signal to background

Archaeological find at Japanese lab; psychology of virtual collaboration; pumped-up pumpkins; a neutrino record for the books; ornaments highlight physics conferences; raising the flags; book review; letters.

Photos courtesy of the J-PARC Project Team and the Ibaraki Prefecture Kyoiku Zaidan

A project worth its salt

The Japan Proton Accelerator Research Complex (J-PARC) isn't scheduled to open until 2008, but the Tokai campus facility is already the site of discovery—just not of the physics variety.

While digging up the earth during early phases of construction at J-PARC, workers unexpectedly stumbled upon the ruins of an ancient salt farm as well as coins, pottery, and human remains. The finds are estimated to be from between the 15th and 17th centuries.

At first, the J-PARC community was less than thrilled with the discovery. The find meant an archaeological study was necessary and that construction of the facility would likely be interrupted. However, as it became clear the delay would be shorter than anticipated—only about a half year—many team members began taking an interest in the study and, says Shoji Nagamiya, J-PARC project director, "they started to enjoy it."

Others enjoyed it, too, it seems. Local residents pitched in to help professional archaeologists with the excavation, an effort that lasted two and a half years. "We also asked local school kids to help," says Nagamiya. "It was a nice educational project for them."

While the findings are only moderately significant on a national level, they provide a significant glimpse into the past for the local community. The salt farm is the largest discovered in northern Japan and provides vivid evidence of how salt was produced in earlier days.

The human remains reveal something of the area's early culture: "I was surprised to see that all the bodies were kept safely and nicely," says Nagamiya. "In Japan, the direction of human bodies—north for head and south for foot—is important. Most bodies were correctly aligned along this direction."

Jennifer Yauck

The human side of virtual collaboration

Advances in virtual control technology have shown scientists just how important humans are after all. Although scientists can now essentially operate a particle collider from anywhere in the world, having members of a team work well remotely is just as significant a challenge.

The Global Accelerator Network Multi-Purpose Virtual Laboratory system has everything needed for remote control, servicing, repair, and fault analysis. But an extra component makes it radically different from other virtual control systems: It takes into account the human aspect of teamwork around the world. How do you get a virtual team to be as efficient as a real one? Why do we have problems working together over distances when it seems so easy when we're all together? For these questions, the physicists and computer scientists sought the help of two psychologists who specialize in human-computer interfaces.

"The biggest obstacle is trust," says psychologist Markus Hodapp from Mannheim University. "In a normal working environment you know your colleagues and have an estimate of the level of trust you have in them. In the virtual team, you sometimes have to trust your opposite blindly—people are not happy with that."

But how do you build up trust? Apparently there's no avoiding face-to-face meetings. "This is especially important in the start-up phase of a project," says Hodapp. Videoconferences help, because a lot of information is transmitted non-verbally in body language, facial expressions, or gestures, and seeing them is already a step up from telephone conferences. "Ironically, in our virtual team working on virtual [collaboration] we have the same problems as everybody else," says Hodapp. Informal things, "like virtual coffee breaks, for example," seem to be another solution because social interactions help build the needed trust.

Barbara Warmbein, ILC Global Design Effort

Gigantic pumpkin

Three-year-old Madeleine Rogers stands inside the spooky remains of a 275-pound pumpkin grown by her father, Stanford Linear Accelerator Center engineer Reggie Rogers. Since this photo was taken in 1999, both Madeline and the pumpkins have grown bigger; this year, the sacrificial squash at the center of his Halloween display weighed in at 521 pounds.

Carving a jack-o-lantern out of a giant pumpkin isn't easy. The top of the pumpkin, which is traditionally used as the opening, is too thick to cut. So Rogers used his engineering skills to construct a special tool that cuts through the thinner back side of the pumpkin, where the wall is still about a foot thick. "Then you use a shovel to scrape it out," says Rogers. "When my daughter was young enough, she used go on the inside and scrape out the rest."

Rachel Courtland

Record making

Fermilab might not have the world's longest fingernails or the world's oldest man, but, according to *Guinness World Records 2007*, the lab does have the most powerful beam of neutrinos.

The Neutrinos at the Main Injector (NuMI) beamline has an output power of 200 kilowatts, firing neutrinos 720 kilometers from Fermilab to a particle detector in a mine in Soudan, Minnesota.

Siri Steiner

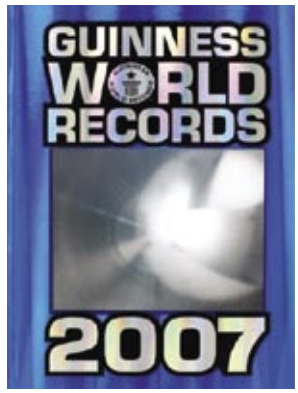


Photo: Reggie Rogers

Photo: David Harris

O Christmas Tree!

Like many particle physicists, JoAnne Hewett can trace the course of her career through her scientific publications. But for a more colorful retrospective of her work, the SLAC theorist simply decorates her Christmas tree.

About 20 years ago, Hewett, a graduate student at the time, bought a totem-pole keychain while visiting a collaborator in Vancouver. Shortly after, a sort of eureka moment struck: "I thought, hey, I could use this as a Christmas ornament," she says.

Since then, Hewett has made a habit of collecting tree trinkets whenever she travels to conferences, workshops, committee meetings, and the like. "I look for something that says to me, ahh, this is that place," she says.

Indeed, Hewett can tell you with enviable recall the place—as well as the year and event—each ornament represents. The hand-painted egg? Budapest, 1991, Beyond the Standard Model workshop. The cactus? Tucson, 2003, supersymmetry conference. The glass Santa in a gondola? Trieste, 2006, presentation of LHC lectures.

And then there's the poorly crafted half-sphere diorama that's stuffed with figures vaguely resembling people and cacti. "This is what you end up with when you've had too many margaritas," Hewett laughs. San Diego, 1989, 4th generation physics meeting.

Most every ornament comes with a story, too, but clearly, the story that takes the holiday fruitcake belongs to the ornament shaped like the Stanley Hotel, where Hewett attended a linear collider meeting in 1995. Located in Estes Park, Colorado, the hotel is famous as the set for the thriller movie, *The Shining*. But what Hewett remembers most about the hotel is its run-down condition at the time. "We had no hot water or curtains, and the meeting was in a shack in the back yard with only two bathrooms for all of us. It was absolutely awful," she says. "When I saw the hotel ornament, I knew I had to have it."

And of course, there's one other ornament Hewett always knew she had to have in her collection, too: a miniature cowbell. "Every physicist who's ever been to CERN has seen one," she says with a smile.

Jennifer Yauck

Photo: Reidar Hahn, Fermilab

Raising the flags

Security officers raise and lower 20 flags in front of Fermilab's Wilson Hall every day. Each flag represents a country that researchers come from to work at the lab. "The problem is that there are twenty flag poles," says Fermilab's Roy Rubinstein. "Sometimes we have researchers from more, and sometimes we have researchers from less than twenty countries." Rubinstein says he was surprised that Fermilab happened to have a Czech flag in storage October 30, when Czech Republic Consulate staff visited the lab. Security officers ran the flag up one of the 20 poles just in time.

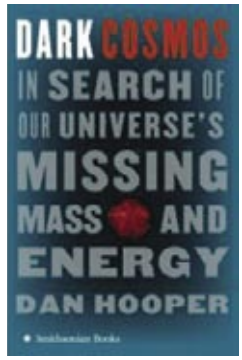
Although flags occasionally get replaced, the usual order is: Argentina, Brazil, Canada, Columbia, France, Germany, Greece, India, Israel, Italy, Japan, Mexico, Netherlands, People's Republic of China, Poland, Russian Republic, South Korea, Spain, Switzerland, and the United Kingdom. They are flown in alphabetical order. Nearby, flags representing the United States, the Department of Energy, and the State of Illinois are on permanent display.

Siri Steiner

Reviewed by Don Lincoln, Fermilab

Dark Cosmos: In search of our universe's missing mass and energy

by Dan Hooper
Published by Collins, 2006



Lovers and insomniacs have enjoyed the night sky for millennia. With the surprising observation that stars are less than five percent of the universe, it is natural that there would be a proliferation of books for the layman about the other 95 percent. Dark matter and dark energy have become buzzwords among science enthusiasts, and this excitement has generated an interest for many who want to understand just what the hubbub is all about.

Dan Hooper's first book, *Dark Cosmos*, is an excellent introduction for a layman who is completely unfamiliar with the subject. Hooper focuses on the physics, hitting only the high points, without bogging the reader down with details or much of the extensive experimental evidence supporting dark matter and energy.

The relatively shallow treatment of the subject matter makes the book unsuitable for a knowledgeable layman who is an avid student of the dark side of the universe. Nor will a reader who is interested predominantly in the history and personalities involved in these exciting discoveries learn much from this book, as these topics are given only the most cursory attention. However, for a reader who is interested in just the high points and the big ideas, this book is a valuable read.

In a scant 227 pages, with large type, Hooper discusses dark matter and energy, along with some leading ideas as to their identity. While no topics are discussed in depth, the book manages to introduce a dizzying array of terms: black holes, gravitational lensing, the relevant portions of quantum mechanics, the Standard Model of particle physics, supersymmetry, superstrings, the big bang, and inflation, to mention only a few. More importantly, the role of these mysterious terms in the mystery of the dark side of the universe is explained. For its intended audience, *Dark Cosmos* is a well-written and interesting book.

Letters

Photo courtesy of Martha Heil

Covered

Thank you for *symmetry's* beautifully designed covers. I am excited to receive each month's new issue, since I rip off the cover and some of the articles inside and use them for wrapping paper and craft projects. Could you please include folding and cutting instructions for craft projects in future editions?

Martha Heil, Greenbelt, MD

Editor's note

Last year, SLAC librarian Lesley Wolf created the "SymmeTree" (see February 2006 issue). If anybody else has used *symmetry* in creative ways, please send us your photos.

Letters can be submitted via letters@symmetrymagazine.org