

FACES AND PLACES

AWARDS

LHC, RHIC, cosmic rays and neutrinos reap a batch of honours



Left: Lyn Evans, LHC project leader at CERN, honoured by the APS. Middle: Lucio Rossi (centre) receives the award from John Spargo, chair of the IEEE Council on Superconductivity (left) and Martin Nisenoff, chair of the Council on Superconductivity's Awards Committee. (Courtesy IEEE Council on Superconductivity.) Right: Philippe Lebrun (left) with his honorary doctorate at Wrocław University of Technology, from Maciej Chorowski (right), dean of the faculty of mechanical and power engineering. (Courtesy Laurent Tavian.)

The science and technology of modern collider-beam machines, as well as the physics that they are beginning to access, are earning awards for the pioneering scientists and engineers involved. In particular, three of the key people in the LHC project at CERN have received recent recognition for their work. At the same time, particle physics that goes back to its roots in studying particles from the Sun and natural cosmic accelerators also figures in the latest awards.

The American Physical Society (APS) has recognized the LHC project leader, Lyn Evans, with the award of the 2008 Robert R Wilson prize. Evans receives the prize in recognition of his outstanding achievement in the physics of particle accelerators, and for his "sustained career of technical innovation and leadership in the SPS proton-antiproton collider, culminating in the construction and commissioning of the LHC". Evans played a key role in bringing the SPS at CERN to operate as a proton-antiproton collider, which led to the discovery of the W and Z bosons in 1983 and the award of the Nobel Prize in Physics to Carlo Rubbia and Simon van der Meer in 1984. He has since

been a leading figure and driving force behind the project to build the LHC.

Earlier in the year, the Institute of Electrical and Electronic Engineers (IEEE) Council on Superconductivity honoured Lucio Rossi, head of the Magnet and Superconductor Group in CERN's Accelerator Technology Division, with its Award for Continuing and Significant Contributions in the Field of Applied Superconductivity. The IEEE recognized Rossi's leadership of the group responsible for procuring the superconducting dipole and quadrupole magnets for the LHC; his contributions to the design of various superconducting magnet systems, including the ATLAS barrel toroid magnet; and his teaching work at the University of Milan and INFN, where he trained future leaders of the superconducting magnet community. He received the award during the International Conference on Magnetic Technology (MT-20), held in Philadelphia at the end of August.

More recently, Philippe Lebrun, head of CERN's Accelerator Technology Department, received the title of doctor *honoris causa* in a ceremony at Wrocław University of Technology on 2 October.

The university honoured Lebrun, who leads his department's work on magnets, cryogenics and vacuum technology for the LHC project, for his contributions to the development of helium cryogenics and its application to accelerator technologies. The university rector, Taddeus Luty, chaired the ceremony and Maciej Chorowski, dean of the faculty of mechanical and power engineering at Wrocław and member of the Polish delegation to CERN's finance committee, awarded the degree.

Work on the pioneering heavy-ion collider RHIC at Brookhaven National Laboratory (BNL) has also received awards from the APS and IEEE. Satoshi Ozaki and Michael Harrison, who led the decade-long development and construction of RHIC, received the 2007 Particle Accelerator Science and Technology Award at the 22nd Particle Accelerator Conference in June (see p29). The Nuclear and Plasma Sciences Society of the IEEE sponsors this award, which they shared with Victor Malka of the Centre National de la Recherche Scientifique. Malka was honoured for his groundbreaking work on laser-plasma accelerators.

The APS has recognized further work at RHIC with the 2008 Tom W Bonner prize for outstanding experimental research in nuclear physics. Arthur Poskanzer of Lawrence Berkeley National Laboratory receives the award “in recognition of his pioneering role in the experimental studies of flow in relativistic heavy-ion collisions”. Poskanzer co-founded the STAR collaboration at RHIC and is a co-discoverer of elliptic flow there – important evidence for quark–gluon plasma.

The APS also recognizes the returning influence of cosmic-ray studies in high-energy physics by awarding the 2008 WKH Panofsky prize in experimental particle physics to George Cassiday and Pierre Sokolsky of the University of Utah, for “the pioneering development of the atmospheric fluorescence technique as a method for



BNL's Michael Harrison and Satoshi Ozaki with their 2007 Particle Accelerator Science and Technology Award. (Courtesy BNL.)

exploring the highest energy cosmic rays”. The method was used at the Fly's Eye

and High-Resolution Fly's Eye cosmic-ray detectors at Dugway Proving Ground, and in the new Telescope Array cosmic-ray observatory in Utah. The method also features in the Pierre Auger project.

The importance of non-accelerator physics has come to the fore in recent years with the solution of the long-standing solar neutrino problem in terms of neutrino oscillations and neutrino mass. The APS recognizes this with the JJ Sakurai prize for outstanding achievement in particle theory, awarded jointly to Stanislav Mikheyev of the Russian Academy of Sciences and Alexei Smirnov of the Abdus Salam International Centre for Theoretical Physics. They receive the prize for their “pioneering and influential work on the enhancement of neutrino oscillations in matter, which is essential to a quantitative understanding of the solar neutrino flux”.

SUMMER SCHOOL

Trest Castle provides school for young high-energy physicists

The European School of High-Energy Physics, for PhD students in experimental high-energy physics, has a well deserved reputation for its lecture courses by distinguished physicists. It is also famous for its discussion sessions, which are important both for the students and for the future careers of the young discussion leaders. The active social programme is a third important ingredient and is a good training ground for future collaborative work in large experimental teams. The school moves around Europe, and avoids big cities to minimize the temptation of competing attractions. This year it returned to the Czech Republic after many years, this time to the castle at Trest.

Organizers devoted the first week to courses on the Standard Model of electroweak and strong interactions, where Ronald Kleiss of Nijmegen swiftly ruined all expectations as he reconstructed the basic properties of the electroweak interactions on the blackboard without ever using the notions of symmetry and gauge principles. In his lectures on QCD, James Stirling of the University of Durham offered students his description of how to understand and use their “bread and butter”: the parton distributions. Hitoshi Murayama from the University of California transmitted in a



The poster session at the summer school, where students presented their research and results. (Courtesy E Lillestøl.)

charming lecture course his fascination with the observable phenomena that arise from the neutrinos' masses. The expected notions of symmetry and gauge principles did finally come into play in the rich lecture course on flavour physics and CP violation by Thomas Mannel of the University of Seigen.

The second week looked mainly to the alluring scientific prospects for the near future. Nobel laureate Jim Cronin from the University of Chicago described how the Auger Project is investigating the properties of ultrarelativistic cosmic rays, and in a successful after-dinner talk the president of the Czech Academy of Sciences, Vaclav Pács, offered a tasty post-dinner presentation from genetics, entitled: From

the peas of Gregor Mendel to the human genome. Jean Iliopoulos from the Centre National de la Recherche Scientifique, fresh from receiving the Dirac medal for his contributions to the Standard Model, looked at the popular views beyond it. CERN's Urs Wiedemann described what hadronic matter should look like under extreme heating in heavy-ion collisions. Mike Turner of Chicago convinced the young high-energy experimentalists of the beauty and importance of cosmology and astrophysics. To end with, talks on the upcoming LHC, by Alexey Sissakian from JINR and Philippe Lebrun and Jos Engelen from CERN, described the bright future ahead.

The mandatory “work” also included a lively evening poster session organized in the music room, where students presented their research work and results.

On the social side, an evening with the famous Martinu string quartet playing Dvořák and Janáček was a great success. On another evening, a local orchestra set the atmosphere for tasting the local wines by playing and singing folk songs. As the Czech Republic is often associated with beer, a short visit to a brewery was inevitable. Returning to the spirit of learning, there was also a visit to the Carolinum, the historical building of Charles University in Prague.

ANNIVERSARY

Brookhaven celebrates 60 years



Hundreds of staff gathered on a local field on 1 May to form a giant “BNL 60” in honour of the laboratory’s 60th anniversary. The living logo was photographed and videotaped by Roger Stoutenburgh and Michael Herbert from the top of a 30m water tower overlooking the field. A total of 680 people took part: 165 in the B, 132 in the N, 112 in the L, 132 in the 6 and 139 in the O. (Courtesy BNL.)

In 1946, representatives from nine major universities in the eastern US — Columbia, Cornell, Harvard, Johns Hopkins, Massachusetts Institute of Technology, Princeton, University of Pennsylvania, University of Rochester, and Yale — formed a non-profit corporation to establish a new science facility. The site they chose was a surplus army base on Long Island, New York — now known around the world as the location of the Brookhaven National Laboratory (BNL). On 21 March 1947, the US War Department handed the Camp Upton site on Long Island to the US Atomic Energy Commission, predecessor to the US Department of Energy.

The plan was to promote basic research in the physical, chemical, biological and engineering aspects of the atomic sciences. Equally important was establishing a national laboratory in the north-eastern

US to design, construct and operate large scientific machines that individual institutions could otherwise not afford to develop on their own. The laboratory was to resemble a university as much as possible.

In particle physics, this concept got off to an excellent start with the construction of a 3 GeV proton synchrotron, the Cosmotron, in 1952, which was followed eight years later by the Alternating Gradient Synchrotron (see p26). The latter machine led to famous discoveries, including the Ω^- . The discoveries of the muon neutrino, CP violation and the J/ψ particle were all rewarded with the Nobel prize. The laboratory was also the workplace for Raymond Davis, the Nobel-prize winning pioneer of solar neutrino experiments.

More recently, BNL has taken the lead in the study of heavy-ion collisions at RHIC, where experiments are investigating

strongly interacting, hot, dense matter with exciting new properties. The laboratory also has an illustrious presence in other areas of research, served in particular by the National Synchrotron Radiation Light Source.

BNL’s 60th anniversary celebrations throughout this year culminated on 19 October with a day-long symposium for employees, guests, media and others interested in hearing about past and present developments in the laboratory’s fields of research. Sam Aronson, the current director of BNL, opened the symposium. Topics covered ranged from nuclear and particle physics to neuroimaging, nanoscience, climate change and energy. Speakers included Robert Palmer and Veljko Radeka on accelerator design and instrumentation, and William Zajc and Nicholas Samios on nuclear and particle physics. A celebratory reception followed the talks.

OUTREACH

Lillestøl receives award for excellent communication



Norway rewards experimental particle physicist Egil Lillestøl for his efforts in public outreach. (Courtesy Arne Langleite.)

The Research Council of Norway has honoured Egil Lillestøl from the University of Bergen with its Award for Excellence in Communication for 2007. Lillestøl received the award on 26 September at the Oslo Concert Hall as part of the Research Council's annual Evening of Excellence.

Lillestøl, an experimental particle physicist particularly well known at CERN, has made a great effort over many years in communicating physics to the general public through lectures, television programmes, newspaper articles and by hosting research schools and camps for young people. He is the current director of CERN's high-energy physics schools in Europe and Latin America (see p35). Norway is seeing among its young people a resurgent interest in the natural sciences, and the prize jury attributes some of the credit for this to Lillestøl, who has been an innovator in communicating the fundamental concepts of physics and natural science in his home country.

APPOINTMENT

Persis Drell takes the helm at SLAC

Persis Drell has stepped in as acting director of SLAC while the search for Jonathan Dorfman's successor continues. The president of Stanford University, John Hennessy, appointed her to the position, which took effect from 10 September. The international search for a director at SLAC is expected to be completed by the end of the year.

Dorfman announced in March his intention to step down this autumn as SLAC's director after eight years (*CERN Courier* May 2007 p37). He has relocated to the university's main campus and become an assistant to the president. In this role, he will focus on the relationship between Stanford University and SLAC, including the renewal of the SLAC site's lease to the US Department of Energy (DoE) and Stanford's contract to continue overseeing SLAC on behalf of the DoE.

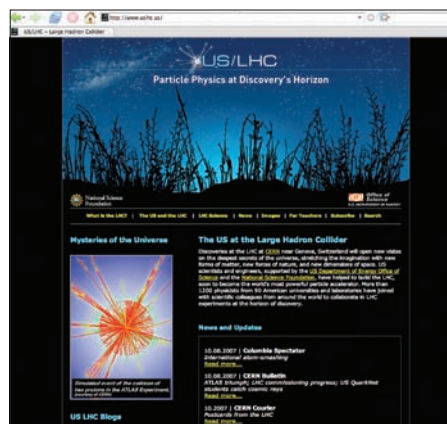
The university's operating contract with the DoE for SLAC was due to expire on 30 September, but the DoE has indicated that it will grant Stanford a two-year extension. The lease agreement between Stanford and the DoE for the SLAC site is not due to expire until 2012.



Persis Drell takes over at SLAC until a permanent director is found. (Courtesy SLAC)

INTERNET

Website tells of US role in LHC project



To see the new site, visit www.uslhlc.us.

The US Department of Energy's Office of Science has launched a new website to tell the story of the role of the US in the LHC project. The aim is to provide a one-stop site for anyone seeking information about the US and the LHC. Updated daily, it features news and information about the LHC, along with high-resolution images, scientists' blogs, resources for students and educators, and contact information for the media. The US has a leading role in the design and construction of both the LHC accelerator and the experiments, with over 1300 scientists from more than 90 US institutions participating in the project.

OBITUARIES

Helmut Faissner 1928–2007

Helmut Faissner, one of the pioneers of neutrino experiments at CERN, died on 3 August 2007 aged 79.

Faissner was born in Kempten in southern Germany and studied physics at the University of Heidelberg. He passed his Diploma of Physics examination in February 1952 and obtained a PhD in October the same year. His thesis on the anomalous dispersion of the lines of yellow-green bromium vapour was under Walter Bothe, and his theory teacher was Hans Jensen. This led to a position as assistant at the Max Planck Institute near Heidelberg under the direction of Bothe.

Faissner gained a position as research associate at CERN in June 1958 and joined a team studying the capture of negative pions in carbon-12. He spent most of his time finishing off studies he had begun earlier, mainly on the spallation of heavy nuclei by 600 MeV protons. He became a staff member at CERN in June 1959, and the following spring joined a group of physicists who were investigating the experimental possibilities of detecting high-energy neutrinos, under the direction of Gilberto Bernardini. In addition, Faissner was given the task of setting up a neutrino-counter group.

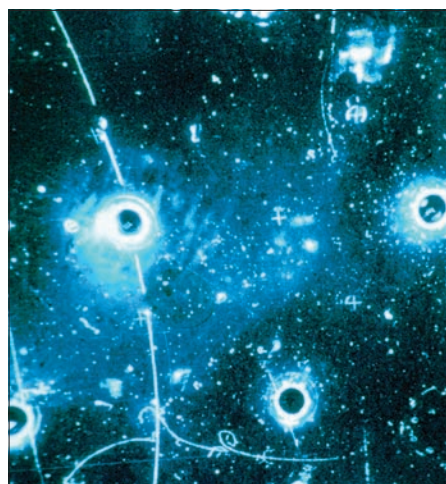
The first neutrino experiment at CERN operated from 1963 to 1964 in an external proton beam. It used magnetic focusing on the produced pions, and had spark chambers and a heavy-liquid bubble chamber as detectors. The results that Faissner obtained included the first evidence of an electron-



Helmut Faissner. (Courtesy D Rein/RWTH.)

neutrino (ν_e) and solid evidence beyond doubt of the muon-neutrino (ν_μ).

At the end of 1963, Faissner accepted a position as full professor at RWTH Aachen, and in the summer of 1964 he began lecturing on weak interactions, symmetries and other topics of elementary-particle physics. The same year, Murray Gell-Mann put forward the quark model of particles and Faissner soon began a search for quarks in cosmic air showers carrying a characteristic electric charge of $1/3$ – but without success. He then joined the effort to study neutrino physics using the Gargamelle bubble chamber at CERN. This made the first observations of weak neutral currents by detecting elastic scattering events $\nu_\mu e \rightarrow \nu_\mu e$ and one event



The first weak neutral current found on the scanning tables in Faissner's group at RTWH Aachen in December 1972.

of $\bar{\nu}_\mu e \rightarrow \bar{\nu}_\mu e$. It was Faissner's student at Aachen, Franz-Josef Hasert, who recognized the first candidate $\nu e \rightarrow \nu e$ in December 1972. The statistics were later improved on by building an experiment with a massive spark chamber as detector. In 1980, Faissner was awarded the Max-Born prize jointly by the UK Institute of Physics and the German Physical Society for his contribution to the physics of high-energy neutrinos and to the discovery of the weak neutral current.

Faissner leaves behind his wife, Ursula, two sons and a daughter. He will be remembered as a kind person by all who worked with him and he will be missed sorely by all of his friends.
Klaus Winter, Gland.

Julius Wess 1934–2007

Julius Wess was an imaginative, technically strong and influential theoretical physicist. He died suddenly in Hamburg on 8 August at the age of 72.

Julius, an assistant to Walter Thirring in Vienna, went on to be a professor first at Karlsruhe University and then at the University of Munich, later becoming a director of the Max Planck Institute for

Physics in Munich. He was an excellent and friendly teacher and taught many students who now have positions in universities and research institutes. He was also awarded several honorary doctorates, as well as physics prizes and medals.

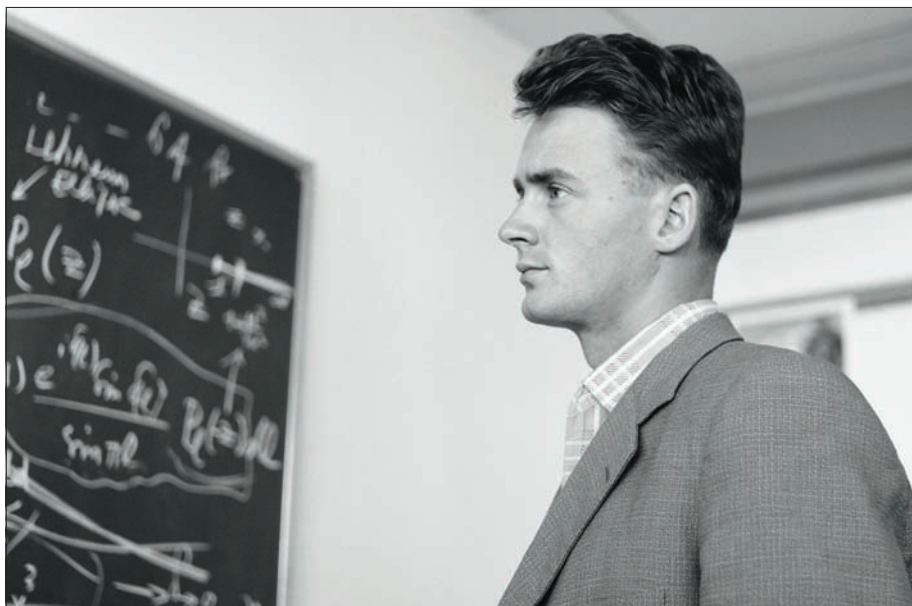
Julius's scientific work was influenced strongly by the recognition that the dynamics of quantum field theories is

dictated largely by symmetries. His first pioneering work was on the consequences of conformal invariance for quantum fields. He then studied the representations of $SU(3)$ for the classification of hadrons. This work was done with Thirring two years before Murray Gell-Mann and Yuval Ne'eman, but not with the same representation as in the "eightfold way". Instead, it included

only the Λ in the same representation as the nucleons; at that time it seemed too daring to include the other five particles as well, as their properties seemed to be unduly different. Working with Tom Fulton, Julius went on to formulate an $SU(6)$ theory in an attempt to unify spin and isospin in agreement with special relativity.

Julius also worked in collaboration with Bruno Zumino on the mathematical structure of anomalies in non-Abelian gauge quantum field theory. This work showed that anomalies must satisfy a consistency condition and that they give rise to interaction terms (usually called Wess–Zumino terms) which have interesting topological properties. This pioneering work has had numerous ramifications for both physics and mathematics.

Julius also wrote a number of papers on supersymmetry (SUSY) and supergravity in collaboration with Zumino. This work shows that there exist 4D, local, relativistic quantum field theories that admit a symmetry between Bose and Fermi fields and that are renormalizable in the conventional sense. SUSY implies that these theories are more convergent (for instance, have no quadratic divergencies) than generic theories and



require fewer renormalization constants. It is possible to formulate SUSY extensions of the Standard Model (SM) of particle physics that do not have the difficulties of the conventional SM. These extensions imply new particles and fields, which could be found at CERN's LHC, which is due to start up in 2008. Some of these theories predict particles (e.g.

neutralinos) that are candidates for the dark matter of the universe.

Julius's path took him to many places around the world, and through his lovable, unassuming manner and his contagious zest for life, he rapidly made many friends. We shall all miss him greatly.

Walter Thirring and Bruno Zumino.

Leszek Łukaszuk 1938–2007

The Polish theoretician Leszek Łukaszuk died aged 69 on 12 July 2007.

Leszek was a bright young theoretical physicist from the Institute of Nuclear Physics in Hoza Street in Warsaw when he came to CERN in 1964 and worked with me. Together, we found, among other things, the constant in front of the Froissart bound, π/m_π^2 . He later envisaged,

with Basarab Nicolescu, the possibility of a dissymmetry between particle and antiparticle scattering, the so-called “odderon”. Though this possibility seems rather far-fetched, it has never been ruled out from first principles and the Russian theoretician LN Lipatov has given arguments in favour of its existence.

Leszek was an active and courageous

member of Solidarity, and, for that reason, he was exiled to Szczecin. When Solidarity triumphed, he left politics because he was disgusted by the way people were taking advantage of their being members (some very new) of the movement.

Leszek will be remembered as an excellent physicist and a very fine friend.

André Martin, CERN.

Igor Solovtsov 1952–2007

Friends and colleagues were saddened to learn that the well known theoretical physicist Igor Leonidovich Solovtsov died in Gomel, Belarus, on 28 July 2007. Aged 55, he suffered an unexpected heart attack.

Igor was born in Belarus, then part of the Soviet Union, on 9 January 1952. He graduated from secondary school in Gomel

in 1970, and then went to Moscow State University where he studied particle physics and quantum field theory, graduating with honours. He became a trainee researcher at the Bogoliubov Laboratory of Theoretical Physics at the Joint Institute for Nuclear Research (JINR) in Dubna in 1976 and received his Candidate of Science degree

(first doctoral degree) there in 1979 with a dissertation on Harmonic analysis of the Lorentz group in composite models of elementary particles.

After teaching for three years at Gomel Polytechnical Institute, he became head of the Mathematics Department there in 1981. He held this post until 1993, when

he returned to the Bogoliubov Laboratory as a senior scientist and there defended his dissertation for Doctor of Science in 2000. A year later, he returned to Belarus (although he retained his affiliation with JINR) as head of the Department of Higher Mathematics at Gomel State Technical University. He also became head of the International Centre for Advanced Studies in Gomel, which was jointly established by Gomel State University and JINR.

Igor was a leading expert on QCD, devising clever approximation schemes for extracting phenomenologically relevant information from this rather intractable theory. For example, he popularized a technique in the mid-1990s called variational perturbation theory. It was this work that first brought him to my attention, and together we wrote a proposal to the US National Science



Foundation in 1996, which, together with generous support from the University of Oklahoma, allowed him and his wife to make extended visits to the US. It was

during these visits that we applied analytic perturbation theory – a new idea developed by Igor and Dimitri Shirkov in 1997 – to study many inclusive processes in QCD. This work still has an impact.

It was during a theoretical conference in Gomel, after he had given a review talk on 10 years of development of this subject, that Igor fell ill and died. He leaves behind his fellow-physicist wife, Olga, and two sons, Alexander and Dmitry.

Igor was a wonderful family man, a brilliant scientist and a true friend. His loss is tremendous for theoretical physics, as well as for all those who wish to make progress in understanding how the Standard Model really describes nature. I am sure that his wife Olga Solovtsova will be able to carry on their joint work.

Kimball A Milton, University of Oklahoma.

NEW PRODUCTS

Oerlikon Leybold Vacuum has introduced the new LEYCON Valve Program with improved flexibility. LEYCON Valves are available as ISO-KF angle and straight-through valves. All types are bellows-sealed and available in two materials for housing, in either aluminium or stainless steel. There is the choice of hand or pneumatic operation, as well as electro-pneumatical or electro-magnetical actuation. For further information see www.oerlikon.com.

SEDI Fibres Optiques now offers comprehensive solutions for fibre-optic hermetic feed throughs. These are associated with connectors: FC for single-mode or graded-index fibres; SMA for large-core fibres from 140 µm to 1000 µm; ST connectors for all types of silica fibres from 140 µm to 1000 µm; and FC/APC for single-mode fibres. For further information, tel +33 169 366 400; e-mail info@sedi-fibres.com or see www.sedi-fibres.com.

Hamamatsu Photonics has introduced new high-sensitivity photomultipliers. The super bialkali (SBA) tubes offer 35% quantum efficiency (QE) and the ultra bialkali tubes have up to 45% QE. This QE is close to that of many semiconductor sensors. For further information, tel +44 170 729 4888; e-mail Europe@hamamatsu.com or see www.sales.hamamatsu.com.

Agilent Technologies Inc has introduced the first time-to-digital converter from its Acqiris product line. The TC890 records multiple events or hits on each of its six input channels, with a timing-resolution of 50 ps and a double pulse resolution of less than 15 ns. At full speed, it offers a data throughput of 25 million events/s. Six of the seven identical input channels are independent stop inputs, and the seventh is the common start. For more information see www.agilent.com/find/acqiris.

Metrum Information Storage offers a new cost-effective portable thermal-imaging camera. The Thermo Tracer TH9260 is hand-held and features a 1.3 megapixel digital camera. Multi-point measurement can be made over the 640 × 480 array of pixels using a comprehensive set of dynamic analysis tools over a wide range of temperatures from –40 to +500 °C standard, or 100–2000 °C. Contact Scott Foster, tel +44 118 973 3000; or e-mail thermography@metrum.co.uk.

Pfeiffer Vacuum has expanded its series of DigiLine vacuum instruments with the new MPT 100 transmitter. The combination of a Pirani and a cold cathode sensor is compatible with existing controllers and accessories, giving a measurement range from 5×10^{-9} to 1000 mbar and insensitivity

to gas inrush. The MPT 100 can easily be combined with Pfeiffer Vacuum backing-pumps, turbopumps or leak detectors via the RS-485 interface. For further information, see www.pfeiffer-vacuum.net.

ETL has launched a new, portable high-accuracy barometric-pressure measuring unit. The 765–16B gives barometric-pressure readings of ± 0.08 hPa with a resolution of 0.0001%. An internal logger can automatically store more than 390 000 high-resolution data points. For further information, contact Derek Nobe, tel +44 178 447 2130; or e-mail sales@explocean.com.

New technology developed jointly between **Southern Scientific** and the **UK National Physical Laboratory** has been incorporated into a compact electrometer module board to measure very small currents with extremely high precision and repeatability. The PAM pico-ammeter is an auto-ranging, microprocessor-controlled, single-board, low-current measurement instrument. It measures currents from 10 fA to 200 nA with a typical accuracy of $\pm 1\%$, a stability of < 50 fA and linearity of $\pm 1\%$. For more information contact Yvonne Turner at Southern Scientific, tel +44 190 360 4000; e-mail info@ssl.gb.com or see www.ssl.gb.com.