haps to emulate a volcanic eruption, would change the hydrological cycle and weather patterns in ways that would be simply unacceptable, even if they were doable. The cost and viability of any such proposals are other major issues, but in my view, they are overwhelmed by the ethical considerations.

Kevin E. Trenberth
(trenbert@ucar.edu)
National Center for Atmospheric Research
Boulder, Colorado

Ode to the Large Hadron Collider

Deep beneath the farms of France, physics takes a massive chance.
Europe's best and brightest teams focus up their narrow beams,
While gangs of dedicated geeks tighten tubes and look for leaks.
Giant magnets, so it's said, accelerate a proton thread
Until it hits the speed of light—well, maybe not exactly quite—
But anyhow, extremely fast. The speed of light is unsurpassed.

When protons have sufficient spin, they're whacked against their proton kin,
Spun from an opposing strand, swirled around from Switzerland,
All aligned with great precision, smashed together in collision.
Then, whatever fragments found, fathom matters most profound:
Like, What are mass and gravity, space and supersymmetry?
Dimensions deep and matter dark? What riddles lurk within the quark?
Is it worth the money spent on this vast experiment?
Other questions, not as thrilling, strangely garner equal billing:

What if all this, just perhaps, precipitates a mass collapse?
Could the apparatus heave a flying hadron through Geneva?
Could quantum spin and somersaults zap the gold in Zurich's vaults?
Sour the milk and spook the pigs? Just what if the hunt for Higgs
Tolls our final self-destruction or invites an alien abduction?
What would Isaac Newton think? Would he envision Earth might sink?
Humanity, prosperity, down a singularity?

For this we've waited many years to have a hadron smash,
Boldly probing new frontiers and spending piles of cash.
Scientists seem unconcerned, proudly listing all they've learned,
While their rivals gather traction in equal and opposing action.

Alas, no protons whizz around, and silent is the ring.
No hadrons thread the underground, at least until the spring.
Some free advice on this device, while disappointment lingers:
Find that glitch and throw the switch! Be sure and cross your fingers!

Andrew Croal
(acroal@cogeco.ca)
Toronto, Canada

University of Tsukuba defends professor's dismissal

Administrators at the University of Tsukuba have read the letter from 11 physicists who criticized the university's disciplinary action against Teruji Cho (PHYSICS TODAY, December 2008, page 10). We are concerned that the writers did so without a full grasp of the incident and the procedure followed by the university. The university's website has posted the official investigation report in Japanese (http://www.tsukuba.ac.jp/public/press/080306press_4.pdf) and an abridged English translation (http://www.tsukuba.ac.jp/english/public/pressrelease/p_report/report_d.pdf).

The University of Tsukuba has an established system of handling incidents of research-related misconduct under its Scientific Ethics and Research Conduct Committee. SERCC sets up an investigation committee that examines the details of the case and reports its findings to SERCC. If SERCC concludes that misconduct was perpetrated, the disciplinary committee of the university's Education and Research Council determines the disciplinary measures.

For the incident involving Cho and three assistant professors, the procedure was strictly followed. The investigation committee, whose members are listed in the online documents, included three distinguished plasma physicists from outside the university.

After a year of investigation between April 2007 and March 2008, SERCC concluded that Cho and his three coworkers falsified raw data to make two figures for their paper published in *Physical Review Letters (PRL)*[1] and that the falsification constitutes scientific misconduct. SERCC based its conclusions on an in-depth examination of documentary evidence, including e-mails and intermediate analyses, that it acquired from the students who filed the misconduct complaint and from Cho and coworkers. SERCC reported its conclusions to the president of the university on 4 March 2008 and advised that the authors retract the paper. The president acted on those conclusions and advice. Subsequently, the disciplinary committee determined that Cho should be dismissed from the faculty, and that action was carried out on 27 August 2008. The committee also decided that the three assistant professors be suspended from their positions for one to four months; that was put into effect on 16 October 2008.

During the investigation, the university, through SERCC and the investigation committee, took every measure to guarantee that Cho and the three coworkers had opportunities to present their views and rebuttals in written form. Those rebuttals, however, failed to convince SERCC to reverse its conclusions.

In the incident, the falsification occurred during the process of making two figures from raw data. Since access to the raw data was confined to Cho's group, uncovering such a falsification would have been extremely difficult if students from the group had not raised the issue. Besides Cho and the suspended professors, 11 University of Tsukuba faculty members are listed as coauthors of the *PRL* paper. They are experts on the GAMMA-10 tandem mirror and longtime collaborators with Cho. However, even they could not detect the falsification. After the investigation, 23 coauthors, including 1 of the 3 suspended assistant professors, have asked the *PRL* editorial office to withdraw their names from the paper.

The incident has been deeply troubling for the university, since the mirror fusion research led by Cho had been an important component of our scientific activities for many years. We therefore made every effort to follow the due process of investigation and make sure our decisions were based on fact. The findings left us no choice but to take the action against Cho and three coworkers. The university's investigation was open, and the results have been made public. We invite our colleagues in the international academic community to read the reports so they can understand the reasons for our action.

Reference

1. T. Cho et al., *Phys. Rev. Lett.* **97**, 055001 (2006).

Hiroshi Mizubayashi
(mizubayashi@hq.tsukuba.ac.jp)
University of Tsukuba
Tsukuba, Japan

Several sports have varying surfaces

The Quick Study items are thoroughly enjoyable and a great addition to the magazine. That includes "Tennis Physics, Anyone?" by Rodney Cross (PHYSICS TODAY, September 2008, page 84).

Unfortunately, Cross begins his review of tennis physics by saying, "Tennis is unique among major sports in that it is played on a wide variety of surfaces." One can also correctly argue the exact opposite.

Baseball and American football use both real grass and artificial turf at different stadiums. Baseball goes further in having dirt, in addition to grass or turf, on the same playing field—not including the bases, which are also in play.

Each hole on a golf course changes from virtually no surface—when the ball is held above it by a tee—to the short grass of the fairway and longer grass in the rough to extremely short grass on the green. Most courses also include sand traps and water hazards. Golfers have a specialized club, the sand wedge, to play out of sand traps, and water is such a different "surface" that most players don't even try to hit out of it.

NASCAR drivers and other major motorsports participants spend days before a race testing the responses of their cars on the surface of the particular track they'll be driving on next.

Even something as supposedly standard as a basketball court can differ from arena to arena. The old Boston Garden was infamous for the pits and dead zones in its parquet flooring; Celtics players familiar with the uneven surface used it to their advantage.

Hockey rinks change the nature of their surfaces during play. At the beginning of a period, the ice is clean, solid, and smooth; by the end of a period, it is chewed up. That's the purpose of a Zamboni, after all—to return the ice to its formerly pristine state.

Some sports—track and field or soccer, for example—might attempt to regulate their surfaces, but even then there will be noticeable differences from one locale to the next.

One could perhaps argue that tennis has the widest range of surface properties among major sports. But the truth is that across sporting events, a variety of surfaces is the rule, not the exception.

Christopher Sirola
(christopher.sirola@usm.edu)
University of Southern Mississippi
Hattiesburg

Dental amalgam and mercury myths

In their Quick Study on dental composites (PHYSICS TODAY, April 2008, page 82), the authors make the following statement: "Patients and practitioners have registered an aversion to mercury based on perceived health risks and real environmental concerns."

The "aversion" is based on the unfounded suspicion that mercury poisoning can arise from dental amalgams. A popular myth-debunking website offers the following:

> More than half a century ago, Orson Welles panicked his radio audience by reporting that Martians had invaded New Jersey. On December 23, 1990, CBS-TV's "60 Minutes" achieved a similar effect by announcing that toxins have invaded the American mouth. There was, however, a big difference. Welles' broadcast was intended to be entertaining. The "60 Minutes" broadcast, narrated by veteran reporter Morley Safer, was intended to alarm—to persuade its audience that the mercury in dental fillings is a poison. It was the most irresponsible report on a health topic ever broadcast on network television.[1]

Reference

1. S. Barrett, "The 'Mercury Toxicity' Scam: How Anti-Amalgamists Swindle People" (2006), http://www.quackwatch.com/01QuackeryRelatedTopics/mercury.html.

Berol Robinson
(berol.robinson@drbsoftware.com)
Brookline, Massachusetts

Stansbury, Bowman, and Newman reply: The amalgam health risks were described as "perceived" while the environmental risks were termed "real" to convey that the former lacks credible scientific evidence to support health concerns for dental patients receiving amalgam restorations. We are in full agreement with Berol Robinson in that regard. There is a legitimate health concern for dentists and their clinical and clerical staffs who potentially are exposed to chronic low levels of mercury vapor. However, we teach our dental students the precautions necessary to mitigate that exposure and that as dentists they can reassure their patients that an amalgam filling poses no significant health risk.

Jeffrey W. Stansbury
Christopher N. Bowman
Sheldon M. Newman
University of Colorado Denver

An inner ear magneto-receptor?

After reading Sönke Johnsen and Ken Lohmann's very thorough article on magnetoreception in animals (PHYSICS TODAY, March 2008, page 29), I cannot help but think that they may have overlooked one of the most exquisitely sensitive electrical sensors in mammals and perhaps in other animals as well. This sensor is the inner ear, which is insulated to a large degree from the rest of the body. Of particular interest are the semicircular canals, located on three axes and containing a conductive fluid. Although in humans the main function of these truncated loops is balance, in the lower animals they may be usable for navigation as well. If you move a conductive truncated loop through a magnetic field, you will generate an electrical current; it follows that the semicircular canals in movement might yield the location in a magnetic field.

Alan H. Purdy
(ahpurdy@nethere.com)
San Marcos, California

Johnsen and Lohmann reply: We agree with Mr. Purdy that the conductivity and triaxial orientation of the semicircular canals, combined with their vestibular function, make them intriguing suspects in the search for a magnetoreceptive organ. In fact, we proposed exactly that hypothesis in a previous article.[1] It definitely merits further investigation, although so far there is no evidence that the inner ear plays a role in magnetoreception.

Reference

1. S. Johnsen, K. J. Lohmann, *Nat. Rev. Neurosci.* **6**, 703 (2005).

Sönke Johnsen
(sjohnsen@duke.edu)
Duke University
Durham, North Carolina
Kenneth J. Lohmann
University of North Carolina at Chapel Hill ■