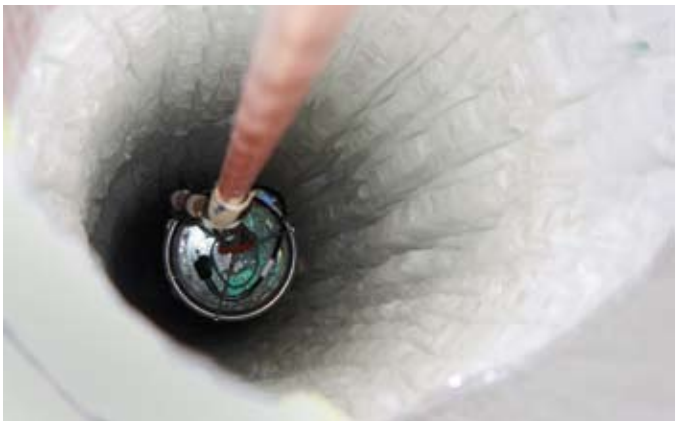
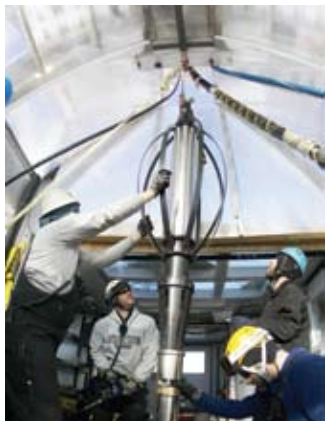
signal to background

Dusty ice helps climate scientists; SLAC's red phone "brring brrings" a warning; teens do fresh science with recycled gear; a goofy race around the bottom of the world; what wine goes with elephant?; a sharp eye for castoffs; correction.

Photo: Jim Haugen





Photos: Delia Tosi

Ancient winds blow anew at IceCube

Scientists studying global warming hope to use dust buried in Antarctic ice formations to determine how fast the winds blew as many as 90,000 years ago.

The resulting paleowind record will be the most comprehensive one to date, says physicist Ryan Bay of the University of California, Berkeley, who heads the study. Scientists hope the data will help them understand how wind affects the distribution of ice in glaciers, ocean circulation, and the ocean's absorption of carbon dioxide.

The study piggybacks on research at the IceCube Neutrino Observatory, where scientists have drilled 79 holes two kilometers deep into the ice. They're lowering strings of detectors into those holes to look for signs of neutrinos interacting with the ice. Bay and his team lowered a laser probe into six of those holes to measure trapped dust and bubbles that can interfere with the neutrino measurements.

Bay knew from earlier experiments that he could use this same data to measure sastrugi, rippling ice formations up to a meter high that trap dust in distinctive patterns. Because they get taller as the wind blows harder, they're a good gauge of wind speed at the time they formed. Ancient sastrugi are normally hard to study because they're buried deep under new layers of ice. The depth and regular spacing of the IceCube holes allowed Bay to sample a much larger volume of ice in much less time than conventional ice coring would allow.

"We have a different perspective that no one has ever had before, which allows us to see the big picture rather well," Bay says. Results are preliminary, but so far he's finding that in periods of increasing carbon dioxide, winds were calmer at the South Pole.

Bay says scientists base most of their current understanding of past wind speed on inference. The new study will give them concrete data to plug into climate models.

Chris Knight

Photo: Brad Plummer, SLAC

Holy beam line! The red phone is ringing

When a villain threatened Gotham City, Commissioner Gordon picked up a bright red phone to call Batman. During the Cold War, a Moscow-to-Washington "red phone" served as a hotline to prevent nuclear attacks.

Now SLAC National Accelerator Laboratory has its own red phone to avert the types of crises found in accelerator physics—things such as poor beam quality and mechanical troubles. While not as dramatic as the Joker terrorizing Gotham City, these situations do require immediate warnings and rapid adjustments to save valuable time, money, and data.

The phone line runs between two control rooms in two separate buildings. One controls the Linac Coherent Light Source, the world's most powerful X-ray laser; the other controls one of its primary experiments, known as SXR for Soft X-ray Material Instrument, which begins commissioning in May.

"An experiment is only as strong as its communication link," says Bill Schlotter, an SXR instrument scientist. When the red phone rings, "the call is not just for the person on the line, but for the rest of the SXR control room, too." No dialing is necessary; in true hotline tradition, a scientist need only lift the receiver in one control room to establish a direct connection to the other.

When they hear the red phone's distinctive, old-fashioned "brring brring," Schlotter says, "everyone will know to pay attention."

Lauren Knoche

High schoolers catch some (cosmic) rays

Ben Nachman and several friends climbed out on the roof of Westside High School in Omaha, Nebraska, hauling a tangle of wires and what resembled a car-top luggage carrier. The high school juniors weren't pulling some elaborate prank. They were looking for a message hurled from the roiling heart of a distant galaxy.

"It was an ordeal," Nachman says of the frigid weekend adventure three years ago. "But it was awesome!"

Nachman and his friends were installing a cosmic-ray detector as a part of CROP, the Cosmic Ray Observatory Project.

University of Nebraska physics Professor Greg Snow and colleague Dan Claes dreamed up the project in the mid-nineties, when they learned the University of Chicago's Chicago Air Shower Array experiment was ending. The idea was to "recycle" the experiment's cosmic-ray detectors by giving them to high schools. The detectors were free, courtesy of the University of Chicago. Snow just had to pick them up from a remote Army base in the Utah desert.

Since then, more than 25 Nebraska schools have used the detectors as a dramatic teaching tool that offers students a taste of hands-on physics research.

"It's real science; we're collecting real data," says John Rogers, a physics teacher at Westside.

Jim Rynearson, who teaches at Lincoln High in Lincoln, says his students do university-level research: "They're asking questions about cosmic rays that nobody has the answers to. You can't go look it up somewhere."

Nachman, now a Cornell University sophomore, went from working with CROP to working with experiments at CERN's Large Hadron Collider. He says he hopes CROP will continue to grow.

"It definitely felt like we were doing something important," Nachman says. "I'm still interested in doing experimental physics, so it must have paid off."

Andrea Mustain

Photo: Ben Nachman

From left: Anfei Li, Ben Nachman, and David Lynch brave the wind and cold to install a weather-resistant cover for a cosmic-ray detector on the roof of their high school in Nebraska.








Photos: Nathan Whitehorn and Laura Gladstone

Around the world in eight goofy minutes

Many a college student has built a room around a sturdy coffee table made from a cast-off wooden cable spool.

But when two University of Wisconsin graduate students went to the South Pole they found spools put to a different use: as chariot wheels.

The chariot joined a steam-breathing dragon, a fake feast on a flatbed truck, and a lot of people in zany costumes in the December 26 Race Around the World. Since it circled the geographical and ceremonial South Pole, the two-lap course was just 2.4 miles long.

The race and parade are an annual tradition among the roughly 250 researchers and support workers at Amundsen-Scott South Pole Station. About half participate while the rest line the route to heckle and cheer the mish-mash floats. Many wear silly costumes.

"It's a community spirit that arises out of extreme isolation," says Wisconsin grad student Laura Gladstone. She was at the pole to work on IceCube, an experiment that's deploying an array of detectors deep beneath the ice to study neutrinos.

IceCube drillers built the steam-puffing dragon and the chariot. The dragon towed an improvised hot tub warmed by a heater that normally boils water for the ice drills. The cable from the chariot's 8-foot-diameter wooden-spool wheels is now dangling detectors beneath the ice.

Gladstone, who guesses the "balmy summer temperature" was between minus 5 and minus 15 degrees Fahrenheit, jogged alongside the floats in an insulated windbreaker, hat, gloves, long underwear, hiking boots, and wind-protection running pants. She says it took 36 minutes and felt like running in sand.

Fellow grad student Nathan Whitehorn whipped around the course in about eight minutes on a snowmobile while towing researcher Emanuel Jacobi on a surfboard made from a packing crate.

"I'm not sure it was as fun as Christmas with my family," Gladstone says, "but it was fun."

Tona Kunz

A little wine with that physics?

Friends and colleagues of particle physicist Bill Wisniewski know him as a wine connoisseur. When Wisniewski announced that he was stepping down from the BaBar experiment's management team, it only made sense that his farewell party would feature his favorite beverage—but with a distinctly BaBarian spin.

Wisniewski's enthusiasm for wine began 30 years ago, when he moved to California to work at SLAC National Accelerator Laboratory. Two or three times per week, he would meet with colleagues over wine and cheese to discuss the construction and commissioning of the MARK III particle detector. Wisniewski became the resident wine expert. Later, working on the BaBar experiment at SLAC, he was often asked to select wines for off-site collaboration meetings. He estimates that his personal wine collection has held as many as 1000 bottles at a time.

As his farewell party approached, fellow BaBar scientists casually asked Wisniewski what his favorite international wines were and began scouring their home countries for highly prized bottles. When the big day arrived, Wisniewski says he was surprised and genuinely touched to receive wines originating from most of the 12 countries represented in the collaboration.

Guests sipped whites from Europe, Asia, and North America, and reds from the Middle East and Europe.

A few bottles were bestowed on Wisniewski for his personal collection, including a bottle of Chateau Rayas 1999 Chateauneuf du Pape Reserve. It was from the last vintage made by the winery's founder, obtained after an extensive search by a BaBar member in France.

Wisniewski says the wine is famous because its details can change from season to season, yet it never seems to have a bad year—qualities it obtains from the many different grapes that go into it. He plans to drink it on his 65th birthday.

Calla Cofield

Photos: Donna Hernandez

Liz Buckley-Geer with the 850-pound mounting frame scavenged from Kitt Peak

Photo: Reidar Hahn, Fermilab

A recycling tale that's hard to top

There's luck, and then there is LUCK.

Brenna Flaugher has the latter.

During a trip to Kitt Peak National Observatory in Arizona to search for cosmic signs of dark energy, Flaugher took a break to walk around with fellow Fermilab astrophysicists Tom Diehl and Liz Buckley-Geer. Suddenly she pointed excitedly.

"I know what that is," she said. "I want that."

Halfway down the hill, partly hidden beneath a tree, lay a metal frame the size of a dune buggy. Not just any frame—the exact 850-pound frame Flaugher and Diehl needed to mount the world's largest digital camera onto a telescope.

This Dark Energy Camera will be mounted on the four-meter Blanco telescope in Chile, allowing scientists to take pictures of roughly 300 million galaxies as they existed when the universe was only a few billion years old.

The Blanco telescope happens to have a northern twin, the Mayall telescope at Kitt Peak. Flaugher had spied the Mayall's discarded mounting frame.

A little negotiation, a bit of planning to arrange shipping, and a little elbow grease to remove rust, and the duo had the perfectly useable frame sitting at Fermilab in Illinois, where the camera is under construction. Their scavenged part saved the experiment a couple of thousand dollars.

Tona Kunz

correction

He plays one in the movies

A story in our Dec 09 issue incorrectly described Mark Van Slyke as commander of the Midwest Garrison of the 501st Legion: Vader's Fist, an organization of Star Wars costuming enthusiasts that was involved in the filming of a Star Wars fan flick at Fermilab. Although Van Slyke belongs to the garrison, he's not the commander; but he does play one in the film.