

signal to background

Sonic Boooooom shakes art world; Neanderthal crashes SNOLAB; China dreams deep; L'Aquila science center appeals for donations; kids reach out to kids after earthquake; letters.



Photo courtesy of Nelly Ben Hayoun

Hundreds splash through an artist's neutrino tunnel

French artist Nelly Ben Hayoun is no stranger to science. Her portfolio of work includes explorations of brain plasticity in snails, a scheme for generating dark matter in a kitchen sink and

a recliner in which people can experience the first 10 minutes of a Russian Soyuz rocket's lift-off sequence.

She may have outdone herself with her latest project, though. For *Super K Sonic Boooooom* (top photo), she constructed a flashy version of Japan's Super-Kamiokande neutrino observatory in London's Shunt Lounge, a labyrinth of abandoned railway tunnels beneath the London Bridge train station that's been turned into an underground performance space.

"I'm really obsessed with large-scale scientific experiments," Hayoun says. "The project was born from the idea of giving everyone access to the Super-K detector."

The installation consisted of a 49-foot-long channel filled with nearly 4000 gallons of water and lined with 600 bal-

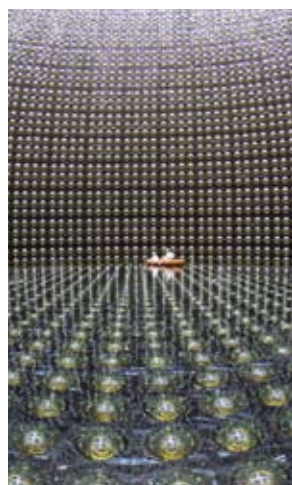
loons representing Super-K's thousands of photomultiplier tubes (left photo). Visitors rowed through two at a time in a small dinghy, accompanied by physicists from Imperial College London and Queen Mary, University of London. Every 10 minutes, loud booms and bright flashes of blue light simulated interactions between incoming neutrinos and the atoms of water—the events that the real Super-K is designed to detect.

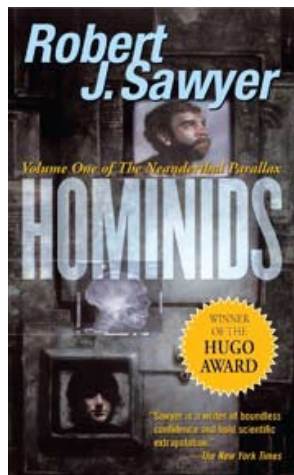
There was no question about the installation's popularity. According to physicist Francesca di Lodovico of Queen Mary, one of the presenters at *Super K Sonic Boooooom*, people lined up for more than an hour to go through the faux observatory. Fifteen hundred attended during an 11-day run in November.

"It was really amazing," she says.

Nicholas Bock

Photo: Super-Kamiokande





Underground, good stories are found

Prior to 2002, very few non-scientists knew that Sudbury Neutrino Observatory laboratory, or SNOLAB, existed. But these days, the laboratory must regularly turn away people who want to visit, even though entering the underground facility requires a long ride down a mine shaft, a sanitation shower, and a full body suit to keep contaminants out of the lab.

SNOLAB rests in the Vale Inco Creighton nickel mine in Sudbury, Ontario. Two kilometers below the surface, it is the deepest underground laboratory in the world.

It was the novel *Hominids*, by Robert J. Sawyer, that turned the lab into such a desirable destination.

In Sawyer's book, there exists a universe parallel to our own, where Earth is much the same except that Neanderthals survived and humans died out. The Neanderthals conduct quantum computing experiments in the location equivalent to SNOLAB for the same reasons that humans picked the mine for neutrino experiments: In addition to protection from cosmic rays, the mine has significantly lower levels of background radiation, which can interfere with highly sensitive experiments, than most underground sites. The novel begins with a Neanderthal passing through a portal into our world, shattering a 30-foot-wide acrylic sphere that was part of the lab's first neutrino experiment.

Sawyer says he grounds all of his work in scientific fact, and that using a real laboratory location adds to a book's credibility. "SNOLAB gave me all kinds of opportunities," Sawyer says. "It's a fascinating place to write about."

His novel *FastForward*, which takes place at the Large Hadron Collider, has been adapted for television. Other novels feature TRIUMF, Canada's national laboratory for nuclear and particle physics research, and the Perimeter Institute for Theoretical Physics.

Hominids has been published in 15 languages and won the Hugo Award, the world's top science-fiction honor. "It gives us a welcome opportunity to discuss the science we're doing," SNOLAB Director Nigel Smith says, "and to help people try and understand the extreme efforts we're going through to do it."

Calla Cofield

World's deepest lab proposed in China

Chinese scientists have carved out a space in the heart of a mountain where a search for dark matter will soon begin. It's just the first taste of what they hope to do there: Create the world's largest, deepest underground laboratory.

The China JinPing Deep Underground Laboratory, or CJPL, would piggyback on a giant hydroelectric project that's under construction in a rugged, remote area of Sichuan province. Engineers are building two dams and drilling tunnels to carry road traffic and water from the Yalong River 17 kilometers straight through Jinping Mountain.

The project's two traffic tunnels caught the attention of physicists, because they offer easy access to the mountain's core. Most of the 2513 meters of overlying rock is marble, whose low level of natural radioactivity would provide ideal shielding for physics experiments. If completed, this lab would surpass the proposed 2400-meter-deep DUSEL laboratory in the United States and the current record-holder, Canada's SNOLAB, which goes down two kilometers. Chinese researchers say the lab would be open to scientists from around the world.

Proponents acknowledge that the giant lab is far from a done deal. The project will need approval from the National Development and Reform Commission, a process that could take several years, says Hesheng Chen, director of the Institute of High Energy Physics in Beijing.

In the meantime, Tsinghua University scientists have excavated an initial lab space, six by six by 40 meters, with the aid of \$4 million in US dollars from the university and the Chinese Ministry of Education and help from the Ertan Hydropower Development Company. They are installing detectors there and plan to start searching for dark matter by mid-2010. And they plan to apply for funding to carry out a bigger dark-matter experiment, as well as to study the feasibility of excavating the "huge cavity"—size yet to be determined—that would house the deep lab of their dreams.

Glennnda Chui



Photo: Hesheng Chen



Photos courtesy of www.6aprile2009.it

Plans for science center in quake-damaged L'Aquila

Many towns have public science centers. But it's difficult to think of one so close to the geographic, spiritual, and cultural heart of a city as one being planned in L'Aquila, Italy.

The 75-acre Parco del Sole (Park of the Sun) science center will sit at the center of L'Aquila in a park filled with towering trees and wide lawns. Next door stands a symbol of the medieval city, the church of Santa Maria di Collemaggio, whose roof partially collapsed in an earthquake that ravaged the town and the region last April. A destination for pilgrims, it housed the body of Pope Celestine V and is considered by many to be the site of the first Papal Jubilee.

Tying the two together, a statue with Pope John Paul II's

declaration, "Science and faith are both God's gifts," would stand at the Parco del Sole entrance.

A small planetarium and exhibit hall would showcase the work of nearby Gran Sasso National Laboratory, the world's biggest underground laboratory and a partner in the project.

The plan grew out of a suggestion by town leaders who appreciated Gran Sasso's long history of science outreach. Still, the offer caught then-laboratory director Eugenio Coccia off guard. "I was impressed that just by a spiritual center could be a scientific center like this park," he said from his University of Rome office.

Planning for the project was already under way when the April 6 earthquake struck. More than 60,000 people lost their homes, and much of the daily

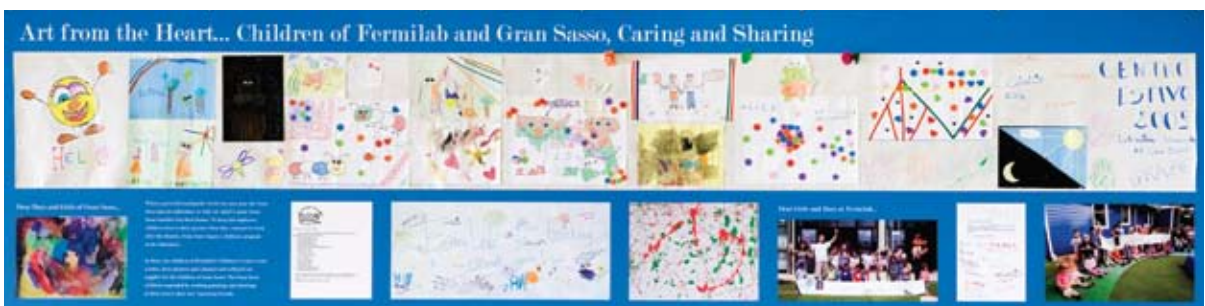
business of the town has had to relocate to Rome and other places.

"So this project is going on slowly now," Coccia says, "but I am confident that it is so good that it will go on."

The National Italian American Foundation is collecting donations to move the project forward. The project Web site, www.parcodelsole.org, has this message: "Completion of this project will symbolize a renaissance for the town as well as a scientific inspiration for future generations."

Tona Kunz

The crayon connection: A lot of families lost their homes when an April 6 earthquake hit near Italy's Gran Sasso National Laboratory. Kids at the Fermilab daycare center collected art supplies and sent them to the kids of Gran Sasso, along with drawings and a letter of support. They received heartfelt thank-you drawings in return.



Don't make us guess

In the latest *symmetry*, I read that, "The two-mile-long linear accelerator at SLAC National Accelerator Laboratory is the second-longest building in the world." OK. I give up. You opened the question and gave no answer: What is the longest building in the world now?

John Michael Williams, Silicon Valley Technical Institute

The editors respond:

We didn't mean to tease! When Beijing International Airport Terminal 3 opened in 2008, it took the title of longest building in the world. It is 3.25 km long, edging out the SLAC klystron gallery at a "mere" 3073 meters. Visiting the SLAC klystron gallery is an item on our physics life list (Aug 07).

Shining Cherenkov's light on Vavilov

The article on Cherenkov light in "Explain it in 60 seconds" (Aug 09) provides a concise and helpful explanation of Cherenkov radiation to readers.

Of course, the Cherenkov radiation is named to honor the Russian physicist Pavel Alekseyevich Cherenkov and this term is commonly used by the physics community. But Vitaly Ginzburg, the Russian physicist who died recently, always called the radiation Vavilov-Cherenkov radiation to give credit to the other co-discoverer, Sergei Ivanovich Vavilov.

Ginzburg introduced the physics of Vavilov-Cherenkov radiation in his book, *About Science, Myself and Others*, and he wrote a short biography of Vavilov in another book *The Physics of a Lifetime: Reflections on the Problems and Personalities of 20th Century Physics*.

The 1958 Nobel Prize in physics was awarded to Cherenkov, Il'ja Mikhailovich Frank, and Igor Yevgenyevich Tamm "for the discovery and the interpretation of the Cherenkov effect". It would be not acceptable for Ginzburg that the Nobel committee did not include Vavilov's name in the headline of the announcement. Vavilov died in 1951, and Nobel Prizes are not given to dead persons.

It is worthy of mentioning that the relationship between Vavilov and Cherenkov was teacher-student. In 1933 Vavilov proposed the PhD topic "The luminescence of the uranyl salt solutions under the influence of hard gamma radiation" to Cherenkov. As a consequence of Cherenkov's hard work, their study turned out to be two papers published in 1934. One paper was on experimental results by Cherenkov, and the other was by Vavilov in which he proposed, correctly, that the origin of the new phenomenon was fast electrons.

Min-Liang Wong, National Chung-Hsing University, Taiwan

An eye for type

Could you please tell me the name of the font family that you use for the print edition of *symmetry*? From what I can tell, the slanted terminals on the c, e, and s and the forms of many of the numbers don't match Helvetica or Arial. It's a very striking font; it reminds me of the old NYC subway signage. I would guess that it's based on Akzidenz Grotesk or one of its derivatives such as Standard or Basic Commercial. Am I right?

Although it may seem unorthodox for a scientist to say, I have long observed that design is an important element of scientific communication. Many of the more successful experimental particle physicists that I know habitually take extra care in preparing their presentations and graphics from the standpoint of aesthetics and clarity. Obviously, there are some very successful people who are a total mess, but there is in my experience a correlation between attention to design issues in presentations and personal success. Akzidenz is probably a good font for presentations. It's clean, easy to read at a distance, and distinctive.

Matthew Moulson, INFN Laboratori Nazionali di Frascati

The editors respond:

We are often asked about the typeface we use in *symmetry*. As Matt correctly guesses, it is indeed Akzidenz Grotesk. The typeface was created in 1896, but we feel it still looks modern and retains all its good qualities for print that made it popular a century ago. The more recent typeface Helvetica is based on it, and both Univers and Folio take inspiration from it.

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