant tunnel boring machine finally broke through: slowly and carefully, TULA (“TUNnel for LAsEr”) drilled through the last centimetres of concrete into its first reception shaft. An important milestone for the tunnel builders of the “ARGE Tunnel XFEL” consortium, which marks the completion of the first 480 metres of the 5777-metre-long future tunnel system of the European XFEL X-ray laser. Everybody involved was satisfied, as the boring machine managed an average pace of 7.50 metres per day.

Eight weeks after tunnel excavation began in Schenefeld, the 71-metre-long machine – which boasts an external diameter of 6.17 metres – reached its first stopover at Osdorfer Born. The tunnel patroness, Hamburg’s State Minister for science Herlind Gundelach, congratulated the tunnel builders inside the 20-metre-deep construction pit during the breakthrough celebration, presenting each with a beer and a herring bread roll. After all, they had just completed the first section of the “Herlind tunnel”. For TULA, however, it was only a short breather. The machine was disassembled inside the shaft, and the various parts were then transported back to Schenefeld where they are now being reassembled. At the end of October, TULA will begin constructing the second section of the Herlind tunnel. After 594 metres of drilling, TULA is due



Pleased and happy: the tunnel builders with the two patronesses (left: machine patroness Imke Gembalies, right: tunnel patroness State Minister Herlind Gundelach) in front of the cutterhead of TULA. The rest of the borer is still located inside the newly completed tunnel section.

to reach the shaft on the construction site Osdorfer Born for the second time in December – if all goes according to plan, that is. In tunnel construction, there is always some uncertainty. The old miner’s proverb “It’s always dark in front of the pick” also applies to state-of-the-art tunnel building with large boring machines. How long the machine will actually take depends on the composition of the soil and on the presence of unknown potential obstacles underground. And of course, the skill of the tunnel builders in guiding the colossus

through the earth, compensating for a little unevenness or “sensing” possible changes in soil composition in time, is equally important. To do this, they sometimes even have to slip into diving suits and into the slurry in front of the machine to check the tools fixed on the cutterhead.

After its second arrival in the switchyard shaft at Osdorfer Born, TULA will be hauled on rails through the shaft for its

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### Open school lab day

The inauguration of the extension of the DESY school lab coincides with an open day: on 13 October, starting at 15 h, everybody can have a look at the new rooms and the new experimental area “eLab – particles and fields”.

The inauguration includes a public lecture by Heinz Ober-

hammer, professor, scientist, cabaret artist and co-founder of the science cabaret group “Science Busters”. His humorous cabaret lecture, with short performances of the Science Busters, begins at 19 h in the auditorium.



## DIRECTOR'S CORNER

Dear colleagues,

these days Germany celebrates the 20th anniversary of its unity. DESY can draw a very positive balance from the reunification: with Zeuthen, we have gained an attractive research location with an excellent scientific reputation. We justly can speak of a successful example of German reunification. I would like to thank all those who have actively supported and shaped the merging process of both locations.

With the aim to hold our ground in global competition, we rely on "bright minds" –

and quite successfully. DESY managed to persuade two top researchers from the United States to come to Hamburg and work for CFEL: Robin Santra from the University of Chicago and Franz Kärtner from MIT in Boston. With the successful acquisition of the sought-after Humboldt professorship for Brian Foster we pulled another coup. This means that the supply of top-class "bright minds" is guaranteed. This gives us a strong impetus for our currently running appointments.

There are also good things to report about our large-scale

facilities. It is of great importance for us that the European XFEL construction work is still proceeding at a good pace. The experiments at the LHC at CERN keep delivering top-quality data. On the DESY campus, we currently concentrate on two new projects: FLASH II and the PETRA III building extensions. The construction cranes will thus remain on the DESY grounds for quite some time.

All our plans would of course be obsolete without the necessary financial resources. Remarkably enough, the Federal Government firmly sticks to its promise to spend

more money for education and research. Our scientific friends from countries with less far-sighted politicians are looking at us with envy in these times. The current political support in Germany must be backed with a wise and foresighted planning from the scientists. Therefore, DESY has already started with the strategy planning for the period beginning in 2015.

Yours,  
Helmut Dosch

last assignment: the two-kilometre-long tunnel for the electron accelerator, which runs all the way to the DESY site. If all goes well, the machine will reach the nearly 40-metre-deep construction pit at DESY-Bahrenfeld in late summer 2011.

Meanwhile, the second tunnel boring machine for the project passed the factory acceptance test at the manufacturer's, Herrenknecht AG in Schwanau near Karlsruhe. Representatives of the civil construction consortium, the European XFEL GmbH and DESY inspected the 83-metre-long machine in early September, witnessing the faultless rotation of the cutterhead and the smashing of a 50-centimetre boulder by means of a large stone crusher. With its slightly smaller external diameter of 5.48 metres, the machine looks very much like its bigger sister TULA. Starting in early 2011, it will construct the photon tunnels underneath the Schene-



View of the end of TULAs back-up system after 100 metres of the tunnel were completed.

feld area. The eight tunnel sections of the "X-ray fan" are due to be completed in summer 2012.

To keep up to date with the tunnel construction, you can visit the web-based tunnel construction progress page on the European XFEL website, which allows neighbours and all other interested people to follow the progress of the work. It shows the positions of the two tunnel boring machines, which are updated every day. In addition, the percentage of the tunnels already completed is shown in the header on every page of [www.xfel.eu](http://www.xfel.eu).

### INFO

[www.xfel.eu](http://www.xfel.eu)

Construction progress:

[www.xfel.eu/project/construction\\_progress/](http://www.xfel.eu/project/construction_progress/)



The Polarstern in Antarctica unloading supply for Neumayer Station III. On its next journey, the ship will take along a DESY detector for cosmic radiation. (Photo: Simon & Simon, AWI)

## Round trip: Bremerhaven – Cape Town – Antarktis

### DESY detector will be installed on the “Polarstern”

At the end of October, the research vessel “Polarstern” of the Alfred Wegener Institute will leave Bremerhaven for its annual journey to Neumayer Station in Antarctica.

One of the passengers is Michael Walter from DESY in Zeuthen who will put into operation a detector on the ship for the measurement of cosmic particles during his stay on board. He will test whether data taking works correctly and analyse first data. After leaving Cape Town, the detector will then take data in an automated way during the whole journey – also on the way back to Bremerhaven.

Already in November 2009, this detector travelled on the Swedish icebreaker “Oden” (see DESY inForm 12/2009). These data have now been analysed and processed to make them available to interested pupils and students via a web interface. This way, young people

have the possibility to get in touch with current scientific questions.

During the “Polarstern” journey, these measurements can be continued and completed, with special attention given to the measurement of the particle rate dependent on the latitude. At the equator, the rate is the lowest because the earth’s magnetic field deflects the particles to the poles. It is equally important to consider meteorological data as air pressure and temperature, since they influence the cosmic particle rate which must be corrected accordingly. Moreover, it will be possible to measure solar flares with the detector. These flares are also observed at the South Pole with the Ice Top Tanks of the IceCube experiment. This means that the detectors can be used as a warning system: excessive particle flows can have a negative effect on electronic systems in satellites or on

earth. The measurement of solar flares at the sea substantially increases the area of observation. Moreover, it offers a data pool that is not only interesting for DESY school labs in Hamburg and Zeuthen but may also be used worldwide for similar projects. (ub)

## A detector in the making

Installation of the last of eight OLYMPUS toroid magnet coils. The OLYMPUS detector is currently set up in the DORIS experimental hall. In 2012, the fixed target experiment will provide precise information about the rate of electric and magnetic charge distribution in the proton.



## October

- 9** DESYaner Photowalk  
DESY, Hamburg, 11 h
- 13** physik.begreifen  
Open school lab  
DESY, Hamburg, bld. 34a, 15 h
- 13** Public lecture  
Science Cabaret  
Heinz Oberhummer, DESY, Hamburg, auditorium, 19 h
- 19** DESY staff assembly  
DESY, Hamburg, auditorium, 9:30 h  
(Video broadcast to Zeuthen, SR3)
- 19** Colloquium  
Retirement of Robert Klanner  
DESY, Hamburg, auditorium, 16:15 h
- 21-22** Conference ([www.weltderphysik.de/lernwelten2010](http://www.weltderphysik.de/lernwelten2010))  
Lernwelten der Naturwissenschaften  
DESY, Hamburg
- 27** Science Café DESY (<http://sciencecafe.desy.de>)  
Mutabor – Magie der Hyperbeln  
Waldemar Tausendfreund, DESY Bistro, 17 h
- 27** Public lecture  
Der Röntgenlaser – Eine brillante Zukunft für DESY  
Rolf Treusch, DESY, Zeuthen, SR3, 19 h
- 27** Public lecture  
Schildvortriebsmaschinen und der Tunnelbau für den Röntgenlaser European XFEL  
Gerhard Wehrmeyer and Petra Folkerts, DESY, Hamburg, auditorium, 19 h

## November

- 2** Public lecture  
Bären, Schneemobile und Polarlichter  
Jens Kube, DESY, Hamburg, auditorium, 19 h
- 10** Science Café DESY (<http://sciencecafe.desy.de>)  
Strom aus der Wüste – Fata Morgana oder nahe Realität?  
Frank Lehner, DESY Bistro, 17 h
- 10-11** Conference on Cosmic Radiation Fields (CCRF)  
DESY, Hamburg
- 13-15** Drawing Exhibition by Ingrid Nikodem  
DESY, Hamburg, foyer auditorium
- 24** Science Café DESY (<http://sciencecafe.desy.de>)  
Normal oder super? – Wozu braucht man Helium bei DESY?  
Bernd Petersen, DESY Bistro, 17 h
- 30** DESY employees assembly  
DESY, Hamburg, auditorium, 9:30 h

## Stay healthy with DESY inForm

Wintertime is just around the corner, and along with it are influenza and colds. Therefore DESY staff members get the opportunity for a vaccination against flu at the DESY medical service on 20 October. Based on the recommendations of WHO and the EU, this year the current vaccine against seasonal influenza also includes immune protection against the so-called "new H1/N1 influenza" – this makes an extra vaccination unnecessary. To get this vaccination, see Katharina Bünz and her team on 20 October from 9 to 13 h, without pre-registration. You find the office in building 5 (entrance at the back of the auditorium building). Do not forget to bring your vaccination card if you have one. After that date, you can still make individual vaccination appointments.

Under the motto „Stay healthy“, the DESY doctor and the DESY education department jointly organise a series of lectures and information on health topics. There are plans for three to four afternoon events per year with talks of renowned experts from the Hamburg area. There will be a wide range of topics: for example asthma and headache, useful and useless medical precautions, depressions and sleep disorder – all these topics are possible and suggestions are welcome. The next lecture takes place on 16 February 2011 and will cover the phenomenon of burnout.

The lectures and topics of the new "Stay healthy" information series and other medical service offers will be presented in a loose sequence in DESY inForm. Moreover, you can find information about all offers at the medical service's homepage: <http://ba.desy.de>. (tz)

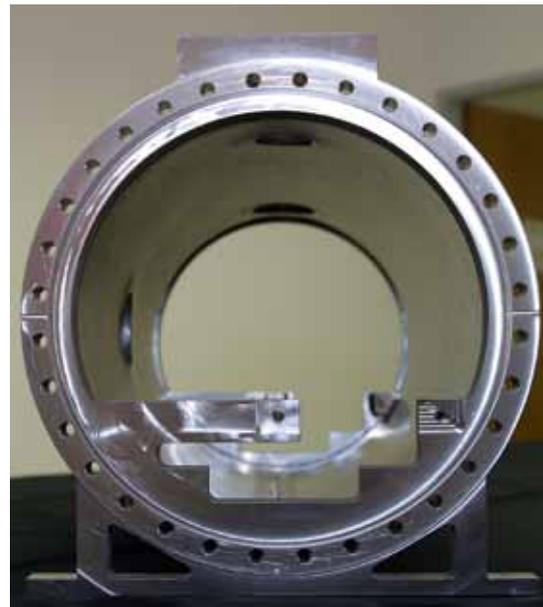
## Titanium welding

New ways for special technological requirements

Titanium welding was recently carried out successfully in Zeuthen for the first time. In a gas-tight welding chamber in an inert gas atmosphere, the first titanium mirror chamber was manufactured for FLASH. Many other conditions had to be observed when processing this extremely light material for the fabrication of a high-quality product to be used for the accelerator in Hamburg.

The free-electron laser FLASH generates soft X-ray laser with light of peak brilliance and ultra short pulses. Switching mirror chambers provide laser light to the measuring stations in the experimental hall. To allow a fast switching process, the chamber must be very light – the solution is the use of titanium.

On the basis of these first and very positive results with the application of this welding technique, DESY in Zeuthen



Pretty and light: the new titanium mirror chamber for FLASH.

will now upgrade the necessary infrastructure to be able to weld parts of up to 800 millimetres in length with this technique. (ub)



## The world of smallest particles

The Science Café DESY celebrated its third anniversary

by Burkard Reisert

As it has become a good tradition in the past three years, an interested amateur public met at the Science Café DESY in the DESY bistro on 8 September, its anniversary.

About thirty guests – from the fascinated pupil to the active retiree – were carried away into the world of smallest particles. In a short lecture the journey into the heart of matter was depicted, starting with the classic Rutherford scattering and ending with the latest results of HERA, the world's largest electron microscope that allowed a gaze in the heart of the proton.

Another good tradition of the Science Café is a break with coffee and cake after an hour. Invigorated, the guests, organisers and the lecturer enjoy the opportunity to discuss in a relaxed atmosphere. Detailed questions in connection with the lecture led to topics like science politics and science as "cultural work" being discussed.

INFO

<http://sciencecafe.desy.de>

# To be in the picture

The winners of the photowalk by DESY have been selected

On 7 August, professional and amateur photographers had a chance to look behind the scenes at DESY and four other labs around the world and to capture on camera their views of our institute. The national winners have now been selected. The jury made up by Hamburg's state minister of science and research Herlind Gundelach, the DESY directors Joachim Mnich and Edgar Weckert and two professional photo editors, selected the winners from almost 800 pictures and also awarded a special prize. Now the three winning photos have been submitted to the international competition. Moreover, there will be a public prize: you can vote for your favourite picture! (gh)

## INFO

All photos and all information on the voting procedure are available at: [www.desy.de/photowalk](http://www.desy.de/photowalk)



The picture of national contest winner Hans-Peter Hildebrandt shows a new view of the often photographed radial tracking chamber of the H1 detector.

# PETRA III does research

The first regular user time started at the new photon source

They came on 3 September: the first official external users at PETRA III. Now they can do research at three measuring stations during user operation – four more stations are running in test operation. “Until the end of the year, we will have light at all of the 14 beam lines,” Hermann Franz, PETRA III experiment coordinator, beams. In the coming user periods, the other beam lines will also be available for user operation. “The end of the upgrade is in sight and the former construction site PETRA III is more and more transforming into a research facility,” Franz explains enthusiastically.

Already now PETRA III is overbooked: fifty-four user applications have been submitted. Thirty-two of them were selected by an international review committee and received measuring time in the current user period that ends at Christmas.



Beatrice Schuster (GSI) installs a sample in the diffractometer of the PETRA III experimental station P09.

The selected experiments cover a wide range of disciplines: from high-temperature superconductivity to biological nanostructures. The first group from the GSI Helmholtz Centre for Heavy Ions Research in Darmstadt, for example, investigates structural changes in

materials that have been exposed to irradiation with heavy ions. This is done under excellent conditions, Franz reports: “Not everything runs smoothly yet, but the beam quality is exactly as we have calculated it in advance.” (gh)

## A Silicon Valley for Russia

In summer 2010, the Russian government decided the foundation of a scientific and technical innovation centre, to be built in Skolkovo near Moscow, following the example of California's Silicon Valley. There are plans to establish a complete infrastructure for about 30 000 scientists within three to seven years. The planning phase of 2010 will be funded with about 102 million Euros. The budget for the period of 2011 to 2015 will add up to 2.8 billion Euros.

The main fields of research of this innovation centre will focus on energy efficiency and saving, nuclear technologies, medical research, information technologies and telecommunication. Firms and institutions will get special conditions. Siemens and MIT are willing to participate in the project. Cisco and Nokia too announced their interest.

An agreement with the Russian Kurchatov Institute was already signed. The Russian Nobel Prize winner Schores Alforow and the US biochemist and Nobel Prize winner Roger David Kornberg have been appointed scientific directors.

[www.helmholtz.de/hermann](http://www.helmholtz.de/hermann)



Some of the library staff in their new premises.

## Books on the road

These new rooms are now the home of the DESY library

Two lorries, eight men, ten days and 1800 metres of books – these are the figures that describe the DESY library move. With construction work starting in their former premises, the library had to move to its new location in building 1d in August, which bring nearly 700 new square metres of space for the library and an additional 120 square metres in the basement, tightly packed with mobile racks for the archive. But how do you get the books from A to B without mixing up their order in the racks? “We were lucky to get a removal firm that already had experience with this,” says Kirsten Sachs, who organised the move. The firm arrived with a lorry and trailer full of rolling book shelves. “The books were taken from the shelves in blocks and packed into the consecutively numbered rolling book shelves,” Sachs ex-

plains. This was the only possible way to return the books to the shelves in their original order. “However, we did not actually install the shelves in the original order,” Sachs says. This made it necessary to store some books temporarily in the rolling shelves, but fortunately the moving firm had brought enough of them. “All in all, everything went fairly well but of course we were very much involved,” Sachs explains. But in the end it was worth the effort. Although last work is still to be done in the new rooms, the highlights are already visible: more space, warm colours and a coffee corner. And there will even be a sun deck which users will be able to enjoy next spring. (gh)

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### Learning worlds get connected

From 21 to 22 October, the first meeting “Learning worlds of sciences” takes place at DESY. The purpose is to create a network of different learning sites, for example schools and school labs, and to communicate current developments. More information on the meeting at: [www.weltderphysik.de/lermwelten2010](http://www.weltderphysik.de/lermwelten2010).

### Max Planck back at DESY

On 21 October, Max Planck returns to DESY. The recasting of a Max Planck statue created by Bernhard Heiliger will be unveiled in Zeuthen in an official ceremony. The original statue made in 1949 had stood in the Zeuthen campus for a long time. In 2006, it was moved to the place for which it was originally intended: the Court of Honour of the Humboldt University in Berlin.