Where the past meets the future

Particle physics is a field that spends an awful lot of time concentrating on the past and the future. That's not a criticism, just a reflection of the long-term nature of the science.

Data is collected during many years of experimenting, and ideas sometimes germinate over decades before fruiting. Large collections of experimental data are some of the field's most valuable assets, but they become stale all too rapidly. Technologies change, institutional knowledge dissipates, individual recall dims. But the data could, and should, live on for a significant time, since old data can be used again, as has occurred many times in the history of physics. Storing that prized resource, however, is hard. Fortunately, many scientists are awake to the problem, and are working toward globally coordinated solutions to preserve the data and keep it available for future scientists to use as needed. (See page 18.)

Photo: Reidar Hahn, Fermilab

It's not only data that has a potential life well beyond the original goals of an experiment. The hardware of particle physics is continually being reused, repurposed, and reinvigorated. (See page 24.) It's hard to even track down how much decades-old machinery is still in use or committed to future use around the world. Sometimes magnets are simply reused in a new particle collider, and sometimes whole accelerator structures are turned into new machines, such as the 40-year-old linear accelerator that has been converted to a new X-ray laser at SLAC National Accelerator Laboratory. The reuse of particle physics equipment isn't merely about getting more from the investment in a commodity. The design and manufacturing expertise; the gathered knowledge from years of experience working with the machinery; and the very human, visceral connection to these devices are hard to quantify, but are of great value to future physicists and engineers.

Data and equipment provide a bridge from the past to the future, but we are now at a very special time in the history of particle physics. As this issue goes to press, the Large Hadron Collider is beginning operations. The LHC could provide evidence of a key missing piece of the Standard Model of particle physics, sought for decades. Finding that piece is important, but more valuable is the guidance it will provide for future explorations. Many scenarios exist for what lives beyond the Standard Model, but nobody has any compelling evidence that would allow us to choose between those scenarios. However, physicists are almost unanimously sure that there are great discoveries imminent and that the LHC's results will revolutionize particle physics. Those results will take a few years to obtain, and getting to that future will rely on reusing data and equipment from the past, fueled by the energy and excitement of the physics community right now.

David Harris, *Editor-in-Chief*

Symmetry
PO Box 500
MS 206
Batavia Illinois 60510
USA
630 840 3351 telephone
630 840 8780 fax
mail@symmetrymagazine.org

For subscription services go to www.symmetrymagazine.org

symmetry (ISSN 1931-8367) is published six times per year by Fermi National Accelerator Laboratory and SLAC National Accelerator Laboratory, funded by the US Department of Energy Office of Science.

symmetry