CERN:

Englert, Higgs and CERN receive the Prince of Asturias Award

CERN, François Englert and Peter Higgs received the Prince of Asturias Award for “the theoretical prediction and experimental detection of the Higgs boson”, in a ceremony held on 25 October at the Campoamor Theatre in Oviedo, in the presence of Her Majesty the Queen of Spain and the Prince and Princess of Asturias. CERN’s director-general, Rolf Heuer, was there to accept the prestigious prize on behalf of the laboratory.

The ceremony was preceded by a cultural programme of exhibitions and events organized by the Prince of Asturias Foundation. Within this programme, Luis Álvarez-Gaumé, a theoretical physicist at CERN, gave a talk on the day of the awards ceremony at the Faculty of Science of Oviedo University, while the day before, CERN’s director for research and computing, Sergio Bertolucci, joined Englert and Higgs in meeting with hundreds of students at the university. Their public lecture was broadcast live on screens throughout the campus and online. The day closed with a concert by the Symphony Orchestra of the Principality of Asturias online. The day before, CERN’s Symphonic Orchestra of the Principality of Asturias Foundation.

The Prince of Asturias Award is divided equally among the laureates and comprises a Joan Miró sculpture representing and symbolizing the award, a cash prize of € 50,000, a diploma and an insignia. CERN’s management has decided that the prize to the laboratory will be used to offer 10 grants for PhD students from around the world to attend next year’s major particle-physics conference, the International Conference on High-Energy Physics, ICHEP2014, in Valencia. The prize to CERN will also be used to launch a competition for school students in Spain. Pupils aged 6–18 will be challenged to submit a drawing, photo, video or news article. Entries will be evaluated through a public vote and by an expert committee involving scientists from CERN and the Spanish Centre for Physics Physics (CPAN), which will contribute to the competition with related outreach activities and awards. Six winners will be rewarded with a two-day visit to CERN. Full details will be available from 1 December at www.cern.net.

Collaboration:

Ukraine to become an associate member of CERN

On 3 October, CERN’s director-general Rolf Heuer and the vice prime minister of Ukraine Kostyantyn Ivanovych Gryshchenko signed a document admitting Ukraine to associate membership of CERN, subject to ratification by Ukraine’s parliament – the Verkhovna Rada.

Ukraine and CERN signed a co-operation agreement in 1993 and a joint declaration in 2011, setting priorities for scientific-technical co-operation. But the relationship dates back to 2011, setting priorities in scientific-technical agreement in 1993 and a joint declaration in 1993, which will allow Ukraine to become a member of the LHC and to research and development on new accelerator technologies. Ukraine also

Operates a Tier-2 computing centre of the Worldwide LHC Computing Grid.

Ukraine’s associate membership will open a new era of co-operation that will strengthen the long-term partnership between CERN and the Ukrainian scientific community. It will allow Ukraine to participate in the governance of CERN, through attending the meetings of the CERN Council. Moreover, Ukrainian scientists will be able to become CERN staff and participate in CERN’s training and career-development programmes. Finally, associate membership will allow Ukrainian industry to bid for CERN contracts, therefore opening up opportunities for industrial collaboration in areas of advanced technology.

Awards:

APS announces winners for 2014

The American Physical Society (APS) has announced its awards for 2014, including major prizes in particle physics and related fields.

One of the highlights early this year was the announcement that the Daya Bay reactor neutrino experiment had observed the disappearance of electron-antineutrinos and established a significantly nonzero value for the “third” mixing angle in neutrino oscillations, $\theta_{13}$ (CERN Courier October 2013 p7). So it is appropriate that the 2014 W K H Panofsky Prize in Experimental Particle Physics, which recognizes and encourages outstanding achievements in the field, goes to Kam-Biu Luk of the University of California, Berkeley, and Lawrence Berkeley National Laboratory (LBNL), and Yifang Wang of the Institute of High Energy Physics, Beijing, for “their leadership of the Daya Bay experiment, which produced the first definitive measurement of the $\theta_{13}$ angle of the neutrino mixing matrix”.

Luk and Wang are the co-spokespersons for the experiment. The contribution of young physicists to the Daya Bay experiment is also recognized in awarding the Henry Prakashoff Award for Early-Career Particle Physics to Daniel A Dwyer of the Lawrence Berkeley National Laboratory, for his “innovative contributions to neutrino physics”, particularly the broad and substantial role he played in commissioning, calibration and analysis in the Daya Bay measurement of the mixing angle $\theta_{13}$.

The Robert W Wilson Prize for Achievement in the Physics of Particle Accelerators is another important award to recognize and encourage outstanding work. Kwang-Il Kim of Argonne National Laboratory (ANL) receives the 2014 prize for “his pioneering theoretical work in synchrotron radiation and free-electron lasers that laid the foundation for both third and fourth generation X-ray sources”. Also related to the developments in accelerators, the 2013 James Clerk Maxwell Prize for Plasma Physics was recently awarded to Phillip Sprangle of the Naval Research Laboratory and the University of Maryland for his “pioneering contributions to the physics of high-intensity laser interactions with plasmas, and to the development of plasma accelerators, free-electron lasers, gyrotrons and high-current electron accelerators. The 2014 award that recognizes and encourages outstanding achievement in particle theory – the J J Sakurai Prize for Theoretical Particle Physics – goes to Zvi Bern of the University of California, Los Angeles, Lance Dixon of SLAC and David Kosower of CEA-SACLAY. The three theoreticians received the award for “path-breaking contributions to the calculation of perturbative scattering amplitudes, which led to a deeper understanding of quantum field theory and to powerful new tools for computing QCD processes”.

The Dannie Heineman Prize for Mathematical Physics recognizes outstanding publications in the field of mathematical physics. The 2014 award goes to Gregory Moore of Rutgers University, for “eminent contributions to mathematical physics with a wide influence in many fields, ranging from string theory to supersymmetric gauge theory, conformal field theory, condensed-matter physics and four-manifold theory”.

Theoretical work is also recognized with the Herman Feshbach Prize in Theoretical Nuclear Physics, which for 2014 goes to John Negel of Massachusetts Institute of Technology, for “lifetime contributions to nuclear many-body theory including identifying mechanisms for saturation and relating the Skyrme interaction to fundamental nuclear forces, and for initiating and leading efforts to understand the nucleon using lattice QCD”.

Also in nuclear physics, the Tom W Bonner Prize recognizes and encourages outstanding experimental research in nuclear physics, including the development of a method, technique or device that significantly contributes in a general way to nuclear-physics research. William Zajc of Columbia University received the 2014 prize for “his seminal work on identical-heavy-ion physics, in particular for his leading role in the PHENIX experiment, as well as for his seminal work on identical-two-particle density interferometry as an experimental tool”.

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Faces & Places

Fernando Luca, winner of the Robert W Wilson Prize. (Image credits: LBNL, IHEP/CAS, ANL.)
**CERN**

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Studies at the smallest and largest scales in the universe are among the areas of research recognized in the 2013 awards by the UK’s Institute of Physics (IOP).

Among the annually awarded gold medals, the Glazebrook Medal – named after the first president of IOP, Richard Glazebrook – rewards leadership in a physics context. This year it goes to Lyn Evans of CERN and Imperial College London, who receives the award for “his outstanding leadership of the Large Hadron Collider Project”, the success of which “is in large measure the result of Lyn Evans’s expertise in accelerator physics and his superb qualities as a project leader.” In the subject awards, the Chadwick Medal and Prize is awarded for distinguished research in particle physics. Jonathan Butterworth of University College London is the 2013 recipient, for “his pioneering experimental and outstanding leadership of the Large Hadron Collider Project”.

He is rewarded for “his pioneering contributions to understanding of hadronic jets”. The Maxwell Medal and Prize is an early career award made to physicists within the first 12 years of their career (allowing for career breaks), for outstanding contributions to theoretical physics, mathematical or computational physics. Ioanna Dunkley of the University of Oxford receives the 2013 medal for “her contributions to determining the structure and history of our universe”. She has worked as part of the science team on NASA’s Wilkinson Microwave Anisotropy Probe (WMAP) and led analysis for the Atacama Cosmology Telescope in Chile. Finally, the Kelvin Medal and Prize, for outstanding contribution to public engagement with physics, this year goes to a theoretical particle physicist, Jeff Forshaw of the University of Manchester, for “his wide-reaching work aimed at helping the general public to understand complex ideas in physics”.

Mikhail Shifman and Andrei Slavnov receive the Pomeranchuck Prize

Mikhail Shifman of the Theoretical Physics Institute, University of Minnesota and Andrei Slavnov of the Steklov Institute, Moscow, received the Pomeranchuk Prize 2013 in a ceremony that was held at the Institute for Theoretical and Experimental Physics (ITEP) on 19 September. The prize – established by ITEP in 1998 in memory of Isaac Pomeranchuk – is annually awarded to one foreign and one Russian theoretician for outstanding achievements in the field.

Shifman has been honoured for outstanding results in nonperturbative quantum field theory, including sum rules in quantum chromodynamics (QCD) and exact results in supersymmetric gauge theories. The Shifman–Vainshtein–Zakharov (SVZ) sum rules provide a powerful tool for the calculation of QCD and the Novikov–Shifman–Vainshtein–Zakharov f-function plays an extremely important role in non-topological sectors in non-topological theory.

Slavnov received the award for his contribution to the investigation of non-Abelian gauge theories, including the formulation and proof of renormalizability. Widely employed since the early 1970s, it inspired further important developments, such as the Slavnov–Taylor identities that are now described in textbooks on quantum field theory.
Polish institute makes Guido Altarelli honorary professor

In a ceremony on 16 September, the Henryk Niewodniczański Institute of Nuclear Physics of the Polish Academy of Sciences (IFJ PAN) conferred the title of Honorary Professor of the Institute of Nuclear Physics on Guido Altarelli, of the University of Roma Tre.

Altarelli joined CERN’s Theory Division in 1987, where he held the position of head of the Theory Division of the Large Hadron Collider (LHC) experiments. (Image credits: J Butterworth (centre), STFC (right).)

CERN physicist Fabiola Gianotti is among the 26 scientists who have been appointed to the Scientific Advisory Board of the UN secretary-general, Ban Ki-moon.

The Scientific Advisory Board consists of experts in a variety of fields, from technology and engineering to medicine and agricultural science. They will provide advice on science, technology and innovation for sustainable development to the UN’s executive heads and secretary-general. UNESCO will host the board’s secretariat. The first meeting of the board will take place at the start of 2014. Besides Altarelli, four other physicists have been appointed to the board: Susan Avery, president and director of the Woods Hole Oceanographic Institution; Vladimir Fortov, president of the Russian Academy of Sciences; and nuclear physicist Dong-Pil Min of Seoul National University. The appointments are for two years with the possibility of renewal. The positions are unpaid and the members are expected to “act in their personal capacity and will provide advice on a strictly independent basis”.

Last December, the United Nations General Assembly granted CERN observer status (CERN Courier January/February 2013 p5), which allows CERN the right to participate in the work of the General Assembly and to attend its sessions as an observer.

Fabiola Gianotti, ATLAS spokesperson from March 2009 to February 2013, in front of the ATLAS detector. (Image credit: Ahram Kim IBS.)

Fabiolan Gianotti selected for UN’s Scientific Advisory Board

Since 2004, Altarelli received the honour “in recognition of his outstanding contribution to theoretical particle physics, in particular in verifying the Standard Model of fundamental interactions and ideas in physics beyond the Standard Model, and for his enduring support of the collaboration between CERN and IFJ PAN”.

The author and co-author of more than 200 scientific papers, Altarelli’s research achievements cover a range of problems in the phenomenology of particle interactions within and beyond the Standard Model, in close connection with experiment.

Guido Altarelli (left) with Marek Jeżabek, the general director of IFI PAN, and Adam Maj, the institute’s scientific director. (Image credit: IFJ PAN.)

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An umbrella symposium for the physics of multiparticle dynamics

Record rainfall in Chicago failed to dampen the enthusiasm for multiparticle physics of those attending the XLIIJ International Symposium on Multiparticle Dynamics, which took place on 15–20 September at the Illinois Institute of Technology (IIT). While some jokingly credited the umbrellas that were provided to participants for the meeting’s success, everyone was excited to attend the first in the series to be held in the US for four years. With more than 100 participants from nearly 20 countries, ISMD 2013 was organized jointly by the High Energy Physics Division of Argonne National Laboratory and IIT to review progress and discuss upcoming issues in the fields of high-energy physics, nuclear physics and astrophysics.

The ISMD series started more than 40 years ago in Paris, with the goal of fostering the enthusiasm for multiparticle physics, high-energy physics and cosmology, between outstanding issues that span nuclear physics, high-energy physics and cosmology, particle physics and astroparticle physics. Extended in 1994, the Yangbajing Cosmic Ray Observatory in the Tibetan Highlands is one of the four largest international extensive air-shower arrays for studying gamma rays and cosmic rays at ultra-high energies. More recently, construction of the Daya Bay Reactor Neutrino Experiment started in October 2007. IHEP’s current director, Yifang Wang (p31), is co-spokesperson of the experiment, which attracted the world’s attention with its discovery of a nonzero value for the neutrino mixing angle $\theta_{13}$ (CERN Courier October 2013 p7).

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The ISMD 2013 was supported by the US Department of Energy, the National Science Foundation, CERN and DESY, a Research Centre of the Helmholtz Association.

The XLIIJ International Symposium on Multiparticle Dynamics will be held in Bologna in 2014.

For more information about the presentations and proceedings of ISMD 2013, see http://atlaswww.hep.anl.gov/ismd13/.

A colourful contributor to a successful symposium. (Image credit: Z Sullivan.)

An ANNIVERSARY

China’s IHEP celebrates its first 40 years

The Institute of High Energy Physics (IHEP) of the Chinese Academy of Sciences (CAS) in Beijing celebrated its 40th anniversary this year. Founded in 1973, it has grown to become one of the foremost research institutions in China, focusing on physics on particle and astrophysics, accelerator physics and technologies, radiation technologies (mainly X rays, neutrons and positrons) and their applications.

In September 1972, China’s premier, Zhou Enlai, wrote to high-energy physicists Zhang Wenyu and Zhu Guangya, saying: “This issue should not be delayed any further. The study of high-energy physics and the R&D of a high-energy accelerator should be one of the main projects of CAS.” Less than six months later, IHEP was established in February 1973, with Zhang Wenyu, a noted physicist and Purdue professor (1949–1956), appointed as its first director.

The proposal for a high-energy accelerator came to fruition a decade later. In April 1983, the State Council officially approved the project to construct the Beijing Electron Positron Collider (BEPC). Deng Xiaoping and other high-ranking officials took part in a ground-breaking ceremony in October the following year. Four years later, on 16 October 1988, the first electron–positron collisions took place. Only a few months earlier, IHEP had established the first computer link with CERN via satellite – a VAX785 at IHEP became the first computer to be connected to the internet from China with the node BEPC2 IHEP/CERN.CH.

The beam energy of BEPC was in the range 1–2 GeV and the Beijing Spectrometer (BES) installed there focused on charm physics, as its lifetime is short and it collected large samples of D, $\overline{D}$, D mesons and $\tau$ particles, with notable results (CERN Courier December 2001 p6 and December 2002 p6). However, to meet the challenges in precision measurements in this energy region, a thorough upgrade was necessary. In December 2003, a double-ring design was officially sanctioned and, in March 2004, BEPCII shut down and the installation of BEPCII began (CERN Courier June 2004 p6). The new BESII detector observed its first collisions in July 2008 and by May 2012 it was accumulating as many as 40 million $\overline{D}$ mesons a day. Earlier this year, the BESIII collaboration announced the discovery of a new mystery particle (CERN Courier May 2013 p7).

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Record rainfall in Chicago failed to dampen the enthusiasm for multiparticle physics of those attending the XLIII International Symposium on Multiparticle Dynamics, which took place on 15–20 September at the Illinois Institute of Technology (IIT). While some jokingly credited the umbrellas that were provided to participants for the meeting’s success, everyone was excited to attend the first in the series to be held in the US for seven years. With more than 100 participants from nearly 20 countries, ISMD 2013 was organized jointly by the High Energy Physics Division of Argonne National Laboratory and IIT to review progress and discuss upcoming issues in the fields of high-energy physics, nuclear physics and astrophysics.

The ISMD series started more than 40 years ago in Paris, with the goal of establishing a dedicated international conference to discuss multidisciplinary production in quantum chromodynamics (QCD). Early on, the symposium alternated its location between countries in eastern Europe, the US and the Far East (mainly China) and astrophysics, accelerator physics and astrophysics, and astroparticle physics, accelerator physics and astrophysics, and astroparticle physics.

The ISMD series started more than 40 years ago in Paris, with the goal of establishing a dedicated international conference to discuss multidisciplinary production in quantum chromodynamics (QCD). Early on, the symposium alternated its location between countries in eastern Europe, the US and the Far East (mainly China). The XLIII International Symposium on Multiparticle Dynamics was held in Bologna in 2014.

In 2013, the US Department of Energy, the National Science Foundation, CERN and DESY, a Research Centre of the Helmholtz Association, the XLIV International Symposium on Multiparticle Dynamics will be held in Bologna in 2014.

For more information about the presentations and proceedings of ISMD 2013, see http://data1wv.ihep.ac.cn/ismd13.

The installation of the electron injector for the European XFEL has begun at the project’s Bahreinfeld site. Scientists and engineers are currently putting together the different systems of the injector, many of which are tailored to produce 27,000 X-ray flashes per second, a far higher rate than other free-electron laser facilities. The injector will fire electron bunches—needed to produce the X-ray beam—into the accelerating section of the free-electron laser. Here workers guide the injector klystron into place using a crane in the injector hall. DESY is building the injector as part of the German contribution to the European XFEL. (Image credit: European XFEL.)
New series of summer schools starts in Oxford

The First International Summer School on Intelligent Front-End Signal Processing for Frontier Research and Industry took place in Oxford on 10–16 July—the first of a new series of annual summer schools covering the complete signal-processing chain found in modern instrumentation. The aim is to focus on the most advanced technologies in the fields of semiconductors, deep-sub-micron and 3D technologies, nanotechnology, advanced packaging and interconnects, telecommunications, real-time signal processing and filtering, and massive parallel computing. The participants studied many of the crucial challenges and issues of front-end detector technologies processing for building 21st-century frontier instruments.

Sixty young physicists and engineers from around the world—master’s and PhD students and young postdocs—participated in a programme of lectures and laboratory work. Technical examples were drawn from cross-disciplinary applications and ranged from exploration of the distant universe through medical imaging to the physics of elementary particles. This variety brought together a new generation of engineers and scientists from across the research communities, allowing them to get to know each other through training sessions that combined advanced technologies with frontier research. Worldwide experts from academia and industry gave lectures on technical developments and science overviews, alongside hands-on laboratory sessions with technology. The school also featured a number of masterclasses on science and as a forum for discussions.

The school began with an introductory examination of why it is essential to introduce “intelligence” at the early processing stage, followed by an explanation of advances in related cutting-edge technologies. The first day covered the main components of a state-of-the-art full processing chain and the technologies for designing and producing the front-end ASIC circuits. The next two days looked at silicon photomultipliers and then semiconductor microstrip- and pixel-based instruments. Silicon photomultipliers, microstrips and pixels are the technologies that are most used today in research and many applied fields.

The fifth day of the school moved on to the tools for real-time filtering, triggering and data selection at the front end and in testing conditions. The challenges of data transmission at the front end and related advanced high-tech solutions were then discussed and the seventh day looked at the tools for testing, characterizing and ensuring the performance of the demonstrators produced.

Participants also took part in social activities and in and around the city of Oxford. These included a banquet in the ancient dining hall of Exeter College, evenings in traditional English pubs and an entertaining race around Port Meadow on the River Thames.

Building on the success of this inaugural school, the next will be held in Paris on 14–25 July 2014.

For more information on this 2013 school, visit www.physics.ox.ac.uk/INFIERI2013/.

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Obituary

Alfredo Susini 1926–2013

Alfredo Susini, an expert in RF cavities, died at home in Switzerland on 17 August after a long struggle with illness. Alfredo was born in Rome, Italy. An electrical engineer, he was working for the Italian Military Aviation as an expert in electronics in the 1950s when he was selected by Edoardo Amaldi to work at CERN as an RF engineer in the Synchrocyclotron (SC) Division for the 600 MeV accelerator. He was a brilliant engineer and even though he did all of his computing on a pocket calculator he was never proved wrong. He was among the first to use ferries and water to damp the higher modes of resonance of the RF cavities.

He soon became a world leader in RF for cyclotrons and synchrotrons and, when the SC was stopped, he moved to the Proton Synchrotron Division and took leave from CERN during 1973–1977 to work for the Swedish nuclear research cyclotron at the Aalto-Metlin Institute in what was then West Berlin. The spin-off from this project was the use of medium-sized cyclotrons in the energy range 40–60 MeV, which were built for research, isotope production and neutron therapy.

Alfredo contributed to the construction of the 40 MeV cyclotrons for Eutrons in Koya, Iraq, and for the Clatterbridge Hospital in the UK, as well as 60 MeV machines for Seattle in the US and Seoul in Korea. He also collaborated with the Gustav-Werner Institute of Uppsala, the INFN synchrocyclotron of Catania, the Abdus Salam International Center for Theoretical Physics in Trieste and the TERA Foundation in Pavia, and was “Libero docente” at the University of Pisa.

Alfredo was used to building his RF cavities on a small budget, sometimes even re-using equipment that had been discarded by other groups. He impressed his colleagues when at the Low Energy Antiproton Ring at CERN he constructed the RF cavity using a wooden box that he covered internally with aluminium paper. The cavity worked perfectly for six months. Because of this attitude he often came into conflict with some of his younger colleagues, who were not used to recycling.

In private, Alfredo was gentle and full of curiosity. He often enjoyed sailing with his small boat on Lake Geneva or on the sea at Isola del Giglio, where he spent his vacations in a summer residence. He leaves behind his wife Clara and two sons, Stephanie and Albert, who had made him a grandfather. He is greatly missed and will be remembered by us all.

His friends and colleagues.

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M E E T I N G S

INSTR14, the International Conference on Instrumentation for Colliding Beam Physics, will be held in Dresden, Germany, on 15–20 June 2014. The programme includes plenary sessions and parallel sessions with special poster session for students – held as information on registration before 14 April (lower fees) and reservation of accommodation, see www.ipac2014.org.

Elsys Instruments has developed a new software driver that makes Elsys’ entire range of highly accurate data-acquisition products fully compatible with LabVIEW. CERN’s data-acquisition modes (Vis), the LabVIEW driver supports all of the advanced data-acquisition modes offered by Elsys. These include the Event Controlled Recording (ECR) mode, standard multichannel mode, multiblock mode and continuous acquisition modes. The driver that comes with the instrument driver supports 32-bit and 64-bit Windows (XP or newer) and LabVIEW 2010 or newer. For the free plug-and-play driver, complete with installer, manual and examples, contact Thomas Berger e-mail thomas.berger@elys.ch, or visit www.elys-instruments.com/labview.

FLIR Systems has expanded its range of entry-level R&D grade thermal-imaging kits for academic teaching and industrial research labs. New additions are the portable (<1 kg) and easy-to-operate E40 and T420 packages. They eliminate guesswork with instant non-contact readings that deliver up to 78,000 repeatable, accurate temperature measurements in each thermographic image. Visualizing temperatures from −20°C to +650°C, the kits deliver high accuracy (±2%) and sensitivity (up to ±0.04°C) to reveal fine thermal variations. For a full information pack, contact FLIR e-mail research@flir.com, or visit www.flir.com/ thermography/americas/us/view/?id=99690.
The First International Summer School on Intelligent Front-End Signal Processing for Frontier Research and Industry took place in Oxford on 10–16 July—the first of a new series of annual summer schools covering the concept of intelligent signal-processing chain found in modern instrumentation. The aim is to focus on the most advanced technologies in the fields of semiconductors, deep sub-micron and 3D technologies, nanotechnology, advanced packaging and interconnects, telecommunications, real-time signal processing and filtering, and massive parallel computing. The participants studied many of the crucial challenges and issues of front-end detection and signal processing for building 21st-century frontier instruments.

Sixty young physicists and engineers from around the world—from master’s and PhD students and young postdocs—participated in a programme of lectures and laboratory work. Technical examples were drawn from cross-disciplinary applications and ranged from exploration of the distant universe through medical imaging to the physics of elementary particles. Participants together formed a new generation of engineers and scientists from across the research communities, allowing them to get to know each other through training sessions that combined advanced technologies with frontier research. Worldwide experts from academia and industry gave lectures on technical developments and science overviews, alongside hands-on laboratory sessions with technology demonstrators, as well as masterclasses on related science and as a forum for discussions.

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Building on the success of this inaugural school, the next will be held in Paris on 24 February–1 March. The conference will cover novel methods of particle detection, as well as masterclasses on related science and as a forum for discussions.

For more information on this 2013 school, visit www.physics.ox.ac.uk/INFIER2013.

O B I T U A R Y

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New products

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