

FACES AND PLACES

LABORATORIES

Water in Homestake drops to the 4850 Level

After more than a year of continuous effort at the former Homestake gold mine in Lead, South Dakota, on 13 May pumps brought the water level down to below the historic 4850 ft level (1478 m underground). This event paves the way to re-open the site of the world's first solar-neutrino detector. Ray Davis began the original experiment in 1965; it ran for almost three decades and brought him a share of the 2002 Nobel Prize in Physics (*CERN Courier* December 2002 p15).

The State of South Dakota is investing \$121 million to convert Homestake into a dedicated science and education centre – initially through the activities of the Sanford Underground Laboratory at Homestake, which plans a major experiment in the same cavern used by Davis. This will be followed by a proposed investment of \$550 million for the national Deep Underground Science and Engineering Laboratory (DUSEL), currently being developed by the US National Science Foundation (NSF). DUSEL is set to become the largest, deepest underground laboratory in the world and will more than double the world's current underground-laboratory space (*CERN Courier* September 2007 p9).

When the Homestake Mining Company announced in September 2000 that the 125-year-old mine would shut down, scientists were quick to suggest converting it into a multidisciplinary underground laboratory for physics, geology, hydrology and biology. Progress was slow, however, and when the owners turned off the pumps in 2003 the water level gradually rose to 1380 m below ground.

It took a \$10 million federal grant, \$41 million from the South Dakota Legislature and a \$70 million donation from local philanthropist, T Denny Sanford, to get the pumps started again in 2008, under the auspices of the South Dakota Science and Technology Authority (SDSTA). They will continue to pump until they reach Homestake's deepest level, 2500 m below ground. Several experiments are planned at various depths in the cosmic-ray-shielded, low-background-radiation environment.

The SDSTA has already begun to refurbish the "4850 Level" and clean out the Davis cavern for the Sanford laboratory's new dark-matter experiment, the Large



South Dakota governor, Mike Rounds (right), and businessman/philanthropist, T Denny Sanford, shake hands at the plaque dedicating the Sanford Underground Science and Engineering Laboratory, in a ceremony at the 4850 Level of the former Homestake gold mine on 22 June.

Underground Xenon (LUX) detector. Other experiments planned for the 4850 Level, which will be one of DUSEL's main "campuses", include the search for neutrinoless double-beta decay – indicating that neutrinos are their own antiparticles – and a high-current, low-energy ion accelerator to study astrophysical nuclear reactions. Some of these experiments anticipate additional installations at the laboratory's 7400 Level (2256 m underground), which offers added shielding from backgrounds.

Planning for DUSEL is being led by the University of California, Berkeley, and the Lawrence Berkeley National Laboratory (LBNL), in collaboration with other institutions including the South Dakota School of Mines & Technology (SDMST) and Black Hills State University. Kevin Lesko, of Berkeley and LBNL, and Bill Roggenthen, of SDMST, are the project's joint principal investigators. "Regaining access to the 4850 Level is critical for DUSEL," says Lesko. "It allows the re-introduction of physics experiments into Homestake – the birthplace of neutrino astrophysics." Funding for the construction of DUSEL could come as early as 2012.

The biggest experiment intended for the 4850 Level is the Long Baseline Neutrino Experiment proposed by the US Department of Energy. For this the NSF plans to excavate one or more vast cavities, each holding 100 000 tonnes of ultrapure water and large enough to house nearby Mount Rushmore



The workshop area on the 4850 Level is now free of water. (Photos courtesy Bill Harlan, Sanford Underground Laboratory.)

whole. Fermilab, 1300 km to the east of Homestake, would generate the neutrino beam aimed at the huge detectors, while the Brookhaven National Laboratory would build the instrumentation. In March this year the governor of South Dakota, Mike Rounds, and representatives of SDSTA, NSF, and DUSEL – including Lesko and Roggenthen – welcomed the laboratory directors, Pier Oddone of Fermilab and Sam Aronson of Brookhaven for a tour of the Sanford Laboratory.

Meanwhile, research has already begun at the Sanford Underground Laboratory. Roggenthen, a geologist, has installed a 3D seismic array with sensors at several levels. Preliminary experiments are also under way in biology and hydrology, and the mine is being surveyed for a gravity-wave detector. Members of the LUX collaboration will install their dark-matter experiment later this year.

FACILITIES

New X-ray, light-source and rare-isotope projects get underway in Europe and US

On 21 July federal research minister Annette Schavan, Hamburg's science senator Herlind Gundelach and Schleswig-Holstein's research minister Jörn Biel met at the DESY research centre in Hamburg to sign an agreement for participation in the European XFEL X-ray facility. With €90 million, the federal states Hamburg and Schleswig-Holstein will cover nearly 16% of Germany's contribution to the project (*CERN Courier* July/August 2007 p9).

The three politicians cemented this investment symbolically by laying the cornerstone for a test hall. In 2011 the new hall will be the site for intense functional tests of the facility's superconducting accelerator modules at -271°C . After the tests, the 12 m-long modules, each weighing 10 tonnes, will be transferred to the main tunnel of the X-ray facility to be assembled into a 1.7 km-long electron accelerator.

In the US, a month earlier, senators Charles Schumer and Kirsten Gillibrand, and congressman Tim Bishop joined representatives from the Brookhaven National Laboratory, the US Department of Energy (DOE), Battelle, and Stony Brook University on 15 June as they put shovels to the ground to commemorate the start of construction for the National Synchrotron Light Source II (NSLS-II) at Brookhaven. The project received \$150 million earlier this year through the American Recovery and Re-investment Act to speed up the construction of the state-of-the-art research facility, which will create jobs and stimulate the local economy.

With construction now underway, the NSLS-II is scheduled to start operating in 2015. It will provide researchers with extremely bright beams of X-ray, ultraviolet and infrared light to study the ultrasmall structures and properties of a variety of materials and biological samples for studies in energy, environmental science and medicine among many other fields.

Michigan State University (MSU) announced the signing of a co-operative agreement with the DOE on 6 June concerning



Federal research minister Annette Schavan applies the mortar while Hamburg's science senator Herlind Gundelach holds a brick, in the company of Schleswig-Holstein's research minister Jörn Biel (left) and DESY's director, Helmut Dosch (behind). (Courtesy DESY.)



Rapper **Alpinekat** is helping put the science behind the FRIB (see main text) on the map with a new rap about nuclear physics commissioned by MSU. The physics alumnus from MSU made headlines last year with her LHC rap, which has already been seen more than 5 million times on YouTube. (Courtesy MSU.)

• For the "Rare-isotope rap", see www.youtube.com/watch?v=677ZmPEFIXE.



Gleaming shovels at Brookhaven. Left to right: Michael Holland, DOE; Shirley Strum Kenny, SUNY Stony Brook; Frank Crescenzo, DOE; Steve Dierker, BNL; Patricia Dehmer, DOE; Senator Kirsten Gillibrand; Senator Charles Schumer; Sam Aronson, BNL director; Ron Townsend, Battelle. (Courtesy BNL.)

the Facility for Rare Isotope Beams (FRIB). The pact, an important milestone towards establishing the FRIB project, provides the instrument for the DOE Office of Science to provide financial assistance for MSU to design and establish the new facility.

The FRIB will be a DOE National User Facility within the department's Office of Nuclear Physics portfolio, located on the MSU

campus. The centrepiece of the new facility will be a superconducting linear accelerator that will produce rare-isotope beams (*CERN Courier* July/August 2008 p15). While the FRIB is under construction, MSU will continue to operate the National Superconducting Cyclotron Laboratory as a National User Facility, funded by a co-operative agreement with the National Science Foundation.

COLLABORATION

John Adams Institute teams up with CERN

The John Adams Institute for Accelerator Science (JAI), a joint venture between the University of Oxford and Royal Holloway University of London, signed a collaboration agreement with CERN on 14 July. It will provide for co-operation between the JAI and CERN on a range of projects, from the LHC upgrade and the Compact Linear Collider Study to improved methods of treating cancer

using protons and light ions.

The JAI is named after CERN's former director-general and renowned accelerator engineer, John Adams. Established in 2004, it provides a focal point for scientists and companies in the UK to develop leading concepts and technologies for major accelerator projects, as well as facilities and infrastructure for research and training in accelerator science and engineering.

The agreement was signed by CERN's director-general, Rolf Heuer, and the director of the JAI, Ken Peach. After the ceremony, visitors from the two universities toured the LHC accelerator, the ATLAS experiment and the respective control rooms.



CERN's director-general, Rolf Heuer (left), and Ken Peach, director of the JAI, seal the agreement.

AWARDS

Prize time in Krakow at EPS HEPP 2009

The European Physical Society High Energy and Particle Physics (EPS HEPP) prize for 2009 has been awarded to the Gargamelle Collaboration "for the observation of the weak neutral-current interaction". This is the first time that the prize has been given entirely to a collaboration. The prize committee, for this purpose, identified the Gargamelle Collaboration with the authors of the first paper on the observation of neutral-current interactions in the hadronic channel. Antonino Pullia and Jean-Pierre Vialle accepted the prize on behalf of the collaboration on 20 July, at the 2009 Europhysics Conference on High Energy Physics in Krakow. The medal is to be attached to the Gargamelle bubble chamber, which now stands in the grounds at CERN.

The discovery of neutral currents came through investigations of neutrino interactions in Gargamelle during the early 1970s (p25). Neutrinos also featured in the award of the EPS HEPP Young Physicist prize in Krakow, which went to Maurizio Pierini of CERN and Niki Saoulidou of Fermilab. Saoulidou is rewarded for her contribution to neutrino physics; in particular she has worked on the DONUT and MINOS neutrinos experiments at Fermilab. Pierini receives his share of the prize for his contributions to the study and analysis of B mesons on the BaBar experiment at SLAC. The 2009 Gribov medal for outstanding work by a young physicist in theoretical particle physics and/or field theory goes to Freddy Cachazo of the Perimeter Institute, Canada,



The EPS HEPP High Energy and Particle Physics prize goes to Gargamelle. (Courtesy Per Osland.)

"for his research with others that led to significant simplifications in the calculation of scattering amplitudes in both gauge theories and gravity ones".

The 2009 EPS HEPP Outreach prize goes to Herbi Dreiner and Michael Kortmann of Bonn University "for the idea and realization of a physics show performed by university students and especially for the realization and sustainment of a particle-physics show within this framework". Dreiner performed one of the experiments from the show after the award ceremony, but it is usually students from Bonn who develop and perform the show (CERN Courier October 2007 p54).

At the same conference, Mick Storr and Andrzej Siemko of CERN received the Medal of the Commission of Polish National Education in recognition of their outstanding contributions to the organization of the Programme for Polish Teachers.

NN Bogoliubov prize goes to Paton and Shirkov

The NN Bogoliubov Prize of the Joint Institute for Nuclear Research (JINR) for the years 2006–2008 is to be awarded to Boris Yevgenievich Paton, president of the National Academy of Sciences of Ukraine, and Dmitri Vasilievich Shirkov, academician of the Russian Academy of Sciences and honorary director of JINR's Bogoliubov Laboratory of Theoretical Physics.

Paton receives the prize for his outstanding contribution to science and the development of international co-operation, while Shirkov is honoured for his outstanding contribution to theoretical physics, in particular for the development of new methods in quantum-field theory. The prize was instituted in 1995 by the JINR Committee of Plenipotentiaries and is awarded once every three years to two scientists from different countries.



Winners Shirkov (left) and Paton. (Courtesy JINR.)

IOP honours contributions to particle physics, cosmology and outreach

The UK's Institute of Physics (IOP) has awarded Tejinder "Jim" Virdee of Imperial College London with the 2009 Chadwick medal for distinguished research in particle physics. Virdee, the current spokesperson for the CMS collaboration at CERN, receives the award "for his crucial role in the design and construction of CMS".

The Moseley medal (formerly the Boys medal) is intended to recognize physicists early in their careers. The 2009 award goes to Matthew Wing of University College London, which he receives "for his outstanding contributions to the experimental programme of the HERA collider at DESY ... In particular, his work has led to a deeper understanding of the strong force and will have important applications to the LHC and future colliders".

Particle physics also features prominently in the award of the 2009 Bragg medal to Becky Parker, of Simon Langton Grammar School, "for her work to energise generations of pupils to take up the study of physics".



Jim Virdee receives the 2009 Chadwick medal from the IOP for his work during the design and construction of the CMS detector at CERN.

Among many achievements, she founded the National Cosmic Ray Grid, which is integral to the CERN@school project to develop simple and robust detectors that are suitable for use in schools. She has also devised methods to use the CERN Medipix chip in the Langton Ultimate Cosmic-ray Intensity Detector.

The IOP has bestowed its international award, the 2009 Isaac Newton medal, on Alan Guth of the Massachusetts Institute of Technology. This award is made to any physicist, regardless of subject area, background or nationality, for outstanding contributions to physics. Guth receives it "for his invention of the inflationary-universe model, his recognition that inflation would solve major problems confronting then-standard cosmology and his calculation, with others, of the spectrum of density fluctuations that gave rise to structure in the universe".

British cosmologist John Barrow of Cambridge University is honoured with the Kelvin medal for outstanding contributions to the public understanding of physics. He receives the award "for the promotion and explanation of physics and astronomy to young people and the general public through many books, lectures, broadcasts and drama with special reference to their wider cultural and historical importance".

University of Technology Dresden bestows honorary degree on Dorfan

In a ceremony on 6 July, SLAC's former director Jonathan Dorfan was honoured by the University of Technology (TU) Dresden with the degree *Doctor rerum naturalium honoris causa*. The award recognizes his merits in planning, constructing and operating the electron-positron collider PEP-II and the experiment BaBar, which have led to the discovery of the asymmetry between matter and antimatter in the decays of b quarks.

The particle-physics group of TU Dresden was the first German group to join SLAC's project for a B-meson factory, followed later by university groups from Bochum, Rostock, Dortmund, Heidelberg, Karlsruhe, Berlin and Mainz. The ceremony included a welcome address by Michael Kobel on behalf of the Faculty of Science and the laudation by Klaus Schubert – both of whom are members of the BaBar Collaboration.



The rector of TU Dresden, Hermann Kokenge, hands the award document to Jonathan Dorfan (left). (Courtesy TU Dresden.)

NIM A awards go to young scientists

Stefan Rossegger of TU Graz and CERN and Yusuke Uchiyama of the International Center for Elementary Particle Physics, Tokyo University, received Nim A Young Scientist awards for the best presentations at the 11th Pisa Meeting on Advanced Detectors. Rossegger, who works on the ALICE experiment, presented a poster on "An analytical approach to space-charge distortions for time-projection chambers" (TPCs). His solution for the given TPC geometry is faster and more accurate than finite-element analysis.

Uchiyama works on the MEG experiment at PSI, which is searching for lepton-flavour violation in muon decay. His poster was on "Gamma-ray reconstruction with liquid-xenon calorimeter for the MEG Experiment". It described reconstruction methods and techniques for background rejection.

CELEBRATIONS

Vladimir Lobashev reaches 75th birthday

Vladimir Lobashev, experimentalist in nuclear and particle physics, celebrated his 75th birthday on 29 July.

The early part of his scientific career, at St Petersburg Nuclear Physics Institute of the Russian Academy of Sciences, was dedicated mainly to fundamental neutron physics. His discoveries of several parity-violating effects in nuclear reactions with polarized thermal neutrons were instrumental in establishing the universality of weak interactions. He also designed novel methods of dealing with ultracold neutrons and obtained a limit on the neutron-dipole moment, which was the best in the world at the time.



Vladimir Lobashev. (Courtesy INR RAS.)

In 1972 he moved to the Institute for Nuclear Research of the Russian Academy of Sciences, Troitsk, where he played a major role in designing the complex of intense beams of the Moscow Meson Factory. Lobashev is perhaps the best known for his experiment, Troitsk-NM, on the direct search for the mass of the electron-neutrino in tritium beta-decay, which together with the Mainz experiment produced the best limit on the neutrino mass. A co-inventor of the idea of the method used, he still leads the Troitsk-NM experimental team. The same idea is now being realized in the Karlsruhe Tritium Neutrino Experiment (KATRIN).

Cyclotron centre bids adieu to Bikash Sinha

Kolkata's Variable Energy Cyclotron Centre (VECC) celebrated its foundation on 16 June – 32 years to the day since the first beam from the room-temperature machine was extracted in June 1977. The occasion was made more special as members of staff, both of the cyclotron centre and the adjoining Saha Institute of Nuclear Physics, bid adieu to Bikash Sinha in a fitting farewell. He has contributed significantly to these two institutions over the years. Sinha, who was director of the Saha Institute for 17 years and director of the VECC for the past 25 years, retired from his post at the end of June.

Sinha completes a remarkable quarter century, particularly with the recent sighting of the internal beam of the superconducting cyclotron and, more significantly, the collaboration with CERN at the SPS and now at LHC, as well as with Brookhaven National Laboratory. The success of the Photon Multiplicity Detector (PMD) at the SPS, at RHIC at Brookhaven and in the ALICE experiment at the LHC, has made the PMD and the dimuon spectrometer significant landmarks of Indo-CERN collaboration.

A special workshop, “25 years with professor Bikash Sinha”, was organized to commemorate this unique occasion. The meeting consisted of talks on topics that have been the focus of his interest, covering



Left to right: Rakesh K Bhandari, executive director of VECC; Bikash Sinha; Gopal Krishna Gandhi, governor of West Bengal; and Anil Kakodkar, chairman of India's Atomic Energy Commission.

a broad area, including: the quark-gluon plasma, nuclear physics, the anomalous helium abundance from thermal springs, cyclotrons (especially superconducting cyclotrons), the radioactive ion-beam project and radiation medicine.

During the workshop, the governor of the State of West Bengal, Gopal Krishna Gandhi (a grandson of Mahatma Gandhi) delivered a fascinating lecture on climate change. In the fourth Raja Ramanna memorial lecture at the cyclotron centre Anil Kakodkar, chairman of India's Atomic Energy Commission, outlined the need of the appropriate technology for a better tomorrow. Jürgen Schukraft of CERN,



Rakesh K Bhandari and Bikash Sinha (back row fourth and fifth from left) in front of the VECC Superconducting Cyclotron, Kolkata. (Photos courtesy VECC.)

Hans Gutbrod of GSI and Tim Hallman of Brookhaven were present alongside an array of distinguished Indian scientists. Rakesh Bhandari, executive director of VECC and project director of the Superconducting Cyclotron, welcomed the guests and staff.

VISITS

The Cypriot minister of education and culture, **Andreas Demetriou** (right), was welcomed to CERN by the director-general, **Rolf Heuer**, on 11 June. During his visit, Demetriou learnt about the LHC Computing Grid project and applications of CERN's technology in the life sciences and medicine, as well as opportunities in education and training.



The presidents of Argentina, Mozambique and Poland visited CERN on 15 June while in Geneva for the International Labour Organization's summit on the Global Jobs Pact, held on 15–17 June. **Cristina Fernández**, President of Argentina (right) toured the ATLAS experiment and also visited the ATLAS control room, as well as meeting Argentine staff at CERN. Mozambique's president, **Armando Guebuza** (below, right), visited the CMS experiment together with CERN's co-ordinator for external relations, **Felicitas Pauss** (centre) and CMS spokesperson, Jim Virdee. Polish president Lech Kaczyński and First Lady **Maria Kaczyńska** (bottom right) also visited the CMS experiment and met Polish CERN staff.



MEETING

The **6th Vienna Central European Seminar on Particle Physics and Quantum Field Theory** is to be held in Vienna on 27–29 November. The title this year is "Effective Field Theories" and topics include chiral perturbation theory, soft collinear-effective theory, non-relativistic QCD and hadronic atoms, as well as effective field-theory methods in electroweak symmetry breaking. For more information, see www.univie.ac.at/vienna.seminar/2009/index.html.

NEW PRODUCTS

Aitech Defense Systems Inc now offers the

S950-02, an enhanced, 1 GHz version of its S950-3U CompactPCI radiation-tolerant, single-board computer. Designed for space applications, the computer provides a low single-event upset rate, incorporating 128 MB of triple-redundant SDRAM to protect on-board memory from radiation. For more information, see www.rugged.com/s950.htm.

Bull has launched bullx, an environmentally friendly, ultradense and ultrahigh-performance family of supercomputers. Built around high-density blade servers, the range offers scalability and low power consumption and is designed to deliver from several teraflops to petaflops. For further information, see www.bull.com/extremecomputing.

PUBLISHING

EPL offers Open Access for high-energy physics papers

EPL, the letters journal of the European Physical Society (EPS), is now offering Open Access publication free of charge for papers from nuclear and particle physics. For some time, *EPL* (formerly *Europhysics Letters*), has offered Open Access to individual articles in its online edition (www.epljournal.org) against a fee charged to the authors. This fee is now being waived for papers from PACS groups 10 (high-energy physics) and 20 (nuclear physics).

This offer is a transitional measure in anticipation of when EPL joins the Sponsoring Consortium for Open Access to all Particle Physics Publications (SCOAP³) and to express the support of the EPS for the SCOAP³ initiative, launched by CERN in 2007. In addition, to broaden the expertise of the EPL Editorial Board in nuclear physics, relativistic heavy-ion physics and particle physics, during the past year four representatives of these fields have joined as co-editors. They are Peter Jacobs (Berkeley), Rüdiger Voss (CERN), Dieter Zeppenfeld (Karlsruhe) and Vladimir Zelevinsky (Michigan).

● For more information about the SCOAP³ initiative, see www.scoap3.org.

Thermo Fisher Scientific Inc has introduced Integration Manager, a flexible and powerful data-transformation tool for automated data acquisition and distribution. Integration Manager can collect and store data from a range of instruments and deliver data in the formats appropriate for various recipients. For more information, call +1 866 463 6522 or see www.thermo.com/informatics.

CORRECTION

The obituary for James Allaby (*CERN Courier* July/August 2009 p50) contained an unfortunate error. The name of his son is Mark, as several readers have noted. Many apologies to all concerned.