signal to background

A theater play about a young physics genius; an unexpected dose of excitement on the Fourth of July; a tree made of historic computer parts; retiring a car at half a million miles; day care without a spilled-milk accident; data on where particle physicists study.

Reviewed by Elizabeth Wade

Symmetry

by David Field, performed at Victory Gardens Theater, Chicago, May 27-July 10, 2005

Young science geniuses are the stuff of legend, making breakthrough calculations in their attics on stormy nights and revolutionizing the world by the age of 30. As today's physics is transformed to include string theory, extra dimensions, dark energy, and other topics once relegated to the field of science fiction, the only thing missing is the young prodigy ready to overturn our ideas of space and time. Meet Oscar Newman, the main character of *Symmetry*, a play written by David Field and recently performed at the Victory Gardens Theater in Chicago.

At age 26, Oscar (Aaron Roman Weiner, top photo) sent a ripple through the physics community with a paper on M-theory. His work catches the attention of both technology tycoon John Slocum (J.J. Johnston) and famed Manhattan Project scientist Edmund Lakos (William J. Norris). While Oscar is tempted by their career offers, he feels bound to his low-profile teaching position at Albuquerque State by his mentor, Neil Julian (Matt DeCaro), and Neil's mission to build a state-of-the-art physics lab. As Oscar becomes entangled in the power politics of building an elaborate new facility, he begins to question his previous notions about the power of Western science and math, and he becomes intrigued by the mystical ideas of Ecco Sagada (Jennifer Liu, bottom photo), the new Eastern religions professor.

Photos: Liz Lauren

The audience has seen similar characters many times before, as they represent all

the classic science stereotypes. Fortunately, the public's familiarity with such unrealistic characters ensures that they are not distracted in any way from the best part of *Symmetry*—the science. Scenes set in Oscar's physics classes double as intriguing real-life lectures about topics including Einstein's revolutionary genius, the weirdness of quantum mechanics, and the mind-blowing new theories waiting for experimental verification. By portraying the scientific community as a group of stereotypes, *Symmetry* makes physics as approachable as it has ever been.

Symmetry presents a chance for the curious to hear about the mysteries of our universe (and all the bewildering theories that might explain them) outside of a classroom. Despite perpetuating a stereotypical vision of the scientific community, *Symmetry* ultimately benefits physics by making science accessible and reminding people that, hey, this stuff is cool.

Elizabeth Wade

Memorable Fourth

Holiday weekends are meant to be special, but nine Fermilab employees got a dose of unwanted excitement this Fourth of July. Reaffirming that an accelerator laboratory never sleeps, engineers and technicians were called away from family barbeques and town parades to replace a failed transformer over the long holiday weekend.

Transformers play a crucial role in providing power to Fermilab's accelerators, which operate 24 hours a day, seven days a week to deliver particle beams. When a transformer of the Main Injector accelerator failed on Saturday evening, it had to be replaced as soon as possible to minimize downtime of several experiments.

Although a spare transformer was on site, the repair crew had to order a crane and a rigging crew to lift the old transformer out of position and to replace it with the spare (photo below). Because of the holiday weekend, it took more than a phone call to receive permission for a large crane to travel the Illinois roads. As usual, the repair crew was up to the challenge. Thanks to the crew's dedication, less than 72 hours later, the accelerator was back up and running, and scientists returned on Tuesday, July 5, to a fully functioning lab.

Amelia Greene

Photo: SLAC

Memory tree

The SLAC archives, in the windowless basement of the Central Laboratory Annex, are no greenhouse. Yet for the past few years, a small tree has adorned the den of SLAC's archivist Jean Deken. "It hasn't grown any compared to trees outside, but it hasn't lost any of its fruit," Deken says with a knowing smile, while gently dusting off her three-foot-tall ward.

Nor is it likely to wither soon from lack of rain or want of sunlight: its trunk is made of steel, its branches of aluminum

Photo: Fermilab

wire, and its leaves of old computer parts.

Members of the SLAC computing services assembled this whimsical curio 22 years ago to honor—and chide—their colleague John Ehrman, who was leaving them after 15 years for a job at IBM. A programmer and author of many manuals for SLAC computer users, Ehrman was known for a relentless sense of humor—which proved contagious. So, while some longtime SLAC employees are remembered by a solemn redwood, a cheerful crabapple, or a delicate hawthorn, Ehrman's legacy lives on as a metallic tree bearing dog-eared punch cards, scratched magnetic disks, a lonesome circuit board, a couple of tape-drive rings, a dial-up 300-baud modem, and other memorabilia of the bygone era of mainframe computing.

Time will tell which will have the last laugh, of the timeless but perishable redwoods or the outdated but durable little computer tree.

Françoise Chanut

Car Re*tire*ment

Louis Barrett, physicist at Western Washington University, drives a lot. His daily commute to the university, located in Bellingham, Washington, is more than 80 miles. Every summer for years, he has made the 1900-mile drive to Soudan, Minnesota, to work on the Soudan 2 proton decay experiment (1988-2004) and the MINOS neutrino oscillation detector.

All his driving is in a 1987 Honda Prelude affectionately called "Old Red." Last year he told several people that he was going to "retire" his car after reaching a half-million miles—all driven with the original engine. He achieved the goal at the end of last summer. This summer, Barrett drove by car to Fermilab to take shifts in the MINOS control room. His friends and colleagues were surprised to see him still driving "Old Red," now with 552,000 miles. The only change: It had new tires.

Maury Goodman, Argonne National Laboratory

Photo: Reidar Hahn, Fermilab

Spilled milk

Almost in time with the rhythmic open-mouthed chewing and the occasional call for more ketchup during lunchtime at Fermilab's day care center comes the repeated mantra, "Careful of your milk."

Caregiver Cindy Kane knows all about the constant battle against spilled milk. "It was especially bad about a year ago, when we had this one little boy who spilled his milk every single day," says Kane. "We sat next to him, we reminded him to be careful, and we moved it up above his plate after he took a sip, but something always happened."

Then, one morning, Kane walked into her classroom to find a hand-lettered sign hanging in the window: "We have worked 1 day without a spilled milk accident." The tongue-in-cheek sign was a variation on the familiar notice "We have worked…days without a lost time accident" that greets

Photo: Patricia Hedrick, Fermilab

workers and kids as they enter the center each morning. The sign, created by caregiver Janet Jelonick, was a reminder that safety has become an integral part of life at the national laboratories.

"Introducing the importance of slowing down and exercising caution to kids at a young age is important," Kane says. "But it's also difficult. We usually last zero or one day without a milk accident, and we've never surpassed three days. But we're trying!"

Kelen Tuttle

HEP education

SPIRES is not only an archive for scientific papers; it also provides information on researchers. The HEPNames database contains the names and verified records of over 7000 high-energy physicists, from graduate student to professor emeritus. They are affiliated with more than 1100 institutions worldwide, one third of which are US institutions. They received their PhDs from more than 600 institutions around the globe, including 130 universities in the United States. The list of undergraduate institutions that they attended is even longer: 900 places worldwide, of which 250 are US institutions.

So, who has provided these high-energy physicists with their education? Analyzing only the 5200 records of HEP physicists for which both their undergraduate and graduate affiliations are known, eight institutions rank in the top-ten lists for both undergraduate and graduate education (see table 1). The Massachusetts Institute of Technology (MIT) has been the favorite school among high-energy physicists. The most popular foreign institutions are the University of Tokyo (undergraduate studies) and the University of Cambridge (PhD program).

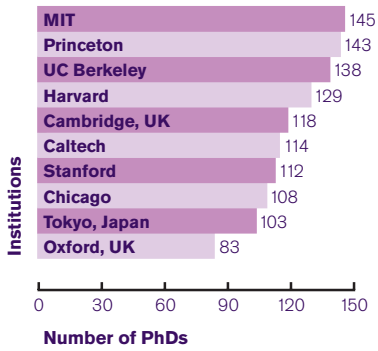
Of the 2200 records with a US PhD degree and information on undergraduate affiliation, over one third show foreign undergraduate institutions. Table 2 shows the top ten foreign countries that have provided students for US PhD programs leading to careers in high-energy physics. The reverse flow of students is rather small. Of the 3000 HEP physicists who received a PhD from a foreign institution, only 54 had been American undergraduates.

Heath O'Connell, Fermilab

HEP physicists' educations

Details can be found at:
www.slac.stanford.edu/spires/hepnames/stats.undergrad.world.shtml

TABLE 1



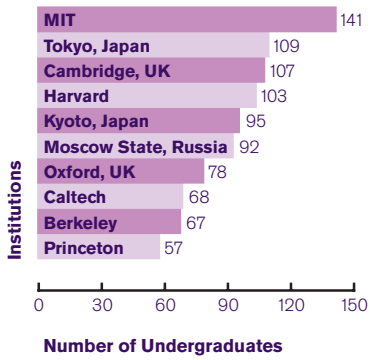
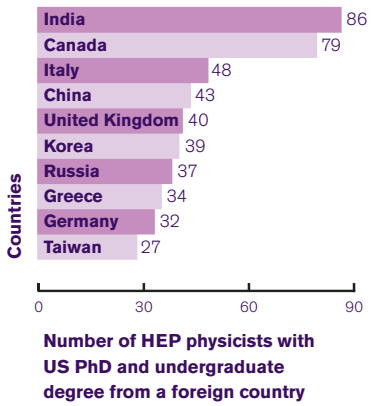


TABLE 2



Source: SPIRES *HEPNames database*

from the editor

Particle physics, like most sciences, is a truly international enterprise. Two specific stories in this issue of *symmetry* highlight its global nature. A story about the development of detectors for the proposed International Linear Collider shows that ongoing research can't even be isolated into geographic compartments but is done by overlapping, international collaborations that find a home in the collective scientific enterprise, rather than any country or region. This issue's deconstruction shows how much a representative selection of physicists travel the world to do their jobs and sustain the face-to-face interactions that play an important role in collaborative progress. Our readership is just as diverse and their letters reflect the international extent of particle physics.

David Harris, *Editor-in-Chief*

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Letters

KEK's activities

On page 18 of the June/July issue in the story "No Little Plans", you state "With California's SLAC, Japan's KEK and Germany's DESY laboratories making the transition from particle physics to light-source-based research,…"

I think this is a very misleading statement. Although KEK does have a light source facility, the KEK *B* factory is still running with record breaking luminosity, and fixed-target experiments and a long-baseline neutrino-oscillation experiment are expected to start in 2008 at J-PARC, a joint project with JAERI with its 50 GeV high intensity proton beam. KEK will continue to strive in particle physics for some time.

Youhei Morita, KEK, Japan

Editor's note: *The implication that KEK is changing focus was unintended and we regret the misrepresentation.*

African particle physics

I am a science student from Nigeria and would like to commend Fermilab/SLAC for relentless effort in keeping thousands around the world acquainted with the latest developments in the world of particle physics.

As an avid reader of this magazine, my favorite column is the "voices" which featured Einstein's *annus mirabilis* and women in physics in volume 2, issues 1 and 3, respectively.

I will be glad if the magazine can include Africa in its reports on particle physics.

Ayodele Adebayo, Ibadan, Nigeria

Remote readers

I am lecturer in physics in a remote area of Pakistan where Internet facilities are hardly found. Fortunately, once I was browsing the Web to find out physics material when I came across your site. I subscribed and received your first magazine. I found it good for me and also for my students covering the area of physics that I like most. Besides, I became aware of the World Year of Physics 2005: otherwise I would have missed the historical year which will never come in my life again. Thanks.

Ram C Reguel
Government College, Mithi, Pakistan

Correction

Due to a production error and mislabeling of an original photograph, an image was reversed and an incorrect caption printed in the gallery of early linac photos on page 31 of the August issue of *symmetry*. The updated image and caption can be seen online.

letters@symmetrymagazine.org