

Showtime!

Footlights on for Germany's first accelerator show at DESY

How many particle accelerators are there in the world? You might be surprised – the number is nearly 20,000. Most of them are used in medicine and industry. Accelerator technology reached our everyday lives a long time ago. So its high time to expose this key technology to pupils, decided Brian Foster, DESY physicist and Humboldt Professor, and he initiated a German version of the physics show Accelerate!, which has been successfully staged for several years in the UK. On 26 April, Germany's first accelerator show will have its premiere at the Girls' Day at DESY.

Blue flashes fly from a Tesla coil, beach balls dance a Mexican wave above the heads of the audience, and volunteers charge themselves up with a Van de Graaff generator, literally making their hair stand on end. All this with the purpose of communicating concepts of accelerator technology to children aged 10 and above in an entertaining way. "I have already given two series of lectures to pupils aged 15 or 16, but they required some basic physics knowledge," Foster tells. "I wanted to find a way to fill younger children with enthusiasm for accelerator science in a less formal way."

At DESY, Foster discussed his ideas with PhD student Marc Wenskat, who will be the first master of ceremonies of the German version. Wenskat also adapted the British original version, developed by Oxford PhD student Suzie Sheehy together with Foster, to DESY and a German audience. By now, eight people belong to the show team: five hosts who alternately appear on stage, two technicians and Brian Foster as a provider of ideas and funds. The Humboldt professor did not want to moder-



Blue flashes flying from a Tesla coil will also be a highlight of the accelerator show.

ate the show himself. "I think younger children relate more easily to presenters who are not too old."

The approximately one-hour accelerator show will not only be entertaining but educational too, as "it is also important to convey the concept of an accelerator," Wenskat emphasises. When the team has gained experience after a number of shows, the project will also go on tour. "First, to schools in Hamburg and surrounding areas, later on, hopefully, all over Germany," Wenskat says. Therefore the team needs more members; interested people are always welcome.

The dress rehearsal on 13 April (10 a.m. in the DESY auditorium) will be the practical test for the show team, with several school classes being the audience. DESY staff members are also welcome – provided that seats are still available.

Name wanted!
Make your Proposals!
physikshow@desy.de

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The team is still looking for a catchy name for the show and started a competition to provide one. Ideas may be submitted to physikshow@desy.de until 20 April. "The winner will learn 'Wie man mit einem Schokoriegel die Lichtgeschwindigkeit misst und andere nützliche Experimente für den Hausgebrauch' from a book with this title," Wenskat promises. (tim)



DIRECTOR'S CORNER

Dear colleagues,

a few days ago the LHC started operation again, and this year, the protons will collide with an increased energy of eight Tera-electronvolts (TeV). If everything goes as planned, by the end of the year we will be able to definitely determine whether the Higgs particle exists as predicted in the Standard Model. Perhaps the LHC will also open the doors to new worlds of physics before the upgrade to its full capacity next year.

However, this is not the only reason why 2012 will be a key year of particle physics: in March, the CERN Council

Strategy Group began consultations on the strategy of European particle physics. The group invited the particle physics community to submit proposals and contributions which will be discussed at a large community meeting in Cracow in September. Next spring, we will present the overall strategy of European particle physics which, of course, will be affected by the expected exciting results from the LHC.

The work on the planned ILC is also entering into a decisive phase. At the end of the year, the Technical Design Report

will be written – this is more or less the construction manual of this next-generation global accelerator; and while the Global Design Effort scientists are still busily working at this TDR, there are already efforts in Japan, also on a political level, to become the host country for this precision machine. This would be an almost perfect transition from the design phase to the planning phase for the ILC and at the same time a wonderful new chapter of our long-standing cooperation with Japanese scientists.

All these are very positive signs for particle physics, and the public interest and fascination for this research field is perhaps greater than ever. This is why I am especially glad that Brian Foster, Marc Wenskat and colleagues will stage a DESY physics show presenting our research to the audience in a fun and memorable way. I am already looking forward to the dress rehearsal on 13 April in the auditorium.

Yours,
Joachim Mnich

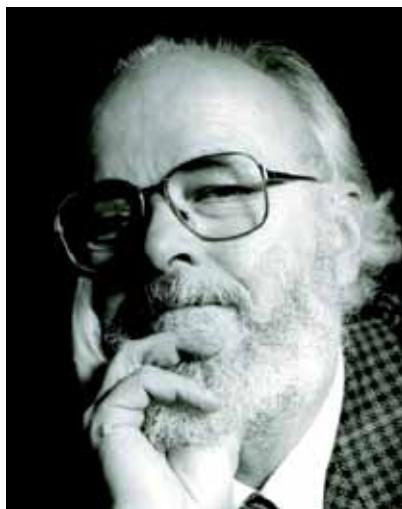
Pedro Waloschek

1929-2012

By Petra Folkerts and Erich Lohrmann

DESY mourns the death of Pedro Waloschek, former leading scientist and temporary head of the PR department, who passed away on 8 March 2012 at the age of 82 years.

After doing research at CERN and in Italy, where he was professor at the University of Bari, Pedro Waloschek became a leading scientist at DESY in 1968. This was also the year the DORIS storage ring project received approval. At that time, Pedro Waloschek was one of the first physicists who prepared experiments at this storage ring. He was one of the initiators of the PLUTO experiment and one of his merits was the procurement of the large superconducting solenoid magnet, the first magnet of this kind in Germany and the



core of the PLUTO detector, which together with other experiments opened the door to the new world of quarks and gluons.

Moreover, Pedro Waloschek was also known for his ability to write about physics in an understandable way, particularly about high-energy physics at DESY's accelerator facilities and about the people involved. He published numerous articles in newspapers and magazines, he was head of the DESY press and public relations department for several years, and he wrote more than twenty books.

With great commitment, Pedro Waloschek made a lot of difference at DESY. His passion for high-energy physics as a scientist and science writer, his outstanding competence, his tolerance and serenity, and his joyful and wholehearted spirit will always be remembered.

„You automatically pay more attention.“

A van Gogh painting is no ordinary object of investigation, DESY physicist Karen Appel explains. She assisted the measurements at DORIS.

How do you handle a van Gogh? Do you get wet hands in such a situation?

Appel: In fact, this was not the first van Gogh at DESY; nevertheless, we automatically paid more attention to this than usually. I am usually working with thin sections of rock samples. These must not be damaged either, though they are not as irreplaceable as a painting. In this case it was reassuring that the museum curator was always present.

You are not just moving the art work into the X-ray beam, don't you? What kind of preparations is needed?

Appel: It starts with the paint. We tested in advance whether the paint would come out of the X-ray beam unscathed. For this purpose, the museum provided us with paint samples manufactured according to original formulas from the painting's time of origin. We then made tests to obtain the measuring conditions for a safe investigation of the paint with our radiation. To be on the safe side, we measured the painting with a period of exposure that was even 10,000 times shorter.

And then, measuring is done as usual?

Appel: No. First, we had to air-condition the measuring station. The atmospheric humidity had to be increased from 30 to 50 – 60 per cent and stabilised, the temperature had to be lowered from 26 to 20 – 24 centigrade. More difficult was the handling of the painting's size: 99 by 79 centimetres. Usually, our samples have the size of two centimetres and our facilities are adapted to these requirements. Now, we had to make comprehensive modifications and measure behind the experimental table. For this purpose, a movable mounting bracket was built to bring all areas of the painting into the X-ray beam. DESY will install a measuring station in the planned extension building at the X-ray source PETRA III which will allow measuring paintings and ancient scriptures after the shutdown of DORIS III.



DORIS revealed a genuine van Gogh

Experiments at synchrotron source show the authenticity of a painting

It is fairly well known that synchrotron radiation is a perfect tool to explore many a problem of the future. However, it is also particularly suitable to shed light – X-ray light, to be exact – on mysteries of the past. This was recently proven by an investigation at DESY: with the help of the particle accelerator DORIS, it was possible to rediscover a genuine van Gogh painting. Ever since 1974, when the Kröller-Müller Museum in Otterlo, the Netherlands, purchased this work of art, its authenticity had been in doubt due to the unusual size of the canvas, the anomalous signature and the opulently filled foreground – all uncharacteristic features for van Gogh.

Although an X-ray image made in 1998 already revealed that the flower piece was painted over the depiction of two wrestlers – a subject that van Gogh mentioned in a letter to his brother – after some controversial debate among the experts, the work was dismissed in 2003 and has been listed as the work of an unknown artist ever since – in spite of remaining doubts.

Now a team of art historians and physicists investigated the painting with the DORIS synchrotron beam. With the help of X-ray fluorescence spectrometry they measured the distribution of specific chemical elements such as zinc and mercury in the painting underneath the painting. These are characteristic for specific colours which were used by painters at that time.

With the analysis, the scientists succeeded in confirming the authenticity of the painting and were able to incorporate the painting into the artist's life: at the beginning of 1886, van Gogh enrolled at the arts academy in Antwerp. In a letter to his brother Theo, van Gogh asks for money because the academy urged him to purchase a large canvas – on which he painted the wrestlers.

The academy was apparently not satisfied with the painting: van Gogh did not stay long and moved to Paris in March 1886. There he must have painted over the wrestlers with the flower still life, with opulent colours in the centre – to avoid the wrestlers shining through. (tz)



Twitter star visiting DESY

The „Häkelschwein“, a piglet crotched around the yellow container of a Kinder egg, is a star in the micro-blogging service Twitter. It travelled around almost the entire world, posting the photographs on its own Twitter account. Now, it also came to DESY, here at PETRA III. Find more evidence on the new DESY Twitter feed: <http://twitter.com/desynews>

WHAT'S ON AT DESY

April

- 2-5** Terascale-Workshop (www.terascale.de/statistics2012)
School on Statistics Tools 2012
DESY, Hamburg
- 15-20** Workshop (www.desy.de/LL2012)
Loops and Legs in Quantum Field Theory
Wernigerode (DESY Zeuthen)
- 19-20** Meeting
NIC-Wissenschaftlicher Rat
DESY, Zeuthen
- 23** Students laboratory day (www.eintagvorort.de)
DPG – Ein Tag vor Ort
DESY, Zeuthen
- 24** Meeting (<http://hasylab.desy.de>)
1st DESY Engineering Day
DESY, Hamburg, auditorium, 13-17 h
- 24** Informationsveranstaltung Gesund Bleiben
Schlafgesundheit
DESY, Hamburg, Sem. Rm. 1, 16 h (in German)
Dr. Holger Hein, Facharzt für Innere Medizin, Schlafmedizin
- 25** Science Café DESY (<http://sciencecafe.desy.de>)
Der kleinste magnetische Datenspeicher der Welt
Sebastian Loth, DESY Bistro, 17 h
- 26** <http://zukunftstagbrandenburg.de>
Zukunftstag für Mädchen und Jungen
DESY, Zeuthen
- 26** <http://betriebsrat-hamburg.desy.de>
Girls' day
DESY, Hamburg
- 26-27** Meeting (<http://prc.desy.de>)
73. PRC-Treffen
DESY, Hamburg

May

- 2** Public Lecture
Vom Kleinen und Großen – Elementarteilchen, Kräfte und das Universum
Christian Stegmann, DESY, Zeuthen, seminar room 3, 19 h
- 7-8** Workshop (www.desy.de/2012FCAL)
FCAL Workshop
DESY, Zeuthen
- 22** employees assembly
DESY, Hamburg, auditorium, 9.30 h
- 23** Science Café DESY (<http://sciencecafe.desy.de>)
Higgs, das meistgesuchte Teilchen der Welt
Marcel Stanitzki, DESY Bistro, 17 h
- 30** Public Lecture
Cool Runnings – Kalte Technologie für schnelle Teilchen
Karsten Büßer, DESY, Hamburg, auditorium, 19 h

The enthusiasm bug

Initiator of a pupils' physics workshop and of Science Café DESY celebrated his 80th birthday.

One of Waldemar Tausendfreund's favourite tasks is to convey the fascination of sciences to the people around him, and this is where he put all his efforts after retiring in 1997. Since the establishment of the "Faszination Physik" workshop, young people who are especially hungry for knowledge and want to look beyond the boundaries of what they learn at school regularly meet at DESY. So far, more than 100 pupils have attended this workshop and Waldemar Tausendfreund can say with pride that most of them studied physics or another sciences after leaving school. On 11 March, the committed fosterer of young people celebrated his 80th birthday.

"I am glad that there are always dedicated people like Waldemar Tausendfreund, with an continuous and passionate commitment to raise enthusiasm for physics and natural sciences among pupils. Our open campus encourages this development," said Helmut Dosch, chair of the DESY directorate, in his birthday note.



Tausendfreund's latest project was the establishment of Science Café DESY in 2007, where guests of all ages and scientists discuss scientific themes in a relaxed atmosphere. The main target group of the Science Café is a special one, the initiator emphasises. "I would like to see here children from 7th grade onwards who so far have had no contact with natural sciences. They have not yet decided whether sciences are good or bad, and we will show them that it is real fun."

50 years at DESY

Jürgen Boster, machine tool technician, is a piece of DESY history

DESY, DORIS, PETRA, PIA, HERA, TTF, FLASH – Jürgen Boster has known them all from the very beginning. Each new accelerator that started operating at DESY in Hamburg, all the directors that have been in office at the research centre. At the end of March, the machine tool technician celebrated a rare anniversary: 50 years – half a century – of employment at DESY. "On 1 April 1962, I started as a precision mechanic apprentice, at the age of 15," the 65-year-old states. At that time, only the halls 1 and 2 existed on the Bahrenfeld campus, the remaining area was still a construction site.

After completing his apprenticeship, Boster first worked in the main workshop and, in addition to his work, qualified as a technician for machine tools. Later he joined the vacuum group and was involved in the PETRA project group from the very beginning. After this, he was involved in vacuum technology for HERA and in the conversions of DESY II and DORIS. "In addition, I contributed to the development of a new accelerator structure for LINAC II and of an RF electron gun for TTF II," Boster reports.

For the machine tools technician, it was always especially exciting when a new accelerator went into operation. "After constructing such an accelerator you are really in suspense when it finally starts up."



DESY Director Helmut Dosch (left) congratulates Jürgen Boster.

And when everything works as planned, "you just pat yourself on the back, mentally." For him, the most fascinating project was the new sector of PETRA III. "The precision that was necessary, sometimes only a hundredth of a millimetre – this was really a big challenge."

With his anniversary of service, the 65-year-old is now retiring after two and a half years of part-time work. He is very concerned about the fact that DESY as a public institution has to compete with industry for the sought-after young technical talents. However, this would be no reason for Jürgen Boster to take up work again, although he always enjoyed it. "My wife and my grandchildren would certainly object to this," he smiles. (tim)

Big Data

DESY and IBM sign strategic cooperation

DESY and the IBM computer corporation are jointly developing innovative next-generation data storage solutions. The goal is a high-performance data management in the petabyte range, to be optimally prepared for future demands in a big data environment. A corresponding co-operation agreement was signed at the computer exhibition CeBIT in Hannover.

"DESY has a long tradition of almost 50 years in the management of large amounts of data," Volker Gülzow, head of IT, emphasises. DESY does not only store and manage data of its own large-scale facilities, it is also a computer

node for the Large Hadron Collider (LHC) experiments.

Decisive factors for efficient data management are not only the volume of data but also access time and transmission rate. Thus, DESY and IBM will develop and test new approaches for global data exchange between research centres.

"DESY provides an ideal test environment under practical conditions," DESY research director Joachim Mnich points out. "In return, the developments within the framework of the cooperation directly improve our scientific potential." (tim)

Cosmic surprise

The universe is more transparent than expected

The universe is more transparent for energetic gamma radiation than anticipated. This surprising result is described by Dieter Horns and Manuel Meyer from the University of Hamburg in a new analysis of nuclear radiation coming from distant active galaxies. Within the gamma radiation range, the brightness of these galaxies is higher than expected. This could be a hint to the existence of so far undiscovered light elementary particles, as Horns and Meyer illustrate in the "Journal of Cosmology and Astroparticle Physics" (JCAP). The experiment ALPS II at DESY will search for these unknown very light elementary particles.

Horns and Meyer collected observation data of different cosmic sources of gamma radiation. Interacting with the background light of stars and galaxies, these sources' radiation should produce pairs of electrons and positrons. The gamma quanta are then absorbed, and over long distances, the universe becomes non-transparent for gamma rays. However, the light of active galactic nuclei (AGN) visible from earth is too bright. "A possible explanation are so-called oscillations, in which photons temporarily transform into as yet unknown very light elementary particles," states Horns.

These hypothetical axion-like particles

barely interact; therefore, they can pass through the background light unhindered. These particles are especially fascinating because they belong to the candidates that could form the mysterious dark matter which is four times more abundant in the universe than the matter familiar to us. The DESY experiment ALPS (Any Light Particle Search) hunts for these axion-like and other exotic particles. Scientists use a strong laser to send its light against a steel wall, and they measure if occasionally a light particle seems to go through the wall. This would only be possible if the particle would have temporarily transformed into an unknown light particle which would cross the wall unhindered. In a first attempt, ALPS was able to define the narrowest limit worldwide for photon oscillations in these light particles.

"With the successor ALPS II, the measuring sensitivity will be further increased, making it possible to detect and observe those particles directly at DESY that could help understand the surprising observations of Horns and Meyer," Axel Lindner, head of the ALPS research group, points out. Thus, ALPS complements the hunt for so far undiscovered heavy elementary particles at accelerators as the Large Hadron Collider (LHC) in Geneva. (tim)



In active galaxy nuclei, a supermassive black hole sucks in matter and shoots part of it as a jet into space. This produces gamma radiation which can even be detected on earth. Illustration: NASA.

Proposals get PIER-reviewed!

Winner of first PIER funding round selected

The PIER fund for innovative ideas (Ideenfonds) has sent out the first funding notifications. In this first funding round, three innovative projects will be financed in the fields of particle or astroparticle physics, nanoscience and photon science. The projects include watching the growth of nanoparticles with X-rays, new detector materials for particle physics and finding the ideal pulse form of terahertz radiation from an accelerator. In total, PIER grants start-up funds for the three projects amounting to 130,000 euros.

Ideenfonds is an unbureaucratic support instrument to kick-start brilliant project proposals with start-up funding, created by the "Partnership for Innovation, Education and Research", i.e. PIER, established in 2011 between the University of Hamburg and DESY. "For the first call for proposals of such a new tool, a surprisingly large number of ideas were submitted," said PIER managing director Christian Salzmann. "The proposals were all on a remarkably high level, thus it was really difficult to make a choice."

Salzmann wants to take the momentum of this successful first call for proposals and start a new round this year. To start with, the call for proposals of PIER workshops was launched at the end of March. These workshops will promote networking and cooperation between institutes and disciplines.

INFO

<http://www.pier-campus.de>
<http://twitter.com/PIERCampus>

Safety at work

DESY is upgraded

DESY by far surpasses the legal provisions for occupational safety. In the latest assessment, the Hamburg occupational safety authority upgraded the Bahrenfeld campus from level III to level II. "During the inspection visit it became evident that DESY is well positioned with regard to occupational safety and that the responsible managers manage occupational and health safety for the benefit of the employees well. In our opinion, all safety issues have a high priority at DESY," the current assessment reads. The strict standards of the so-called Hamburg model provide regulations in level II that by far exceed legal requirements for occupational safety.

Helmholtz participation in Clusters of Excellence

Five more Clusters of Excellence will each receive funding of up to 40 million Euros over the course of the next five years. The three new Clusters of Excellence incorporating contributions from Helmholtz centres focus on the topics of bioeconomy, electromobility and immunotherapy. The Helmholtz Centre for Environmental Research - UFZ – is a partner in the “Bio-Economy Cluster”, which exploits the potential of using biomass for the production of materials, chemicals and energy sources. Combined production processes and cascaded utilisation of raw materials are supposed to allow for sustainable value creation.

The Karlsruhe Institute of Technology (KIT) and the German Aerospace Centre (DLR) take part in the Cluster of Excellence “Electromobility South-West”. They collaborate with industry partners in providing new solutions for electromobility and develop low-emission and cost-efficient products enabling sustainable mobility. The German Cancer Research Centre (DKFZ) is involved in the cluster for “Individualised Immune Intervention” (CI3). About 100 partners work on efficient active agents for immunotherapy featuring a low degree of side effects and diagnostic products for the treatment of cancer, autoimmune diseases and infections. Including the awardees from the third round, a total of 15 Clusters of Excellence now receive funding totalling 600 million Euros. Helmholtz Association centres are involved in nine of these fifteen Clusters of Excellence.

www.helmholtz.de/hermann



The DESY House residents: Sumit Tripathi, blog author Manuel Gnida, Khurelbaatar Begzsuren and Christian Wiebers (f.l.t.r.)

The DESY House

Three disciplines synergise under one roof

By Manuel Gnida

What do an engineer in accelerator development, a particle physicist, and a photon scientist have in common? “They all work for DESY,” you may say. Synergies between these disciplines are typical around the DESY campus. Now picture these three living together in the same household in a quiet residential neighborhood in Hamburg. It would make for a peculiar microcosm, to say the least.

I live in a house that I share with three “DESYans”. Each of my housemates works in one of the three different research divisions, turning our house into a “miniature DESY”.

Christian Wiebers, a development engineer in the machine group, works the closest to the powerful machines that are DESY’s backbone. “Working in accelerator research is great,” Christian says. “It’s not industrial mass production. We only build unique equipment, which makes my work very diverse.”

Christian’s housemate is Khurelbaatar Begzsuren, a senior particle physicist and member of the H1 collaboration. Khurelbaatar, who studies strange particles,

was the first Mongolian physicist employed at DESY. “Before I came here, I was told by one of my mentors that I had to demonstrate the quality of Mongolian physicists,” he says – an extraordinary challenge that not many of us have to deal with.

Sumit Tripathi from DESY’s Photon Science department completes the trio of disciplines in the house. Sumit, a postdoctoral researcher from India, came to Hamburg to design magnetic devices for modern light sources. “I want to learn more about new undulator designs and become an expert in my field,” he says. “DESY is a very famous name.”

Are you curious to find out more about the characters inside the DESY house? Then read the full story and future updates at our blog or DESY’s new facebook page.

INFO

<http://tinyurl.com/desy-house>
www.desy.de/facebook

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