

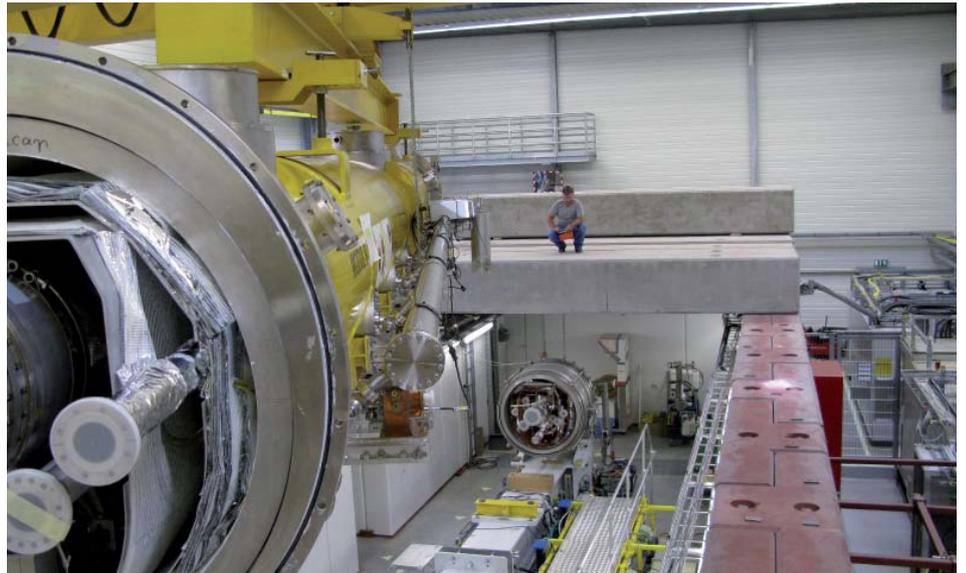
Optimised FLASH lights

Upgrade of the free-electron laser FLASH in September

DESY's free-electron laser FLASH has reliably been producing its unique light for the users, and its operators have long mastered the technology and operation of the European XFEL's little brother. Nevertheless, the FLASH collaborators are not resting on their laurels but are seeking for optimisation possibilities for their superlaser: for them it is time for an upgrade.

However, the plans for the upgrade starting in September, currently developed by the team around Katja Honkavaara and Siegfried Schreiber, look more like a complete remake rather than just some fine-tuning. A large part of the accelerator will be refurbished, starting with the electron source. The new photo injector from Zeuthen will generate considerably less dark current and better aligned particle bunches (see DESY inForm 12/08). The installation of an additional accelerator module, making a total of seven, will bring the electron beam to the energy of 1.2 giga-electronvolts. This makes it possible to generate laser light with a wavelength of less than five nanometres. At the same time, the first accelerator module will be replaced by a new one equipped with so-called piezo tuners.

The highlight, however, will be the installation of a special accelerator module with four superconducting 3.9-GHz cavities. The module, built at Fermilab, will be operated at three times the normal accelerator frequency and – even if this seems weird at first sight –



The new FLASH accelerator module is being craned out of the test stand.

will slow down and not accelerate the electrons. However, the trick makes sense: with the intentional deceleration, the electron bunch becomes sorted so that, when flying through the subsequent bunch compressors, it can be optimally squeezed. The two-millimetre bunch from the injector is shortened to 50 micrometres in two steps, with the electron bunch becoming denser and the laser light brighter. "With the 3.9-GHz module, the objective is to influence the form and length of the FEL pulse," says Siegfried Schreiber, coordinator of the accelerator operation. "We want to provide the users with exactly what they need for their experiments." This application is also an important test for the European XFEL

which will be equipped with comparable modules.

In collaboration with Hamburg University, another project called "sFLASH" will be built in 40 metres of tunnel, in which the so-called seeding with a normal laser will set off the FEL process. Apart from the substantial conversion in the tunnel, the FLASH upgrade also includes the upgrade of the optical laser in the experimental hall and the installation of a reflector for quick FEL pulse switching to several measuring stations. After the five months conversion, a completely new FLASH will be available to the users. (tz)

INFO

http://flash.desy.de/upgrade_2009/

New CALICE spokesman

Tomorrow's experiments need spokesmen already today. R&D activities for the International Linear Collider detectors are in full swing. A leading position is taken by the CALICE collaboration (for "Calorimeter for a Linear Collider Experiment"), as of January under the leadership of DESY's Felix

Sefkow. He takes over from Jean-Claude Brient. About 300 scientists from 12 countries are building calorimeters which will later measure the particles from electron-positron collisions with highest precision. A prototype was built and successfully tested at DESY.



DIRECTOR'S CORNER

2008 has been a successful accelerator operation year: after the restart in summer, DORIS went into trouble-free user operation, FLASH has been upgraded concerning performance and reliability; and at PETRA III, with the completion of the remodelling programme and the beginning of the technical commissioning for the “old” seven-eighths of the ring, an important milestone has been reached. Another great success was the operation seminar for the accelerator sector

that took place in November in Grömitz, after a pause of three years. Several inspiring talks and lively discussions treated the aspects of facility operation and scientific application, accelerator physics and technology.

In the coming months we expect with great excitement the beam commissioning of PETRA III, when the “new octant” in the experimental hall is being completed and the ring closed again. FLASH operation is to continue until

beginning of September, followed by a break of several months used to build a so called HHG seeding FEL section with the cooperation of the University of Hamburg, and for a further upgrade of the linear accelerator as well.

With the beginning of the civil engineering activities, the European XFEL is really going to get started. In this international project, DESY plays a leading role in the construction of the accelerator complex. In the course of

the year, with our international partners, we will launch the production of the main accelerator components and the installation of the required technical infrastructure.

I wish all of you a good start into an eventful year 2009.

Sincerely yours,
Reinhard Brinkmann

We turn 50!

Successful past and fascinating future

It is the year 2009: a most exciting year at DESY. A new Director General will assume office, PETRA III, the world's best X-ray radiation source of its kind will be commissioned in spring and ceremoniously inaugurated in September. Construction work for the European XFEL will also start this year. DESY has established itself as one of the most prestigious research centres in Germany, Europe and the world, and facilitated all these developments.

In 2009, DESY celebrates its 50th anniversary with many events. Throughout the year, DESY's successful past will be remembered and its fascinating future envisioned. Albrecht Wagner and Helmut Dosch will herald the anniversary year at

the opening ceremony in March. The year will also highlight the current research themes: on 7 November 2009, there will be an Open Day where our research centre with all its facets opens its doors to the general public. On the same day, PETRA III, selected from more than 2000 applications, will be presented as one of the “Sites of Ideas” under the initiative “Germany – Land of Ideas”.

In spring 2010, the anniversary year will end with a big ceremony. (cm)



Signature of the State Treaty on the establishment of the foundation “Deutsches Elektronen-Synchrotron” in the Hamburg city hall on 18 December 1959

Zeise is a name closely connected with Altona and Hamburg. This family, also called “The Buddenbrooks of Altona”, owned a factory which produced propellers for all sorts of ships, including many famous ones. Anne Mahn from the Altona arts and cultural history museum will hold a public evening lecture on the ups and downs

of a world-famous factory and on the founding family history that began much earlier with a pastor in Altona who was popular for his sermons in Low German: “Propellers of Progress – The Zeise Family in Altona” (in German). Wednesday, 14 January, 7 p.m., auditorium

Industry Forum

by Katja Kroschewski

On 5 November 2008, the HASYLAB industry service group and the GKSS research centre organised the Industry Forum “New Materials in the Light of the Future”. The workshop, intended to show the opportunities of research with synchrotron radiation for industry included several lectures in the field of materials science and its applications. The address of welcome by Albrecht Wagner was followed by presentations of photon science research at DESY and materials research at GKSS. The second half of the morning was dedicated to synchrotron radiation applications in materials science, for example tomography and internal stress analysis.

After lunch in the new PETRA III experimental hall, the 40 participants visited the construction site of the new synchrotron radiation laboratory. They were especially interested to see the components that had already been installed in the accelerator tunnel and also the measuring stations at the DORIS storage ring and the new GKSS diffractometre.

The afternoon programme was completed with presentations of the use of tomography at Audi and materials science at the Helmholtz Centre Berlin. The participants and hosts agreed that analyses with synchrotron radiation in materials science deliver outstanding results, and they were fully satisfied with the Industry Forum. Only one week later, the first request for measuring was made by one of the participating firms.



Installation of the TPC in the test magnet

Testing the future

Detector prototype collects first data in the DESY test beam

In the electron test beam in hall 2, in December, a magnet and a detector prototype perhaps made history for future times. Built for the planned International Linear Collider ILC, the prototype is a truly global product – the parts and the team coming from Asia, America and Europe. Although the ILC is still a future project, scientists are already developing and testing new technologies to later obtain the best data. With regard to time, space, species and energy identification of the crossing particles, the detectors must excel all detector technologies existing today.

The detector which was tested (and for the most part also built) at DESY is a prototype for a so-called time projection chamber, or TPC, in which three-dimensional tracks of charged particles can be determined. The gas-filled cylinder will later be located close to the point where the particles collide. The

prototype, with a length of nearly half a metre and a diameter of 72 centimetres, fits perfectly into the inside of a Japanese magnet which since last year has been waiting for exactly this kind of use and which, in his former life in Japan, has already been to space. Its advantage: it can be cooled down “ambulantly” – only equipped with a helium tank – and with its magnetic field of one Tesla it will properly test the prototype for the first time. The international team of scientists is satisfied after two weeks of data taking: “Everything worked from the start and now we have sufficient data to further improve the prototype,” says project leader Klaus Dehmelt.

XFEL and HASYLAB Users' Meetings

Every year at the end of January, the users of the DESY photon sources meet to talk about their research progress and about the newest developments. Future XFEL users convene in the DESY auditorium on 28 and 29 January, including a poster session in the auditorium foyer. HASYLAB users meet on 30 January; satellite meetings

take place on the previous day. The central meeting is held in the auditorium as well, the poster session starts at 3 p.m. in the PETRA III experimental hall. This is also the place of an industrial exhibition, already open for the DESY staff on 30 January at 1 p.m.



Representatives of the two consortia, DESY and the European XFEL project team on the occasion of the signing of the contracts for the civil engineering works

European XFEL: Here we go!

Construction starts in a new "outfit", first activities ongoing

by Petra Folkerts

No, the new corporate design of the European XFEL project has nothing to do with those blue overalls the building teams are going to wear on the three building sites! It just came at the right time: at the first meetings with the construction firms, the stickers with the new logo were still hot off the press. Now they are already adorning the first folders.

The basic elements of the new CD for the future not-for-profit European XFEL GmbH – logo, web presence and templates for posters and presentations – had their premiere on 24 November. Shortly afterwards, the DESY purchasing department sent out the faxes announcing the awarding of the contracts for the civil engineering works. Amounting to a total of 242 million Euros, the contracts

were awarded to the two consortia Hochtief/Bilfinger Berger (building sites Schenefeld, Osdorfer Born and tunnel) and Züblin/Aug. Prien (DESY Bahrenfeld). Representatives of those firms met the DESY officials on 12 December to sign the contracts. DESY is the awarding authority, representing the company European XFEL GmbH that is to be founded in spring 2009. Construction will officially begin on 8 January 2009. First set up activities may take place on all three sites before that date.

You wish to know more? Then take a look at the new web presence www.xfel.eu, where you will find a construction calendar (in German) informing about ongoing events.

Installing the undulators

With the turn of the year, the installation of the most important components – the undulators – for the new PETRA III facility begins. There will be one undulator for each of the 14 beam lines in the experimental hall. An undulator is the original source of the highly brilliant synchrotron radiation. With a periodically alternating magnetic field, electrons are forced to travel along a zigzag path, thus emitting the intense light for the experiments.

The installation goes parallel with the assembly and the maintenance of the undulators: in the magnet measuring lab in hall 5 the first undulators are now available – adjusted accurate to the micrometer and successfully tested.

Already in December the PETRA III storage ring test run began as well. After 16 months of complete renewal of the tunnel outside the experimental hall, the machine elements – for example the bending magnets or control systems – will now be tested under normal operating conditions.

(jde)

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Travelling with laptops

Watch out when you travel with laptops that contain data that are worth protecting. Particularly at US immigration, data carriers like laptops are often copied and scanned, encoding is prohibited or circumvented. In order to pro-

tect sensitive data on staff laptops, DESY is currently considering to offer a pool of "travel laptops" on which no sensitive data are to be stored.