

signal to background

Origin of the (classified) barn; meet the shoemobile; creative ways to use symmetry; birds at Fermilab; scientists playing Indiana Jones; battle of the boxes; *Late Show with Lederman*; letters.



Photo: Reidar Hahn, Fermilab

Hitting the broad side of a (classified) barn

In the luminosity lexicon, a picobarn is one trillionth (10^{-12}) of a barn, and a femtobarn is one quadrillionth (10^{-15}) of a barn... but what's a barn? The distinctive and amusing term originated with two Purdue University physicists working on the Manhattan Project in 1942—and it was classified information by the US government until after World War II.

A History of Physics at Purdue (Gartenhaus, Tubis, Cassidy, and Bray) cites the July 1972 issue of *Physics Today* in which Marshall Halloway and Charles Baker write of tossing around ideas over dinner until arriving at “barn” to describe the typical nuclear cross section of 10^{-24} cm², the effective target area that a nuclear particle represents in a collision. Dining in the Purdue Memorial Union, back in Lafayette, Indiana, Halloway and Baker dismissed “Oppenheimer” and “Bethe” as candidates, then considered John Manley, director of the Purdue group at Los Alamos. They

decided “Manley” was too long, and then, as the authors put it in the *Physics Today* article to:

“John’ was considered, but was discarded because of the use of the term for purposes other than as the name of a person. The rural background of one of the authors then led to the bridging of the gap between the ‘John’ and the ‘barn.’ This immediately seemed good, and further it was pointed out that a cross section of 10^{-24} cm² for nuclear processes was really as big as a barn. Such was the birth of the ‘barn.’”

Because of the need for communicating project information as secretly as possible by telephone, the term “barn” was immediately classified. Halloway and Baker wrote an internal report in 1944 (“Note on the Origin of the Term ‘Barn’” (LAMS 523), September 1944), and Los Alamos issued a report after the war in 1947 (“Origin of the Term ‘barn’” (LAMS 523), 5 March 1947). But the term “barn” wasn’t officially declassified by the government until 1948. It is now used across nuclear and particle physics.

Mike Perricone

One big step for safety

It looks like a simple silver trailer, but it’s more like a shoe store on wheels. Mike Sitarz pulls his metal trailer, better known among Fermilab employees as the “shoemobile,” behind the Technical Division industrial buildings at 8 a.m. every Tuesday. He stays until 4 p.m., fitting employees with safety shoes required for their jobs.

Sitarz’s store, Knippen Shoes, located in Wheaton, Illinois, is contracted by Fermilab’s Environmental Safety & Health Section to make weekly visits. Inside the carpeted trailer, stacks of cardboard boxes line the walls and fitting chairs await customers. Sitarz, who’s been making the trip to Fermilab for 11 years, carries about 350 pairs of shoes, ranging from Skechers to Red Wings.

Employees required to wear special work shoes receive a footwear request signed by their supervisor detailing the safety features that are needed. The most common requirements are for nonathletic, leather, ankle-high shoes with steel-toe protection, Sitarz says. Other jobs just require shoes with the capacity to protect those who work with electricity. Fermilab will pay up to \$85 per pair, and if an



Photo: Reidar Hahn, Fermilab

employee chooses a pair over that limit, they're expected to cover the additional cost.

On what Sitarz calls the "free wall" about 40 pairs of shoes are displayed, all \$85 or less. The hardest part is finding the pair that fits best, Sitarz says. "Steel-toed shoes are even more difficult because if you don't get the proper size, they'll kill you," he says. Employees don't have to purchase their shoes from Sitarz, but that's often the easiest option, says Rafael Coll, who coordinates Fermilab's safety shoe program. "It's convenient because people don't have to miss work," he says. "If they go out to town, it could take a couple hours. But here, they're in and out in less than a half hour."

Kendra Snyder

SymmeTree

Tired of the usual holiday decorations, SLAC librarian Lesley Wolf created the first ever "SymmeTree" last November. "I didn't want to put up the plastic tree one more time," she says. "For the library it made sense to create a new one from a hefty journal, so I turned to *symmetry*." Fashioned from two copies of the magazine, Wolf's creation, inspired by the origami in the November issue, delighted library patrons for several weeks before she presented it to the *symmetry* staff as a holiday gift.

Kelen Tuttle



Photo: Diana Rogers



Photo: Dawn Stanton

Seeking the elusive... snipe?

Instead of spin they have lift. They interact via songs. And they come in far more than just three colors.

A total of 277 bird species has been recorded at Fermilab since surveys began in the mid-eighties. Spring and fall are peak seasons to find migratory species, while many birds call the facility home year-round. And though the birds of Fermilab may not solve the puzzles of the universe, people still come to look for them, even in the subzero temperatures of a US Midwest winter.

The annual Christmas Bird Count at Fermilab was a community effort involving members of several local birding clubs, including the DuPage Birding Club, which organized the event. Fermilab physicist Peter Kasper again joined the CBC volunteer ranks this year, as he has every year since 1987. "When I'm here in the Chicago area, I do all my birding at Fermilab," says Kasper, a life-long bird watcher who maintains the well-known *Birds of Fermilab* Web site.

The Christmas Bird Count is part of a larger Audubon Society effort that takes place throughout North and South America from mid-December to early January. Tens of thousands of birders participate in the annual count, which started in 1900. The Fermilab count started in 1976. This year's total for Fermilab's 6800 acres was 2931 birds representing 49 species. Fermilab counters recorded a number of Yellow-rumped warblers, Cooper's hawks, American robins, and Mourning doves. Denis Kania (top photo, far left), Area-1 leader for the Fermilab-Batavia count group, noted that while the count of robins was high, there were fewer Canada geese this year. Other less common sightings included Eastern bluebirds, Lapland longspurs, and a Lesser scaup.

As for snipe?

"Our first bird of the day was a snipe," says Kania. His group found the Wilson's snipe (named after Scottish-born ornithologist Alexander Wilson) foraging in a marsh near Wilson Hall (Fermilab's main building, named after founding director Robert Wilson).

Dawn Stanton



On the trails of Indiana Jones

Innovative 21st century technology at Argonne National Laboratory is taking researchers back to the 19th century, the 16th century, and even the third millennium BCE.

Scientists and historians using the Advanced Photon Source at Argonne, a Department of Energy laboratory, are finding that the most brilliant x-rays in the Western Hemisphere can reveal internal details about relics without damaging them.

For example, researchers found massive amounts of lead—a “toxic overdose”—in bone fragments and hair belonging to 19th century composer Ludwig von Beethoven, confirming the cause of his chronic debilitating illness. The researchers used micro-imaging to look at the distribution of lead in and on both the bone fragments and hair.

The APS was also used to study two astrolabes, instruments that were used to study the positions of the stars before the telescope was invented. The instruments were from different collections, Chicago’s Adler Planetarium and Harvard University, but each bore the same name and date, suggesting that at least one was a forgery.

Three different tests were done at the APS—fluorescence analysis to determine the element composition; diffraction analysis to determine the crystalline texture of the astrolabes; and radiography to study the thickness of each plate of the

astrolabes. All three revealed the same result, showing that the Adler astrolabe is consistent with materials and workmanship of the period, and the Harvard instrument was of much more recent manufacture.

And an international team of archaeologists and physicists from the University of Chicago Oriental Institute used high-resolution x-ray fluorescence data to analyze the composition of a figurine from the Amuq Valley in central Turkey, and dated it to the beginning of the third millennium BCE. The researchers found the figurine to be an early example of the use of metallic alloys, made from copper and tin.

Catherine Foster, Argonne National Laboratory

Battle of the boxes

Last October, the front of the SLAC computing center looked like an elaborate children’s war game in progress. Ad hoc piles of polystyrene, plastic, wooden pallets, and cardboard created an image of bunkers and trenches in a plastic post-industrial landscape. Within a few days, the scene was gone but it will reappear in the near future.

The piles of packaging grew as workers unpacked a new shipment of 353 Sun computers. Like many labs, SLAC buys hundreds of individual PCs instead of a few

large units to get the most computing power for its dollar.

“Cabinet units can cost ten times more than their PC counterparts,” says Charles Boenheim, assistant director of Scientific Computing and Computing Services at SLAC. “Because each collision in a particle accelerator is an independent event, it’s possible to farm out analysis to individual PCs and save on computing costs.”

SLAC currently runs about 3000 processors in its computing center and receives large shipments of new computers every six to twelve months. It takes six people just to arrange the logistics of unpacking each box, rolling the computers into the building, setting up the racks that will house them, hooking them up to power, loading necessary software, and connecting them to the network. On average, this process takes a little over a month, but the first few days create the detritus of unpacking that is gradually cleaned up and recycled where possible.

“People will stand around and gawk at the unloading process,” Boenheim says. “Then they expect the computers to be up and running the next day. They don’t realize all that goes on inside the computing building for weeks afterwards. But if people don’t know we’re here, we’re doing our jobs right.”

Kelen Tuttle



Photos: Melinda Lee, David Harris, SLAC

“Ways to Know You Have Won the Nobel Prize”

Hosting the “Late Show with Leon,” Nobel laureate Leon Lederman shared with high school students his top fourteen ways to know you have won the Nobel Prize:

14. Your telephone rings at 6 a.m. and someone with a Swedish accent invites you to a party.
13. You meet a lot of important people; some are so rich they have unlisted telephone companies.
12. Your fame makes you such an extrovert that you now stare at other people’s shoes when talking to them.
11. You use your prestige to explain to the judge that you couldn’t possibly have been driving at 60 mph when you’d only been driving for 15 minutes.
10. On the seventh Nobel convocation the Queen greets you as an “old friend.”
9. Laureates are arrogant, but they don’t want to be. You overheard one saying, “Lord, please forgive the sin of arrogance, and Lord, by arrogance I mean the following...”
8. Your spouse orders you to take out the garbage. “Woman!” you say, “How dare you!” Then she calls three laureates, and they all take out the garbage!
7. Mysterious but passionate love letters arrive in your mailbox, addressed to “occupant.”
6. Testifying in a lawsuit, you claim you are unquestionably the world’s greatest theoretical physicist. When later confronted by colleagues, you explain: “I was under oath.”
5. Nobelists are supposed to know everything. You find yourself chairing two advisory committees: one on the prevalence of measles in Guatemala and the other on income tax laws in North Dakota.



Photo: Reidar Hahn, Fermilab

4. Physicists have three other prizes they can win: one for physicists who can count and one for physicists who cannot count.

3. Your psychiatrist—all Nobelists have them—diagnosed that you are in love with your umbrella. [Looking up, Leon Lederman said:] How stupid can they get? I like and respect my umbrella, but *love*?

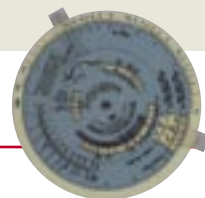
2. Your Nobel colleagues are excited by the discovery of the original document written by the Greek physicist

Democretos heralding his discovery of atoms. It is handwritten, signed by Democretos himself, and is clearly dated: Aug. 2, 467 BC.

1. Two atoms are walking down the street when one says, “Help! I think I lost an electron.” Asks his friend: “Are you sure?” “Yes, I’m positive!”

Streaming video of the show is at http://vmsstreamer1.fnal.gov/VMS_Site_03/Lectures/LateShow/

Letters



Another artifact

In response to our story “Artifact: Relativator,” SLAC physicist and director emeritus W.K.H. “Pief” Panofsky provided us with another type of circular slide rule he has had in his desk since the late 1970s (photo). While the *Relativator* was designed to calculate values useful to Einstein’s special theory of relativity, this *Nuclear Bomb Effects Computer* can be used to calculate the effects of a nuclear bomb as a function of the distance from the explosion or yield of the bomb. Panofsky says he often found the device quick and easy to use even though the same calculations could be performed more precisely with a computer. Images of the reverse side of the device and of the pamphlet that came with the device are online at www.symmetrymagazine.org

Correction

In the December 2005/January 2006 issue of *symmetry*, the story “Graduate school gourmet” incorrectly identified Jonathan Bagger’s association with the High Energy Physics Advisory Panel. Bagger served as co-chair of a HEPAP subpanel.

Letters can be submitted via letters@symmetrymagazine.org