

Cool Crash Test Dummy

European XFEL cryomodule passes a tough test

Sometimes you have to smash things up to find out how much they can take and whether they are safe. Car manufacturers do it all the time by driving test cars into walls. A group of engineers and technicians working on the European XFEL recently crash-tested a full cryomodule. They wanted to find out what the 12-metre piece of kit would look like if somebody happened to use the beam pipe as a stepladder or drive a tunnel vehicle into a flange.

The worst thing that can happen to a cooled cryomodule under vacuum is for the different vacuum systems to break down. The team tested this in DESY's cryomodule test bench CMTB by running five cycles of letting room air into the insulation layers and the beam vacuum. Their goal, apart from getting to know their module in a crisis and input for a final design of the XFEL cryogenic system, was to pass European pressure vessel regulations for later cryomodule mass production for the European XFEL. "There was a loud noise and a massive cloud of helium at the safety valves," says Bernd Petersen, crash test initiator and head of the MKS group. Inside the module's thermal shields the superconducting accelerating cavities sit in a liquid helium bath at -271°C within a helium vessel. If air at room temperature – about 300 degrees warmer than the temperature of the cavities – flows into the container, it freezes out by condensing on the cold surfaces. The helium vaporises and expands immediately,



Cryomodule 3* passed the crash test.

which is where the noise comes from. Crash-testing the insulation vacuum caused only minor damages at the outer shells of the multi-layer insulation and the outer thermal shield. The cryomodule could be cooled down again immediately after the test, and the testers noticed no decrease in the cavities' operating performance. The group also found out that inside the beam pipe and cavities themselves, it would take five seconds for the warm air to travel from one side of the module to the other. "That means that you have a few seconds to close beam tube valves to save as many cavities as possible, that's a long time," explains Petersen, clearly surprised and pleased by the result.

"The impact on the cryogenic system is also much smaller than estimated before in worst-case scenarios."

The data from the crash tests and a few other related experiments are analysed now and will be published soon. The module will be taken apart and checked for damage in the alignment. Petersen hopes that the team can run a similar test with another module of the latest European XFEL design that has built-in alignment monitors. "All these tests make us a lot more secure and relaxed about the XFEL cryogenic design and the later operation of the linac. We know now that even after an accident of this scale, we could simply pump the air back out and switch the machine back on." (baw)

European XFEL – Beginning of 2009

Work goes off: Activities on all three European XFEL construction sites DESY-Bahrenfeld, Osdorfer Born and Schenefeld will start in the first quarter of 2009. The tendering for the underground constructions (tunnel, shafts and buildings) is in its final stage. DESY is expecting to place the three orders in November.

The preparation work is already under way. This includes the expansion of the "Holzkoppel" street in Schenefeld, the 140-metres-long access road to the local European XFEL site. It will be widened to 6.50 metres including a separate foot and bicycle path.



DIRECTOR'S CORNER

At the beginning of February, the directorate and the staff association had invited you to participate in a procedure which aims at a more effective utilisation of our resources. In an "Open Space" meeting some 100 DESY staff proposed twenty topics that have the potential of optimisations and savings and worked on them with great enthusiasm. The topics cover a wide range of areas from energy saving and workflows to bookkeeping and the DESY "fleet" of cars.

In a second step, DESY experts reviewed and evaluated the proposals for their feasibility. Twelve specific fields of action were outlined and assigned to internal consideration by the directorate, followed by an implementation phase in the coming months. The fields of action are listed online at www.desy.de/verborgene-schaetze (in German) and are subdivided as follows:

1. Policies that allow short-term implementation and aim at effective improvements and savings.

2. Action items on energy saving
3. Improved utilisation and organisation of resources at DESY

In the course of the discussion it became evident that you – our employees – are contributing to the improvement proposals with dedication. The feedback also revealed that we should constantly ask ourselves whether our structures and procedures are still up to date. This also requires having a

close look at the DESY infrastructure that has to be adapted to our future tasks and our requirements.

Just like we submit our scientific work to critical review, we have to check systematically the supporting infrastructure in order to use our resources in the best possible way.

Yours,
Albrecht Wagner

“Physik.begreifen” at the Ideas Park 2008

DESY's school labs presented themselves at the technology fair

by Heidi Sommer

The School Labs Network of the Helmholtz Association participated in the Ideas Park 2008 in Stuttgart in May with six school labs, including the DESY physik.begreifen school labs from Hamburg and Zeuthen. With their experiments, they jointly highlighted the importance of science and particularly of basic research at DESY.

At the Ideas Park, Germany's largest world of technology and science fair, around 500 engineers, researchers and students presented their ideas and latest technologies. At 200 exhibits, many of them interactive, more than 290 000 visitors could try out and learn more about technology. In SchlauLoPolis, the city of

education, children and young people experienced that learning more about technology and science was fun. More than 6300 workshop stations located in an entire exhibition hall offered



Shining eyes and lots of questions at the "physik.begreifen" stand at Ideas Park2008 in Stuttgart

the possibility to experiment, puzzle and design to visitors of all ages.

"This surely was a strenuous job," says Maike, one of the student-helpers, "but the noise level and standing all the time were easily forgotten when so many interested people overwhelmed us with their questions." The success of these events is not easy to measure but surely, after extensive discussions, many of the visitors returned home with a new understanding of the term "vacuum".

INFO

<http://physik-begreifen.desy.de>
(in German)

Collaborative Research Meeting

From 9 to 11 July, scientists with projects at FLASH and PETRA III, funded by the Federal Ministry of Education and Research within the framework of Collaborative Research, will meet at DESY. They will present and discuss their scientific goals and methods.

With means of Collaborative Research, the Ministry funds

university projects at large scale facilities. In the current funding period from 2007 to 2010, 22 collaborative research projects at PETRA III will be financed with a total of 12.2 million Euros and 19 projects at FLASH amounting to 15.3 million Euros.

DESY's EU Projects

EGEE III

by Jan Dreyling-Eschweiler

EGEE stands for the EU project "Enabling Grids for E-sciencE". Since April 2004, the members of 120 organisations from all over the world have been building an extensive infrastructure of Grid networks. With this, the EGEE operates the largest Grid infrastructure available to scientists from all disciplines. "Computing Grid" is the term for a computer network via internet, achieving a computing power and storage capacity impossible to reach locally. Only this way such complex computations like the LHC data analysis are possible.

Currently the network is connecting 250 sites in 48 countries all over the world, with a computing power of more than 68 000 processors and a storage capacity of more than 20 petabytes. At present, DESY is participating with about 1000 processors and 250 terabytes of disk memory.

In May, the third project phase, EGEE III, has started with another 30 million Euros of EU funds for two years. "The main focus of EGEE III will be scientific applications," says Andreas Gellrich from DESY-IT.

DESY is engaged in high energy physics, among others by running a Tier-2 centre for the LHC, ILC and the HERA experiments, but also increasingly in other disciplines. It is planned to make the Grid usable for XFEL scientists.

INFO

www.eu-egee.org



More than 60 scientists met at DESY from 18 to 21 July at the 4th Patras Workshop on Axions, WIMPs and WISPs.

Light into the Darkness

News from ALPS & Co

by Andreas Ringwald

There are many hints suggesting that – apart from the known elementary particles of the standard model – there must be more exotic particles. A most significant observation is that only about five percent of our universe seems to be ordinary matter. The remaining 95 percent of the energy density are dark matter (about 25 percent) and dark energy (about 70 percent). From the theorists' point of view, the best candidates for dark matter particles belong to two groups: ultra light and invisible axions, so-called WISPs (Weakly Interacting Sub-eV Particles), or the lightest supersymmetric partners of known particles, so-called WIMPs (Weakly Interacting Massive Particles).

The existence of these particles is predicted by supergravitation and superstring theories. The search for WIMPs is one of the main motivations for experiments at the LHC while the ALPS experiment will be searching for WISPs to provide complementary information

about a fundamental theory.

Since the last report in DESY inForm in February, many things have happened at ALPS. With the participation of the Max Planck Institute for Gravitational Physics Potsdam, the laser performance is to be increased a hundredfold, soon making ALPS top-ranking in WISP sensitivity in the world. The potential of DESY to assume a central role in the field of fundamental physics at low energies recently became evident at the "Brainstorming and CalculationShop on the Low Energy Frontier", where renowned theorists were engaged with the possibilities of high precision low energy experiments, and at the "4th Patras Workshop on Axions, WIMPs and WISPs", the meeting point at DESY for the experts from all over the world.

INFO

<http://alps.desy.de>

<http://axion-wimp.desy.de>

A Kind of MAGIC

The Zeuthen Helmholtz Young Investigators Group of Elisa Bernardini joined the MAGIC Collaboration in May. The MAGIC telescope on the Canary Island La Palma is the world's largest Cherenkov telescope for the observation of high energy gamma rays. The group, also engaged in the IceCube project, is following the so-called multi-mes-

senger approach: The combination of the MAGIC measurements with the IceCube observations of high energy neutrinos allows different ways to investigate celestial phenomena. This leads to a wide-range positioning of DESY astroparticle physics.



Total commitment at football training: DESY football player Stephan Fleig attempts to score a goal.

Football Forever

DESY players training on a new pitch

They do not train as hard as the German national football team did for the UEFA EURO 2008, but nevertheless, the two DESY teams are full of ambition as well. They compete with other company teams such as Holsten brewery, Lufthansa or the Max Planck Society, fighting for the championship in their league. Last year, one of the teams was very close to achieving promotion to the next league. Even the DESY “seniors” – players older than 38 years – are successfully participating in league games and cup matches. This unites! “I began to feel like a real DESY member when I was playing with colleagues from different DESY groups,” says Tonio Schmetz, a centre-back who works in the purchasing department. Until recently, DESY had a sports field,

which is closed now because of construction. Now, the players are using the hard-court “Wilhelmshöhe”, which is located opposite to the main gate at Notkestrasse. Strikers and other football artists who can do their magic on hard-courts are always welcome to join in: training takes place every Wednesday at 17 h.

On the website of the DESY sports community you can not only find the standings of the football teams but also more information on other sports. (she)

INFO

DESY sports and match dates
<http://sport.desy.de> (in German)

The last Kilogramme of ATLAS

Just a small part is missing to complete the 7000 tonnes ATLAS detector. But it is this part that provides the highest precision. ALFA (Absolute Luminosity for ATLAS) measures the rate of proton collisions in ATLAS. This rate will be the basis for precision measurements in the future.

10 000 scintillating fibres will help detect very weakly deflected protons from so-called elastic collisions in ATLAS. These protons deviate from the beam by so little that ALFA has to be placed 240 metres from the interaction point and only a few millimetres from the proton beam.

Know-how and hardware from HERA has been used in the project: Two very similar detectors were operated in H1 and ZEUS. Within the cooperating DESY group, diploma student Dennis Petschull has exactly measured the position of the scintillating fibres in single ALFA detector layers. After assembly ALFA will be installed during the first long LHC shutdown in 2009. (tz)

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Universe or Multiverse?

At the Einstein Forum Potsdam, a panel discussion in German on “Universe or Multiverse? – Open Questions of Modern Physics” will take place on Tuesday, 8 July at 15:30, within “The Self-concept of Natural Sciences” series. It will clarify the impact that particle physics and particularly research at the LHC has on our world view and illustrate

the interaction between the exploration of the microcosm and the universe. Thomas Naumann from Zeuthen will moderate the discussion of particle physicists, cosmologists and philosophers from all over Germany. Admission is free. Address: Am Neuen Markt 7, 14467 Potsdam
www.einsteinforum.de