Fermilab Today

Friday, August 18, 2006

Calendar

Friday, August 18

9:00 a.m. Hadron Collider Physics Summer School Open Lecture - Auditorium
Speaker: D. Green, Fermilab
Title: First Years LHC Experiment Program - 2

11:30 a.m. Hadron Collider Physics Summer School Open Lecture - Auditorium
Speaker: C. Hill, Fermilab
Title: Explorations of the TeV Scale

3:30 p.m. DIRECTOR'S COFFEE BREAK - 2nd Flr X-over

4:00 p.m. Joint Experimental Theoretical Physics Seminar - 1 West
Speaker: U. Baur, State University of New York, Buffalo
Title: Precision Calculations for the ILC and LHC

8:00 p.m. Fermilab International Film Society - *Aparajito* (The Unvanquished) - Auditorium
Tickets: Adults $5

Saturday, August 19

8:00 p.m. Funkadesi - Auditorium
Tickets: $17/$9

Monday, August 14

PARTICLE ASTROPHYSICS SEMINARS WILL RESUME IN THE FALL

3:30 p.m. Director's Coffee Break - 2nd floor crossover

4:00 p.m. All Experimenters' Meeting - Curia II
Special Topic: CMS Pixels in Test Beam

Click here for a full calendar with links to additional information.

Playing dark matter billiards in *Physical Review Letters*

Fermilab physicists Marcela Carena, Dan Hooper and Peter Skands had their research featured on the cover of the August 4 issue of the journal Physical Review Letters*. In the journal article they explain how Fermilab's hunt for the Higgs particle, and the hunt for the stuff that makes up dark matter, can be closely related. FT caught up with Skands to find out how it works....*

Cover image, August 4 issue of *Physical Review Letters.* (Click image to see the issue.)

The story starts with dark matter. Researchers suspect a bunch of tiny, relatively innocuous particles called "neutralinos" make up dark matter, but nobody knows for sure. "The first question is," said Skands, "if dark matter is made of neutralinos, how could we actually see it?" That's one of the problems that Fermilab's Cryogenic Dark Matter Search tries to solve.

At CDMS, the answer might resemble a subatomic game of billiards. Supposedly, neutralinos are all around us, zipping through space at hundreds of kilometers per second. As they move through CDMS's sensitive apparatus, neutralinos

ILC NewsLine

Fermilab's new clean room

A rail system runs under the entire clean room, where the cavities rest and await assembly.

Earlier this summer, Fermilab's Cryomodule Assembly Facility gained a brand new state-of-the-art clean room. Just like the delight you get from the smell of a brand new car, Fermilab's Cryomodule Assembly Facility literally has that pristine, perfectly clean look and feel to it. And the goal is to keep it that way. "The trick is to keep your room as clean as possible," said Fermilab's Tug Arkan, a cryomodule production engineer.

Designed for stringing eight superconducting radio frequency cavities together for International Linear Collider R&D, the 2500-square-foot clean room is divided into three sections to accommodate each stage of the intensive assembly process. Rated according to the number of particles per square foot, Fermilab's clean room contains a Class 1000, Class 100 and Class 10 areas. The first section, a Class 1000 Ante Clean Room, is a prep room where the cavities and other peripheral parts get submerged in ultrasonic baths

Weather

Chance of Showers **80º/69º**

Extended Forecast

Weather at Fermilab

Current Security Status

Secon Level 3

Wilson Hall Cafe

Friday, August 18

-Old Fashioned Ham & Bean
-Black & Blue Cheese Burger
-Summer Herb Cod
-Stuffed Manicotti
-Roasted Veggie & Provolone Panini
-Assorted Slice Pizza
-Baked Potato

Upcoming Menu

Chez Leon

Wednesday, August 23

-New Potato, Kielbasa and Gruyere Salad
-Strawberry Shortcakes

Thursday, August 24

-Roasted Beet and Citrus Salad
-Grilled Swordfish and Vegetable Kabobs
-Lemon Scented Rice
-Plum and Marzipan Strudel

Chez Leon Menu

Call x4598 to make your reservation.

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Info

can emit a Higgs boson, which, in turn, strikes quarks inside atomic nuclei nearby. "It essentially kicks the nucleus," said Skands. Physicists can calculate the number of kicked nuclei that should be triggered by the presence of neutralinos, and check the prediction against the actual number of nuclei that get knocked around at CDMS.

This method of hunting for neutralinos has been going on at CDMS for a while. So what's new in the paper by Carena, Hooper and Skands? Since the billiard phenomenon requires a Higgs boson, the search for neutralinos in CDMS is also an indirect search for Higgs. "We correlate what CDMS does or does not see, with what may or may not be observed in direct Higgs searches at the Tevatron," said Skands.

It's elegant, but what are the actual chances of seeing the Higgs contribution at CDMS? The up and down quarks in the protons and neutrons that make up an atom's nucleus interact very weakly with the Higgs boson--if that was all there was to it, we would have to wait a very, very long time to see protons and neutrons getting kicked by Higgs particles. Fortunately, the laws of quantum physics allow for other quarks to be inside the protons and neutrons as well, even if only for a split second. "Heavier particles, like strange quarks and even bottom quarks, also appear inside the proton, as quantum fluctuations," said Skands. The interactions between the Higgs and strange and bottom quarks could be so strong that they overcome the rarity of the quark quantum fluctuations--making the "kicking proton" phenomenon

to reduce the particle count to less than 10 – a critical step before entering the next stage of the assembly process. With less than 10 particles per square foot, the Class 10 Cavity String Assembly Area is a cleanaholic's dream. Inside this area, technicians will assemble the dressed cavities to form a string. "If required, with two shifts running per day, one string of eight cavities per week could be assembled in this infrastructure for a small scale mass production," Arkan said.

Read More

Photo of the Day

It's that darn hawk again: Employee Rich Bergquist snapped this picture while FESS mechanics were changing the pond pump at the CDF pit. Click the image to see where Bergquist first spotted the hawk.

Announcements

***Symmetry* delivery problem**

The new issue of *symmetry* magazine was mailed to employees yesterday. Due to a glitch in the distribution file, some mail-stop numbers do not correspond with the correct employee names. The symmetry staff is aware of the problem and will correct the employee mail-stop numbers for next month's issue. If your mail stop received a copy for a person not at the location, please forward the copy, looking up the correct mail-stop number in the Fermilab online directory.

Fermilab Today is online at: http://www.fnal.gov/today/

Send comments and suggestions to today@fnal.gov

Hurricane Relief Page

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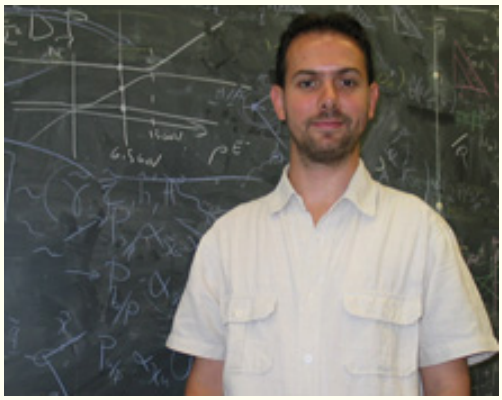
observable to CDMS.

Skands says that the recent article focused on Higgs bosons in so-called supersymmetric theories, which could be created within the energy-realm of the Tevatron. "I think we have shown that a signal in CDMS in the near future would be extremely exciting to our colleagues at the Tevatron," said Skands. "This is a great example of collaboration between the theoretical physics and astrophysics groups at Fermilab," added Carena.
--Siri Steiner



Peter Skands jotted the mechanism by which a Higgs is emitted from a neutralino to kick an atom's nucleus (blue squiggles on the blackboard).

In the News

Popular Science, August, 2006:

Can This Machine Rescue Physics?

When the world's biggest particle accelerator, the Large Hadron Collider, opens next year near Geneva, the focal point of the high-energy physics world will shift from U.S. soil for the first time in half a century. Bummer, indeed. But America's brightest are busy devising a rescue plan. In April, a panel of U.S. science and business leaders presented a bold comeback strategy: to build the biggest particle accelerator yet, a multibillion-dollar, 19-mile-long piece of mega-machinery called the International

Hatha yoga classes

Join Fermilab's next 8-week session of Hatha yoga classes and see why this class is our most successful. The classes are held in the auditorium from noon to 1 p.m. on Tuesdays, August 22 through October 9. The cost for this session is $80.00. Registration can be made in the Recreation Office or, if using a credit card, by phone at x5427 or x2548. Membership to the Recreation Facility is not required.

Hadronic Shower Simulation Workshop

A hadronic showers workshop will take place at Fermilab from September 6 through 8. The workshop will focus on the understanding and simulation of hadronic showers in calorimeters, in shielding, in the atmosphere and the ocean. If you would like to participate, please register as soon as possible. There is no registration fee.

Blood drive

Mark your calendars; Fermilab's blood drive will be held on August 28 and 29 from 8:00 a.m. to 2:00 p.m. On August 28, the drive will be held in Wilson Hall's ground floor NE training room. On August 29, the drive will be held in the Industrial Center Building east ground floor (follow the signs). Appointments can be scheduled on the web or by calling Margie at x3411 or Lori x6615.

Professional development

New classes are always being added to the professional development schedule. For the most up-to-date course offerings, go to the web page.

Classifieds

New classified ads have been posted on

	Linear Collider (ILC) that can smash particles together at near light speed. **Read More**	Fermilab Today. **Upcoming Activities**