

Faces & Places

COLLABORATION

US–CERN agreement paves the way for new era of scientific discovery

A new agreement between the US and CERN, signed on 7 May, will pave the way for renewed collaboration in particle physics, promising to yield new insights into fundamental particles and the nature of matter and the universe. The agreement, signed in a White House ceremony by the US Department of Energy (DOE), the US National Science Foundation (NSF) and CERN, will enable continued scientific discoveries in particle physics and advanced computing. It not only enables US scientists to continue their vital contribution to the important work at CERN, but it also formalizes, for the first time, CERN's participation in US-based programmes such as prospective future neutrino facilities.

The agreement aligns European and American long-term strategies for particle physics, which emphasize close international co-operation. This global relationship has already generated remarkable results, through instruments such as the LHC at CERN and the Tevatron collider at Fermilab. Now, CERN and the US can look forward to fruitful long-term collaboration, in particular in guiding the LHC to its full potential



Left to right: US energy secretary, Ernest Moniz, CERN's director-general, Rolf Heuer, and NSF director France Córdova, sign a US–CERN agreement at the White House. (Image credit: Ken Shipp/DOE Photo.)

through the series of upgrades planned across many years to come.

CERN and the US have a long history of collaboration: American physicist Isidor Rabi was one of CERN's founders, and American scientists have been involved in CERN projects since the organization's creation in the early 1950s. CERN has

provided equipment for US projects, such as Brookhaven's Relativistic Heavy Ion Collider, while European scientists have been critical to the success of US-based colliders, such as the Tevatron. This agreement will automatically renew every five years, unless one of the signatories indicates a need to modify or end the agreement.

GSI

Horst Stöcker returns to research

After 8 years as scientific director at GSI Helmholtzzentrum für Schwerionenforschung GmbH, Horst Stöcker is planning to focus once again on his research activities. The supervisory board of GSI has granted his request to resign from his office, expressed some time ago, and thanked him for his commitment and successful work. The board has appointed Karlheinz Langanke as scientific director *ad interim*.

Stöcker has led the GSI research centre since 2007. During his tenure he fostered close collaborations between GSI and universities and international research institutions, to bring together know-how for research and technical development activities



for the international Facility for Antiproton and Ion Research (FAIR), and to promote young scientists. He plans to continue his research activities, focusing on relativistic heavy-ion collisions, elementary-particle physics, and the study of hot dense nuclear matter, neutron stars and black holes, as well as the development of energy-efficient high-performance computers.

Langanke studied and gained his



Horst Stöcker, left, is stepping down as scientific director at GSI. Karlheinz Langanke is taking over, ad interim. (Image credits: G Otto, GSI.)

doctorate at the University of Münster, and from 1992 to 1996 was a member of the faculty at the California Institute of Technology. He later held a chair for theoretical physics at the University of Aarhus. Since 2005, he has been head of the theory division at GSI, and professor for theoretical physics at the Technische Universität Darmstadt. In 2006 he was appointed research director of GSI.

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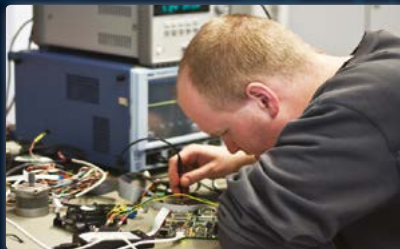
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Weisenberger takes on role as chief technology officer

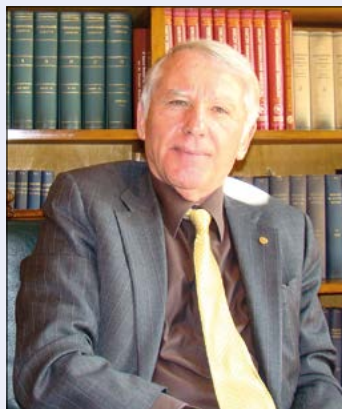
Andrew “Drew” Weisenberger, head of the Radiation Detector and Imaging Group in Jefferson Lab’s Experimental Nuclear Physics Division, has accepted the additional role of chief technology officer (CTO) for the laboratory. As CTO, Weisenberger aims to help researchers at Jefferson Lab to see how their work can benefit society and lead to new or improved commercial applications. In addition to this new role, he will continue to lead the detector group.

As a member of the detector group, Weisenberger has spent years advancing research to improve particle-detector technology, and seeking ways that discoveries in the field can be applied outside Jefferson Lab’s basic research programme. He is, for example, part of the team that developed a molecular-imaging camera for use in breast-cancer diagnostics, which is now produced commercially and used in hospitals and medical diagnostic centres around the world.

Jefferson Lab’s previous CTO, Roy Whitney, retired on 1 August 2014.



Andrew “Drew” Weisenberger. (Image credit: Jefferson Lab.)



Dimitri Nanopoulos has been unanimously elected as the 90th president of the Academy of Athens for the year 2015. As the youngest-ever member of the Academy of Athens, elected in 1997, he has provided the institution with a new spirit of scientific and research thinking. A highly active theoretical physicist in high-energy physics, astroparticle physics and cosmology, he is also the current scientific delegate of Greece to the CERN Council. His many distinguished academic research roles include positions at Texas AM University and the Houston Advanced Research Center, as well as chair of theoretical physics, Division of Natural Sciences in the Academy of Athens. He is shown here in his office at the Academy of Athens. (Image credit: Ioanna Blatsou.)

AWARDS

EPS-HEPP announces 2015 prizewinners

The High Energy and Particle Physics (HEPP) Division of the European Physical Society (EPS) has announced the winners of its 2015 prizes. The awards recognize the efforts of young people in the field as well as those who have made many well-established contributions.

The 2015 High Energy and Particle Physics Prize, for an outstanding contribution to high-energy physics, recognizes seminal work in two areas related to the basic quark structure of matter. James Bjorken of SLAC receives the prize “for his prediction of scaling behaviour in the structure of the proton that led to a new understanding of the strong interaction”. The prize also goes to Guido Altarelli of University of Roma Tre and CERN, Yuri Dokshitzer of the Laboratoire de Physique Théorique et Hautes Énergies and St Petersburg Nuclear Physics Institute, Lev Lipatov of St Petersburg Nuclear Physics Institute, and Giorgio Parisi of University of Rome La Sapienza “for developing a probabilistic field-theory framework for the dynamics of quarks and gluons, enabling a quantitative understanding of high-energy collisions involving hadrons”.

The 2015 Giuseppe and Vanna Cocconi Prize, for an outstanding contribution to particle astrophysics and cosmology in the past 15 years, is awarded to Francis Halzen, University of Wisconsin-Madison, “for his visionary and leading role in the detection of very high-energy extraterrestrial neutrinos, opening a new observational window on the universe”.

The 2015 Gribov Medal, for outstanding work by a young physicist in theoretical

particle physics and/or field theory, goes to Pedro Vieira of the Perimeter Institute “for his groundbreaking contributions to the determination of the exact spectrum of anomalous dimensions of $N=4$ supersymmetric Yang–Mills theory and scattering amplitudes, for any interaction strength”.

The 2015 Young Experimental Physicist Prize, for outstanding work by one or more young physicists in the field of particle physics and/or particle astrophysics, is awarded to young physicists at CERN. Jan Fiete Grosse-Oetringhaus is recognized “for his outstanding contributions to the investigation of particle collisions at the LHC through the analysis of jet quenching and multiparticle correlations in the ALICE experiment”. Giovanni Petrucciani receives his share “for his outstanding contributions to the optimization of the tracking in the CMS detector, the Higgs boson discovery and the measurements of its properties”.

Also this year recognizing the work of a young physicist, the 2015 Outreach Prize, for outstanding outreach achievement connected with high-energy physics and/or particle astrophysics, is awarded to Kate Shaw of the Abdus Salam International Center for Theoretical Physics “for her contributions to the International Masterclasses and for her pioneering role in bringing them to countries with no strong tradition in particle physics”.

● The prizes will be awarded at the Europhysics Conference on High-Energy Physics (EPS-HEP 2015), which will take place in Vienna on 22–29 July. For more information on the conference, visit <http://eps-hep2015.eu/>.

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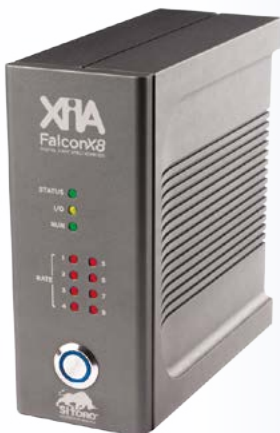
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CONFERENCE

Fundamental problems in quantum physics



Participants in Erice. (Image credit: Dirk-André Deckert.)

Around 80 experts and young researchers from across the world converged on the Ettore Majorana Foundation and Centre for Scientific Culture in Erice, on 23–27 March, for the international conference Fundamental Problems in Quantum Physics. This was the final meeting of the European COST (Collaboration on Science and Technology) Action MP1006 with the same name, co-ordinated by Angelo Bassi (*CERN Courier* June 2011 p32). The Action lasted four years, building up a strong and active international network in quantum foundations and related fields, through an intensive agenda based on staff exchanges, meetings, workshops and conferences.

The conference in Erice addressed the theoretical and experimental open problems in quantum physics. The common theme was: where are we with our understanding of the quantum world? What are the most relevant open issues and which are the directions for future research?

To answer such questions, presentations were organized in seven sessions. The quantum-interferometry session explored

the state of the art in detecting quantum superpositions of large-mass objects. Discussions centred on the challenges in further increasing the mass and complexity of the objects, while preserving their quantum features. The session on mathematical physics and quantum field theory also looked at the state of the art, highlighting the problems of setting up a mathematically concise quantum field theory, and perspectives for future research.

The session on testing the fundamental principles collected up-to-date efforts in deciding the limits of validity of basic principles of physics such as the Pauli exclusion principle and the quantum-superposition principle. The quantum-foundations session explored recent advances in alternative formulations of quantum theory, such as Bohmian mechanics and collapse models. The session on quantum complex systems focused on the current understanding of quantum properties in complex, mainly biological, systems, and discussed the extent to which these systems behave in a truly quantum

way, or in a simpler, classical one.

To close, the sessions on quantum gravity and gravity and cosmology explored the state of the art and difficulties in resolving perhaps the most fascinating open problem in modern physics: the unification of quantum mechanics and general relativity. The most popular answer is still string theory, but several other approaches were also represented.

On 26 March, a special session was organized to celebrate the 80th birthday of GianCarlo Ghirardi, one of the most influential figures in the foundations of quantum mechanics. There were presentations by Shelly Goldstein of Rutgers University, Hendrik Ulbricht of Southampton University, and Vahid Karimipour of Sharif University. Ghirardi himself presented a recollection of memories from his long and successful career.

The conference was organized by Angelo Bassi, University of Trieste, Catalina Curceanu, LNF-INFN, and Detlef Duerr, LMU-Muenchen. For more details, as well as the files of the presentations, visit www.lnf.infn.it/conference/QtG/.



The 7th International Conference on Physics and Astrophysics of Quark–Gluon Plasma (ICPAQGP-2015), which took place in February at the Kolkata Saha Institute and Variable Energy Cyclotron Centre campus, provided an opportunity to celebrate the 70th birthday of Bikash Sinha, who with Sibaji Raha and the late Bhaskar Dutta had organized the first meeting in the series in 1988, at the Tata Institute in Bombay. That meeting marked the beginning of a new and exciting adventure in India. Over the years, the country began to participate in heavy-ion experiments at CERN's Super Proton Synchrotron and later at the LHC, as well as at Brookhaven's Relativistic Heavy-Ion Collider. At the recent meeting, CERN's director-general, Rolf Heuer, gave a public talk and also joined the celebratory dinner at the Bengal Club of Kolkata. (Image Credit: Bengal Club.)

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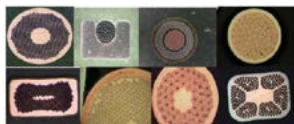
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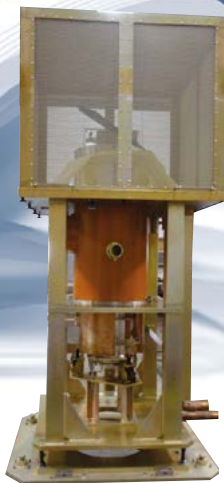
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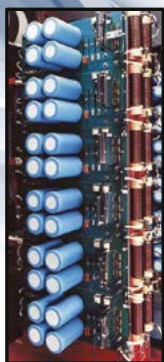
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IPPOG

Reaching out with particle physics

How do we communicate about the LHC as a discovery machine, following the Higgs boson of 2012? How do we take the particle-physics masterclasses to new countries, age groups and settings? What makes a good educational game? How do we join in the existing national cosmic-ray-detector programmes, to take them further? These were some of the questions addressed at the 9th meeting of the International Particle Physics Outreach Group (IPPOG), which took place in Paris on 16–18 April.

IPPOG – which evolved from its European predecessor, EPPOG (*CERN Courier* April 2004 p42) – is a network based on a rare mix of scientists, science educators and communication specialists from prominent particle-physics laboratories and institutions around the globe, who are working in informal science education and outreach for particle physics. The desire to communicate science can take off early in a person's career, and the young people at IPPOG have great creativity and awareness of the social role of science.

IPPOG's meetings are intense, with panel discussions, working groups, and “wrap-ups” that involve the whole group. Brainstorming is the name of the game, and ideas are shared in the same way, no matter if they are for a

common project or for an activity going on in only one country. Between the meetings, work continues and ideas are tested: do they work, for example, with real students and teachers? Other topics on the agenda of the recent meeting included discussions on how to boost the educational use of CERN open-access data, and how to bring science education and outreach to particle-physics conferences in a more effective way. There was also news on web resources, exhibits and programmes for teachers and students in the different countries.

The International Masterclasses in particle physics, IPPOG's flagship initiative, are now held in 42 countries, using data from the ALICE, ATLAS, CMS and LHCb experiments (*CERN Courier* June 2014 p37). Improvements, new measurements and new data are always being added. The TOTEM collaboration is now participating, and there are plans to include astroparticle-physics experiments such as the Fermi Gamma-ray Space Telescope, IceCube and the Pierre Auger Observatory. The new challenges are many and varied. The Australian state of New South Wales would like to have particle-physics masterclasses in all of its high schools. The so-called virtual masterclasses, based on virtual training tools and in which

the communication between researchers, teachers and participants goes on across a longer timescale, may become particularly important. At the other end of the spectrum are the “masterclasses in a box”, which are based on printed images and foreseen for settings where no computers are available.

There were also presentations on activities such as the most recent edition of the International Cosmic Day and the International Muon Week. These are crucial when the goal is to have more modern and experimental physics in high schools, and there is much to learn from sharing ideas and experiences.

The meeting also included inspiring and rewarding visits to the accelerator complex and Science ACO museum at the Laboratoire de l'Accélérateur Linéaire, which is now a European Physical Society historic site, and to the *Collider* exhibition, which is currently at the Palais de la Découverte (*CERN Courier* January/February 2014 p31 and p43).

● IPPOG's current members come from CERN's 21 member states, plus Ireland, Romania, South Africa, the US, DESY, CERN, and five of the LHC experiments. Marge Bardeen, of Fermilab, and Hans Peter Beck, of the University of Bern, are the current co-chairs.



IPPOG's participants in Paris. (Image credit: Dominique Longieras/LAL-Orsay.)

VISITS



On 8 April, **Svetlana Kauzonienė**, left, Lithuania's deputy minister of science and education, met with the director-general, **Rolf Heuer**, during a day at CERN. Her visit included the laboratory's Central Workshop and LHC superconducting-magnet test hall, as well as the computer centre. (CERN-PHOTO-201504-066 – 7.)

Martin Tlapa, left, the Czech Republic's deputy minister of foreign affairs, came to CERN on 16 April. During his tour, he visited the CERN Control Centre, before seeing the ATLAS visitor centre and meeting members of the Czech community at CERN. (CERN-PHOTO-201504-070 – 27.)



Elmir Velizadeh, left, Azerbaijan's deputy minister of communications and high technologies, was welcomed to CERN on 23 April by CERN's head of international relations, **Rüdiger Voss**, before taking in sights that ranged from the Synchrocyclotron exhibition to the CERN Control Centre. (CERN-PHOTO-200504-001 – 19.)

Faces & Places

COLLABORATION

Towards future international projects

At the ILC Tokyo Symposium, held on 22 April, the Linear Collider Collaboration and more than 300 participants from around the world at the Asian Linear

Collider Workshop 2015, together issued a statement confirming their conviction of the scientific justification for a prompt realization of the International Linear Collider (ILC). The statement points to the fact that “the project is now in a phase where governmental involvement should lead to a decision to realize the project,” and expresses “appreciation of the ongoing project

assessment being undertaken by the Japanese government.” It also notes that the project’s realization “requires the establishment of an international framework for sharing the cost and expertise among countries,” and asserts the intention “to facilitate discussions between governments and funding authorities to achieve this goal as soon as possible.”

At the same time, funding-agency representatives and laboratory directors were gathering at Fermilab on 20–21 April for the 2nd International Meeting on Large Neutrino Infrastructures, organized by Fermilab and the Astroparticle Physics European Consortium. The agencies were impressed by the convergence and momentum, since the first meeting, of the efforts of the community working on liquid-argon time-projection chambers to develop a programme based on three elements: a large infrastructure effort, consisting of a long-baseline beam and detector project (LBNF/DUNE) hosted at Fermilab and the Sanford Underground Research Facility (*CERN Courier* May 2015 p10); a medium-scale programme of short-baseline oscillation experiments at Fermilab to test the sterile neutrino hypothesis with unprecedented accuracy; and a rich R&D and prototyping programme in the CERN North Area, related to the above programme and other long-baseline efforts in the world.

The agencies also appreciated the progress towards the realization of the Hyper-Kamiokande experiment (*CERN Courier* April 2015 p9), and noted the complementarity of the techniques used by the large detectors here and in LBNF/DUNE (water, liquid argon and liquid scintillator) in the measurement of neutrino parameters, but above all for proton decay and neutrino astrophysics. Nevertheless, these larger efforts need to be complemented by smaller programmes to guarantee an understanding of whether the Standard Model with three neutrino flavours is realized in nature – or, conversely, to establish a groundbreaking discovery. Finally, a rich programme of single-beta and neutrinoless double beta decay experiments will explore the degenerate neutrino-mass region until the end of the decade. The goal for neutrinoless double-beta decay in the next decade, to cover the inverted mass-hierarchy region, will require tonne-scale detectors, and may demand large international collaborations for their construction.

● For more, visit www.linearcollider.org/ILC/Press/Press-releases/Tokyo-Statement and www.appec.org/9-features/126-towards-the-realization-of-a-global-neutrino-infrastructure.html.

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OBITUARIES

José Mariano Gago 1948–2015

José Mariano Gago, particle physicist and former minister of science in Portugal, passed away on 17 April. He was the person who promoted science in Portugal after the long period of international isolation during the dictatorship that lasted from 1926 to 1974. He was the founder and the present president of the Laboratory for Instrumentation and Experimental Particle Physics (LIP), and was instrumental in Portugal's becoming a member state of CERN.

Mariano Gago studied electrical engineering at the Instituto Superior Técnico (IST) in Lisbon, where he was also involved in continuous political activity, as president of the Students' Association. He went on to study for a PhD in particle physics at the École Polytechnique and the Université Pierre et Marie Curie, his thesis being on the "Production de Ξ^- , de Ω^- et des resonances Ξ^- dans les interactions K⁻-proton à 14.3 GeV/c²" in an experiment at CERN. He became professor at IST in 1978, continuing his involvement with experiments at CERN, to where he regularly returned.

It was at this time that he began to prepare the accession of Portugal to CERN as a full member state. This was finally achieved in 1985. LIP was created some months later, as an institute to bring together a small community of physics researchers coming from different universities. At the same time, he was appointed president of the Portuguese funding agency for science, the Junta Nacional de Investigação Científica e Tecnológica (JNICT). This laid the foundations of an impressive career devoted to the reconstruction and strengthening of the whole of science and technology research in Portugal, which lasted for 30 years.

As president of the funding agency, and later as minister, Mariano Gago opened the way to a gigantic increase in the number of people working in science in Portugal. In 25 years, the number of PhD holders increased by a factor of eight. He also imposed new peer-evaluation rules for institutions, fellowships and project grants, opening the way for a new generation of people to take



José Mariano Gago. (Image credit: Luísa Ferreira.)

leading roles in all areas of science. Thanks to the help of the European Union (EU), which he knew how to make use of in an extremely efficient way, Portuguese science not only increased in size but also improved in quality, and became fully competitive on an international level in many fields.

Mariano Gago believed deeply that science and technology should belong to people in general. During his tenure as minister of science and technology in the years 1995–2002, he created *Ciência Viva*, a large network of public centres for the popularization of science, extending throughout the country. At the same time, he connected all public schools to the internet, in a pioneering programme. From 2005 to 2011, he was again minister, this time of science, technology and higher education. At IST, as a physics professor, he organized nightly particle-physics seminars for all students in the late 1970s, and promoted experimental-physics laboratories for all of the engineering courses in the 1990s.

During the Portuguese EU presidencies, in 2000, Mariano Gago worked with the European Commission to develop the Lisbon Strategy for the European Research Area and the Information Society and, in 2007, he promoted a strategy for the modernization

of EU universities. He chaired the Initiative for Science in Europe, and campaigned for the creation of the European Research Council. He also chaired the High Level Group on Human Resources for Science and Technology, and co-ordinated the European report *Europe Needs More Scientists*, published in 2004.

He also worked with UNESCO to create *Ciência Global*, a new initiative for the advanced training of scientists from developing countries. He strongly supported the creation of SESAME – the Synchrotron-light for Experimental Science and Applications in the Middle East – which is bringing together all of the countries in this region, from Israel to Iran, and he ensured that Portugal became an official observer.

Mariano Gago always regarded and quoted CERN as an example of international co-operation and peace, maintaining a constant strong connection with the organization. Many people remember his speech at the inauguration of the LHC, and he wrote recently on his "Thoughts on CERN's future", in the context of the 60th-anniversary celebrations (*CERN Courier* October 2014 p78). He was personally involved in other international scientific organizations, being a special adviser to the director-general of the European Space Agency, and a policy adviser to the European Cancer Organization. He was also a member of the Board of the French National Institute of Health and Medical Research, and was the first president of the International Risk Governance Council in Geneva. He helped to create the Cyprus Institute at Nicosia, and served as a member of its Board of Trustees. He was a member of the Portuguese Academy of Sciences and of the Portuguese Academy of Engineering, as well as of the *Academia Europaea*.

José Mariano Gago will be remembered for his achievements in many fields, as a particle physicist, a science policy maker, a professor, a dear colleague and, without doubt, a scientist who shaped the scientific culture in his country and internationally.

● *Gaspar Barreira, LIP.*

David Fiander 1931–2015

Dave Fiander, who made important contributions to the accelerator complex

at CERN, passed away on 29 March. Born in 1931, Dave studied engineering at

Imperial College. After graduation he joined the United Kingdom Atomic Energy

Faces & Places

Authority, where he worked on the production of enriched-uranium fuel rods for nuclear power stations. In 1963 he was offered a job at CERN, and joined a group headed by Fred Asner in the PS Division responsible for injection and ejection systems.

The Proton Synchrotron (PS) had recently been completed, accelerating protons to 28 GeV. Once accelerated, the 20 bunches of particles circulated every 110 ns. They were extracted to strike a fixed target from whence a few secondary particles went on to feed a bubble chamber at the far end of the South Hall. The bubble chamber required a very short pulse commensurate with the sensitive time of the chamber, but other experiments in the South Hall used scintillation counters, which needed several 100 ms of resonantly extracted beam spill.

Dave's challenge was to invent a pulsed high-voltage magnet that operated inside the accelerator's vacuum chamber, with an aperture big enough for the beam to pass at injection and a field strong enough to kick the 28-GeV bunches. A septum magnet would then steer the kicked beam out of the machine. This "full-aperture kicker magnet" needed 60 kV to provide the power. A length of high-quality coaxial line, charged to this voltage, produced a pulse of tens of kilovolts when a spark gap (later a thyatron switch) was fired. The pulse was fed into the matched impedance of the ferrite-cored magnet. The rise time of the pulse had to be less than the 100 ns between



David Fiander. (Image credit: Fiander family.)

bunches, and the pulse had to be rigorously flat with an equally rapid fall time.

Dave's inventive imagination was equal to that of any of the great accelerator engineers who made CERN possible. He led a small team to complete the device, and founded a generation of many fast-switching magnets to direct CERN's beams of particles from the Booster to the PS to the Super Proton Synchrotron and, nowadays, to the LHC. All of this was done with characteristic precision and reliability, for a misdirected bunch train might bore a hole in the vacuum system or even one of the LHC's superconducting magnets.

Dave's team grew in size to become the Beam Transfer Group in the PS Division.

He recruited nationals of many countries, from a variety of engineering backgrounds, leading them to achieve results that none, as individuals, could have hoped for. His secret for gaining their respect was a firm, fair and humane style of management, encouraging new ideas that enabled many advanced pulsed systems to be developed under his leadership.

His most productive years were spent working for Roy Billinge and Eifion Jones as they put together the Antiproton Accumulator. This needed many pulsed devices – for which Dave built the power supply – for a magnetic horn and the lithium lens. The latter, originally from Novosibirsk, combined high voltages and current to send the most intense and concentrated beam of protons CERN could then make through a rod of lithium, which the slightest leak of the water cooling system would have set on fire. In Dave's safe hands this was just another "no problem".

His last project before taking early retirement in 1993 was the pulsed high-voltage supply for the ISOLDE radioactive-beam target station. Yet even in the month he died, Dave was very proud of the first full-aperture kicker, which is still pulsing away after 40 years and is set to do so as long as the PS drives the CERN complex.

We share our sorrow with his family and we convey our deepest condolences and sympathy to Brenda, Susan, Keith, Ian and families.

● *His colleagues and friends.*

Till Moritz Karbach 1979–2015

Till Moritz Karbach, a 35-year-old physicist on the LHCb experiment, suffered a fatal fall on 9 April while rock climbing near the city of Pegnitz in southern Germany.

Moritz joined LHCb in the summer of 2009. At this time he was a postdoc in the Dortmund group, where he had also been a student on the BaBar experiment. In July 2012, he began a CERN research fellowship.

Moritz's contributions to LHCb were wide-ranging. He had particular interest in the measurement of the CP-violating phase γ , and in 2014 was appointed as co-convenor of the working group responsible for these studies. He was a world authority on how the results of such measurements should be combined to achieve optimal precision for γ itself. His insight benefitted many other areas of LHCb physics, and in recent months he provided invaluable input to a paper reporting the measurement of the CKM matrix-element V_{ub} , the first such analysis to



be performed at a hadron collider.

In addition to his analysis activities, Moritz was a talented and committed detector physicist. He was deputy project leader of LHCb's outer tracker and had on-site responsibility for this sub-detector for much of Run 1 of the LHC. Recently, he had started to contribute strongly to

Moritz Karbach. (Image credit: Karbach family.)

research and development activities on the scintillating-fibre tracker, a detector foreseen for the LHCb upgrade.

Moritz believed strongly that it is the duty of physicists to explain their work to the outside world. He was involved heavily in the Masterclass programme, which is directed at explaining the process of particle-physics measurements to high-school pupils.

Away from his work, Moritz had a passion for rock climbing and the mountains. While a student, he climbed frequently at Yosemite, and continued these activities in the Alps, having moved to Geneva.


His loss is felt deeply by his parents, brother and sister-in-law, and other close family members. His many friends and LHCb colleagues mourn his passing.

● *His colleagues and friends.*

FROM MODEL

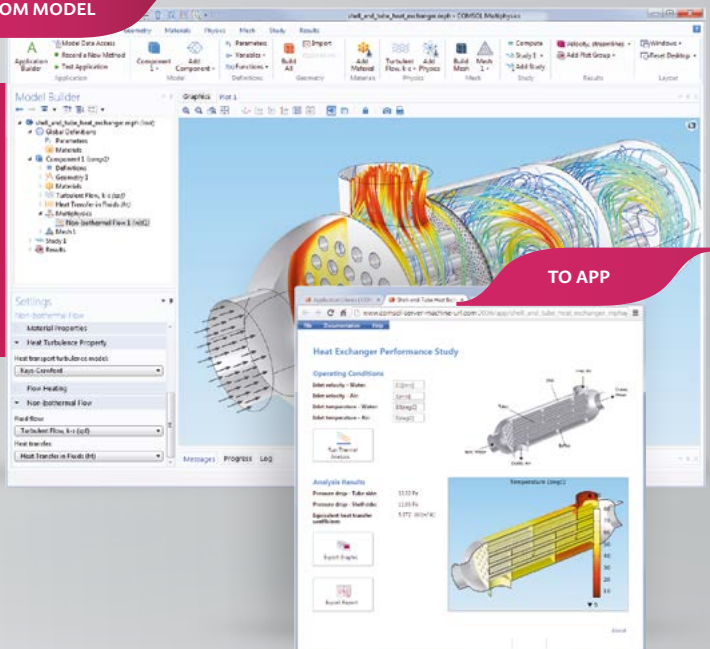
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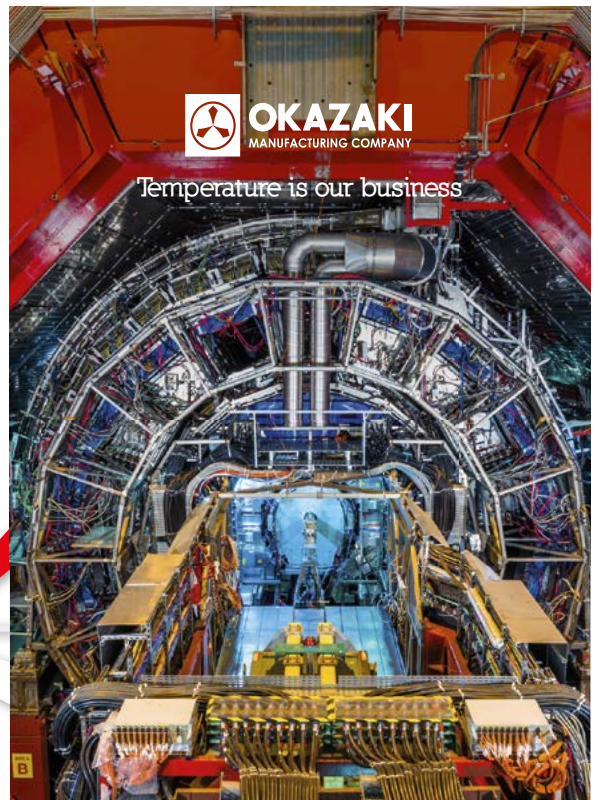
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