6000 hours of good works; hot review; translating physics and beer; walkway to heaven; blades on ice; life list for physics fans; letters.

Photo: Chris Riley, The Gilroy Dispatch

Life service

Somebody who's racked up thousands of hours of community service has either been very bad or very good. SLAC carpenter Michael Hughes has been very, very good. Having volunteered more than 6000 hours of service over the past 34 years, Hughes recently received the President's Call to Service Award, presented by Acting Under Secretary of Energy Dennis Spurgeon. The award honors those who have given at least 4000 hours of service in a lifetime.

Hughes' volunteer career began almost accidentally, after he enrolled in an adult education woodshop course at a local high school. "I first attended the class to work on my personal projects," he says. "Then I started helping people when they didn't know how to do things." For more than three decades he was a class mainstay, spending four hours each week assisting the teacher and helping instruct.

"Woodshop was always a big part of my life," he says. "It felt good to help people make their finished product."

Hughes earned more karmic points volunteering for 25 years at the annual Garlic Festival in his native Gilroy, California. He also volunteers for local Relay for Life chapters, for the Gilroy Police Department, and for special SLAC events.

Alison Drain

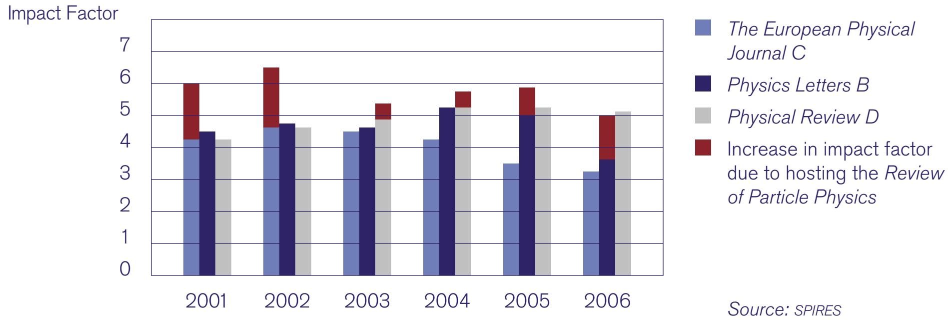
The hottest citation

The article at the top of the SPIRES lists of the most-cited articles in high-energy physics is, as always, the *Review of Particle Physics* (RPP), a compendium of experimental data and reviews put out by the Particle Data Group. This highly useful work is cited whenever the author of a paper refers to standard experimental results, and it gets more than 1000 citations every year.

Just as physicists often look at SPIRES' lists as a measure of which papers are "hot" at a given moment, librarians and journal publishers, in evaluating journals, look at something called the impact factor. It's based on the number of articles published in a journal in a two-year span and the number of citations those articles received in the following year. Impact factors, like other ranking systems based on article citations, may be pilloried as useless or vaunted as convenient measures of quality. In reality they are somewhere in between, and the RPP provides a good example of some subtle effects.

The RPP is run in one of the major particle physics journals

Impact of the Particle Data Group



every two years, although it isn't submitted, reviewed, or edited like a typical journal article. Because the RPP gets more than 1000 citations a year, any journal in which it appears in gets a big but temporary lift in its impact factor.

In *Physics Letters B*, for example, 10% of the 10,000 citations received in 2005 were to the RPP. The resulting boost in impact factor from 4.5 to 5 was based on nothing more than the Particle Data Group's decision to publish the review in the journal that year. For this reason, among others, the group rotates the publication of the book among several journals, and the RPP effect, while pronounced in each year, does get spread around. In 2003 and 2004 the *Physical Review D* impact factor was boosted by about 5% due to the RPP, in 2005 and 2006 *Physics Letters B* saw a 10% rise, and for 2007 and 2008, we can expect the *Journal of Physics G* to see a near doubling of its impact factor due to the RPP.

While physicists generally nod their heads in agreement when they see the RPP at the top of SPIRES' lists, confirming that the Particle Data Group's efforts are quite useful, journal publishers and librarians who don't know about the RPP may wonder at the strange cycle of bumps in impact factors for the journals of particle physics.

Travis Brooks, SLAC

You wanted what?

Sometimes even the language of mathematics isn't universal. This realization came during March at the German lab DESY where a party was thrown by the Asian ECal team in thanks for the use of the DESY Calorimeter Group's test beam. At the multinational gathering, physicists compared the way they use their fingers to count: Most of them trying to order a beer in Japan by holding up one finger would receive four beers! The Asian team also gave a crash course in katakana, Japanese phonetic writing, and kanji, symbolic characters of Chinese origin. According to them, accelerator translates literally as "add-velocity-machine."

Barbara Warmbein, ILC Global Design Effort

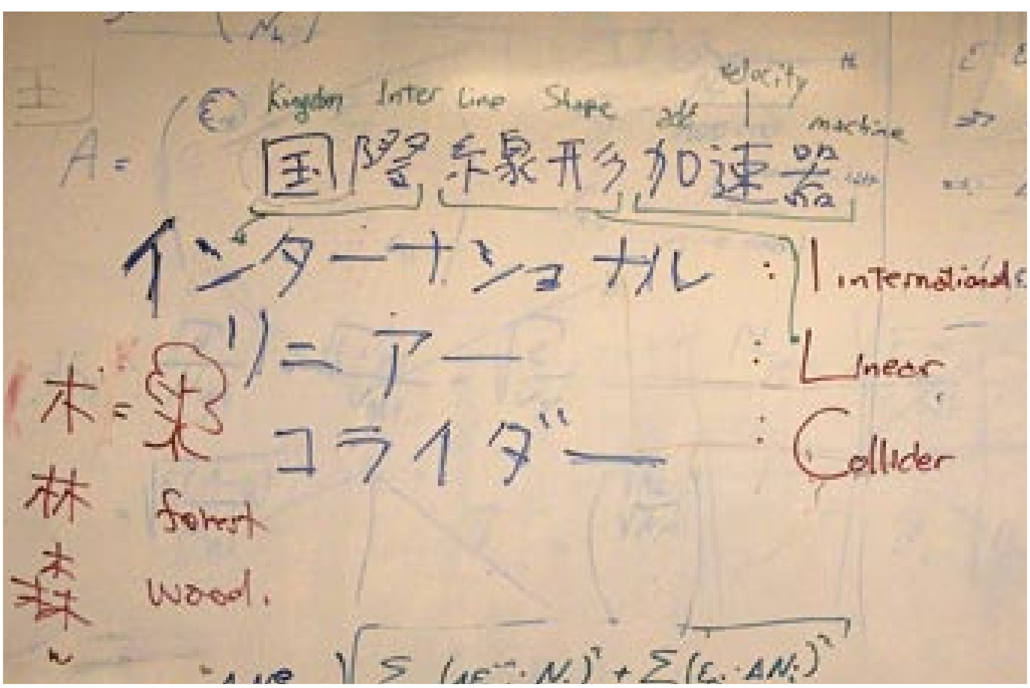


Photo: Barbara Warmbein

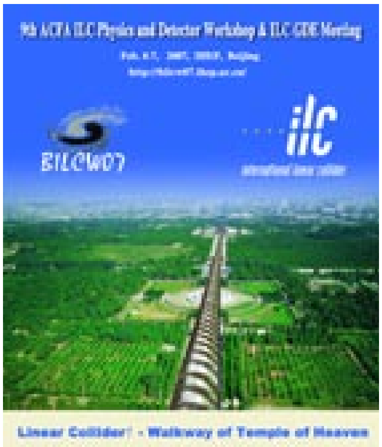


Photo: IHEP, Beijing

Walkway to heaven

The Temple of Heaven, a masterpiece of architecture and landscape design in Beijing, symbolizes the relationship between Earth and heaven—human society and the universe—which stands at the heart of Chinese cosmology.

It was the central image on the poster for the 9th ACFA ILC Physics and Detector Workshop and ILC GDE Meeting in February 2007 at the Institute of High Energy Physics (IHEP) in Beijing, where the International Linear Collider's reference design and preliminary cost were officially announced.

Although the walkway towards the ILC is as long as that at the Temple of Heaven, China is now taking steady steps towards increasing its contribution to the realization of the ILC. Interest in this endeavor has manifested itself in unanimous support from Chinese scientists for China's participation in the ILC, demonstrated at the Fragrant Mountain Meeting held at the end of 2006 and the ILC GDE Meeting this past February, and continues to be evident in the various research and development efforts in progress at IHEP and other institutions as well as in the country's expanding collaboration with KEK in Japan and other labs worldwide.

Jiyuan Zhai, IHEP, Beijing

Slippery science

Why is ice slippery? Alain Haché has two kinds of first-hand knowledge. A veteran amateur hockey goalie, he learned to skate outdoors on frozen ponds. As a professor of physics at the University of Moncton in New Brunswick, Canada, he has combined his professional and personal passions in *The Physics of Hockey* (Johns Hopkins University Press, 2002; Raincoast Books, Vancouver; a Finnish edition, *Jääkiekon fysiikka*, is published by Terra Cognita in Helsinki).

"The collisions in hockey are probably most similar to particle physics," said Haché, in his distinctive French-Canadian accent, "but there are many physics aspects to hockey, maybe even more than other sports."

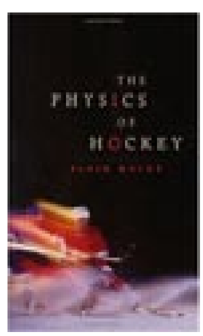
Ice is the prime differentiating ingredient, with players skating at 30 mph and launching slap shots at 100 mph on a frozen surface about ¾ of an inch thick, maintained at about 16°F. "The physics of ice is condensed matter physics, and what happens at the surface of ice is fascinating," said Haché. "Many people have wondered for a long time what makes ice slippery. We've only recently learned the reasons, using powerful atomic force microscopy."

At the macroscopic level, materials like wood and plastic have a coefficient of friction around 0.5; ice has a coefficient of friction of 0.005, which Haché said might be matched only by biological structures such as the joint in a knee. He added that traditional models of ice's slipperiness—surface melting caused by the pressure of a skate blade or friction rubbing from the blade's motion—offer insignificant temperature changes. But atomic force microscopy, which offers resolution on the order of fractions of an ångstrom (0.1 nanometer), provides a compelling new vision of ice formation.

"The top layer of ice is a bulk crystalline structure arranged like the structure of graphite," Haché said. "At the top of the ice the molecules are tightly bound but below them are dangling bonds that are very mobile. So the first few layers at the very top are not quite solid, and not liquid, but something in between. This semi-wet layer or film exists whether or not there is pressure, and whether or not there is friction rubbing, down to something like -200°F. Below this semi-wet layer the coefficient of friction is about 0.6, so ice is like plastic or wood below the surface. But the semi-wet top layer that lowers friction is a property of the ice itself."

The book had its origins at a physics conference, when Haché struck up a conversation with someone who happened to be an editor. "He said, 'You must be Canadian. Do you play hockey?'" Haché recalled. "When I said I did, he said, 'There's a book I'd like someone to write.' Nothing really came of it for a while, but then I wrote half a chapter and sent it to him. He liked it, and there we went."

Mike Perricone






Photos: FNAL, SLAC, CERN, LBNL

CALL TO ACTION!
Help Us Compile a Physics Life List

Bird watchers have life lists of sightings. We think fans of particle physics need a checklist of their own, full of not-to-be missed places, experiences, and artifacts: Fermilab's newborn baby buffalo; America's longest building, at the Stanford Linear Accelerator Center; the six places in the bowels of the Large Hadron Collider where you can stand with one foot in Switzerland and the other in France; a hand-held prototype of the first cyclotron built by E.O. Lawrence, on display at Berkeley Lab. If Einstein's wig or Newton's false teeth existed, we'd throw them in, too.

And so we announce the particle physics life list, which will appear in an upcoming issue of *symmetry*. You probably have some secret gems of your own to add. Send us your entries for consideration to letters@symmetrymagazine.com with subject line "Life List"; contributors will be acknowledged in the magazine.

The Editors

Letters

Plans for antimatter

Congratulations to 12-year-old Austin Ellsworth on his fun model of a linear accelerator (*symmetry*, Mar 2007). However, using antimatter for fueling spaceships or energy storage, as in Dan Brown's book *Angels and Demons*, will never happen.

Fermilab is now the only place in the world to make and collect antiprotons. Going flat out we are able to collect about 5 trillion per day, to inject into the Tevatron collider. Capturing even a few of these in a "magnetic bottle" is extremely hard, but suppose we could capture all of them. If we then let them annihilate with matter, and converted the resulting energy into electricity with 100% efficiency, we could light up a 60-watt bulb for 25 seconds. The power bill to do that would be about 50 megawatts for a day!

So antimatter bombs or antimatter-powered spaceships have absolutely no scientific foundation, unless we could suck them through a wormhole from a parallel antimatter universe! (I am not serious about that!)

Mike Albrow, Fermilab

Magnetic experiences

Before conversion to a superconducting magnet, the Fermi Chicago Cyclotron Magnet (*symmetry*, Dec 2006) was used in the Neutrino Area as an analyzing magnet for muons. I worked on the deep inelastic muon scattering experiment E203 in the late 1970s, and we needed to calibrate the magnet for our experiment. At the time, the magnet pole tips were about 4 meters in diameter and the gap was about 80 cm high. For some reason (probably convenience) we decided to put the NMR (nuclear magnetic resonance) probe in the center of the magnet while it was running at about 1.5 Tesla.

I was designated to put the probe in the center of the magnet, so I removed all metal objects from my pockets, watch, belt, wallet, etc., and, crouching over, I stepped over the magnet coils and proceeded into the gap with the probe. After a mishap (fall) due to my Fermilab-issued steel-toed "safety" shoes, I again proceeded into the gap sans shoes.

We needed a non-magnetic stand to position the probe midway in the gap, so my companions scrounged around for pieces of scrap wood or boxes without nails. Finally someone found a 50-cm long, 30-cm high section of aluminum I-beam. It took about 15 seconds to wrestle it through the fringe field. With the probe in place, I exited the magnet slowly so as to minimize whole-body eddy current effects.

Robert Shafer, Fermilab (retired)

Letters can be submitted via letters@symmetrymagazine.org