

Fermilab Today

Monday, October 23, 2006

Calendar

Monday, October 23

2:30 p.m. Particle Astrophysics Seminar

- Curia II

Speaker: C. Conroy, Princeton University
Title: Modeling Galaxy Clustering and the Build-Up of Stellar Mass Through Cosmic Time

3:30 p.m. DIRECTOR'S COFFEE

BREAK - 2nd Flr X-Over

4:00 p.m. All Experimenters' Meeting - Curia II

Special Topic: Recent Improvements in Antiproton Stacking

Tuesday, October 24

11:00 a.m. Computing Techniques Seminar - Racetrack (WH7XO)

Speaker: A. Robertson, IBM Linux Technology Center
Title: Open Source High-Availability Software on Linux

11:00 a.m. Academic Lecture Series - 1 West

Speaker: K. Ellis, Fermilab

Title: Course 1 - Introduction to QCD at Colliders: The Production of W, Z and Heavy Quarks at Colliders

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

4:00 p.m. Accelerator Physics and Technology Seminar - 1 West

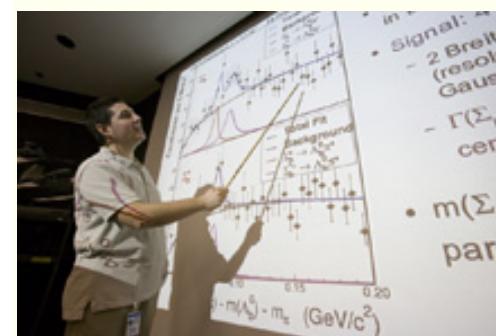
Speaker: V. Danilov, Oak Ridge National Laboratory

Title: H- Laser Stripping Experiments at SNS

Click [here](#) for a full calendar with links to additional information.

Weather

CDF finds exotic relatives of protons and neutrons



Petar Maksimovic of Johns Hopkins University announced the discovery to Fermilab's particle physics community at the Wine & Cheese Seminar Friday. (Click on image to see photo gallery.)

CDF scientists announced today (October 23, 2006) the discovery of two rare types of particles, exotic relatives of the much more common proton and neutron.

"These particles, named Sigma-sub-b [Σ_b], are like rare jewels that we mined out of our data," said Jacobo Konigsberg, University of Florida, a spokesperson for the CDF collaboration. "Piece by piece, we are developing a better picture of how matter is built out of quarks. We learn more about the subatomic forces that hold quarks together and tear them apart. Our discovery helps complete the 'periodic table of baryons.'"

[Read full press release](#)

Safety Tip of the Week

Hand injuries



Last week's safety tip pointed out that one-third of Fermilab's occupational injuries have affected some part of the hand. Over the past 20 years, this part of the body was involved in 578 recordable injuries. Of these, fingers and thumbs were affected 60 percent of the time, wrists were affected 18 percent and palms and the back of the hand were affected 22 percent of the time.

Not surprisingly, knife slips figured prominently in such injuries. In most cases purpose-built tools such as strippers would have been a better choice. Gravity has been another key factor. People got hurt when objects fell onto their hands or when they tried to catch a falling object. In addition, wrists got strained when people attempted to break a fall to the ground. Simply reaching out has resulted in lacerations when sharp edges were unexpectedly encountered. Besides letting things fall, you should also watch for edges on newly-worked metals and inner edges of metal cabinets to avoid cuts. And consider your hands' position when doing repetitive tasks. Repeated forceful wrist

Snow flurries **31°/40°**[Extended Forecast](#)[Weather at Fermilab](#)**Current Security Status**[Second Level 3](#)**Wilson Hall Cafe****Monday, October 23**

- Wisconsin Cheese
- Corned Beef Reuben
- Stuffed Chicken Breast
- Mostaccioli Al Forno
- Chicken Oriental Wrap Pineapple
- Assorted Slice Pizza
- Pacific Rim Rice Bowl

The Wilson Hall Cafe accepts Visa, Master Card, Discover and American Express.

[Wilson Hall Cafe Menu](#)**Chez Leon****Wednesday, October 25**

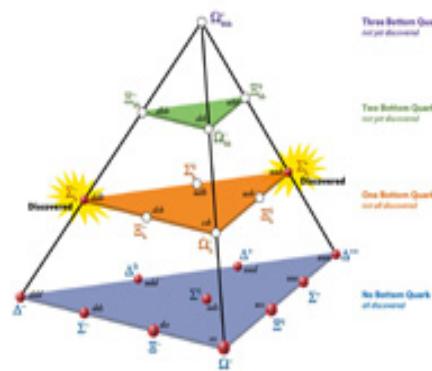
- Seafood Crepes with Sherry Sauce
- Field Greens with Raspberry Vinaigrette
- Lemon Yogurt Cake

Thursday, October 26**Dinner**

Booked

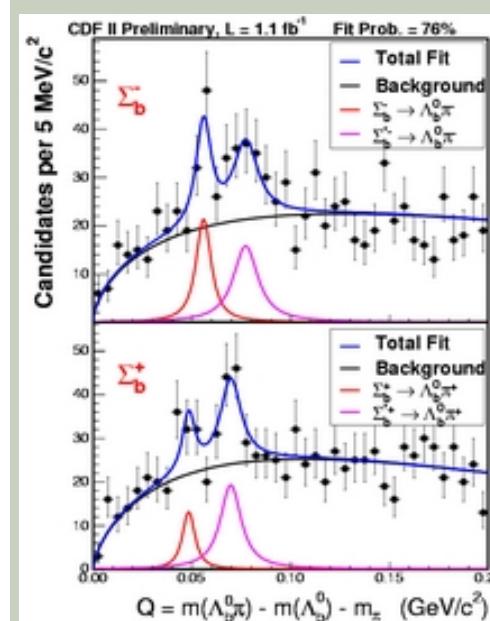
[Chez Leon Menu](#)

Call x4598 to make your reservation.

Search[Search the Fermilab Today Archive](#)**Info**Baryons with Up, Down, Strange and Bottom Quarks and Highest Spin ($J = \frac{1}{2}$)

Baryons are particles made of three quarks.

The particles can exist in a ground state ($J=1/2$) and an excited state ($J=3/2$). The CDF experiment discovered the positively charged Sigma-sub-b and the negatively charged Sigma-sub-b in both spin configurations. (Click on graphic to see related images, including a larger version of this graphic with a detailed description.)

Fermilab Result of the Week**Discover one, get three free**

The peaks from the new Σ_b particles, shown in the mass difference of reconstructed hadrons. The plots are separated to show the positively and negatively charged $\Sigma_b^{(*)+}$ peaks separately.

flexing aggravated carpal tunnel syndrome in a number of cases.

To avoid hand injuries you should review the work process before you begin. How could my hands get hurt? Are there gloves that I should wear for safety? Am I using the best tool for the job? What happens if something falls? Are there sharp edges to watch for? Is repetitive motion causing wrist discomfort? Please check with the Medical Department. When caught early, such symptoms can often be resolved with a few workplace adjustments.

[Safety Tip of the Week Archive](#)**Accelerator Update****October 18 - 20**

- TeV and Pbar magnet replacement continues
- Pbar verified stacking
- TeV sector B3 cold compressor tripped off
- Pbar magnet might have ground fault
- TeV cooldown begins on the evening of 10/21/06

[Read the Current Accelerator Update](#)[Read the Early Bird Report](#)[View the Tevatron Luminosity Charts](#)**In the News*****The New York Times, Opinion, October 20, 2006: The Universe on a String***

SEVENTY-FIVE years ago this month, The New York Times reported that Albert Einstein had completed his unified field theory — a theory that promised to stitch all of nature's forces into a single, tightly woven mathematical tapestry. But as had happened before and would happen again, closer scrutiny revealed flaws that sent Einstein back to the drawing board.

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The b quark is the heaviest quark to form "hadrons," which are composite particles that come in groups of two or three bound quarks. The most famous hadron is the proton, composed of two up quarks and a down quark, and the basis for all material in the universe. Notice the proton does not contain a b quark. In fact, b quarks are rarely found in hadrons. That's why a high rate of b-quark production makes the Tevatron a unique hadron factory, and CDF physicists have recently capitalized on this by discovering four new b-hadrons.

Since the Λ_b (composed of u, d, and b quarks) was discovered a decade ago at LEP and the Tevatron, there has been only one known "b-baryon," or three-quark particle containing a b-quark. Past searches for other b-baryons, including the Σ_b (composed of either u,u,b or d,d,b quarks), have yielded nothing.

That is, until now. A combination of high Tevatron production rate and clever real-time data selection give CDF about 3000 Λ_b 's -- the world's largest sample of Λ_b 's!

After combining Λ_b candidates with additional particles called pions (see Figure), CDF physicists observe a very strong signal of about 240 events. Due to large backgrounds, physicists needed to use all the Tevatron data collected until 2006 to make an unambiguous discovery.

The events are divided into four peaks: two for $\Sigma_b^{(*)+}$ (composed of u,u,b) and two for $\Sigma_b^{(*)-}$ (composed of d,d,b). Since Σ_b^+ is not an antiparticle of Σ_b^- , they even have different masses!

The discovery of $\Sigma_b^{(*)}$ particles and the

Nevertheless, Einstein's belief that he'd one day complete the unified theory rarely faltered. Even on his deathbed he scribbled equations in the desperate but fading hope that the theory would finally materialize. It didn't.

In the decades since, the urgency of finding a unified theory has only increased. Scientists have realized that without such a theory, critical questions can't be addressed, such as how the universe began or what lies at the heart of a black hole. These unresolved issues have inspired much progress, with the most recent advances coming from an approach called string theory. Lately, however, string theory has come in for considerable criticism. And so, this is an auspicious moment to reflect on the state of the art.

[Read More \(registration required\)](#)

Announcements

Give an old coat to someone who needs it

Jeannette Olah of Roads and Grounds is collecting winter coats to deliver to a local non-profit homeless shelter. She needs gently used coats for adults and children. If you have an old coat that you are willing to part with, please drop it by Jeannette Olah's office at Site 37, Roads and Grounds before November 2. You can reach her at 404-0699 if you have any questions.

A Taste of Taiwan

CDF physicists are organizing a get-together with Taiwanese food and music on Thursday, October 26, from 6:30 p.m. to 9:00 p.m. in the Kuhn Barn. "There will be free Taiwanese food," said organizer Shin-Shan Eiko Yu. "We will also provide some travel information, play traditional

measurement of their properties will provide important input to theorists studying how matter forms into hadrons.

Welcome to four new particles!

[Click here for further reading](#)



From left: Michael Schmidt, (U. Chicago, previously JHU), Richard Tesarek (FNAL), Petar Maksimovic (JHU), Matthew Martin (JHU), Dmitry Litvintsev (FNAL) and Jennifer Pursley (JHU). Insets, from left: Elena Vataga (UNM), Igor Gorelov (UNM) and Sally Seidel (UNM).

[Result of the Week Archive](#)

Taiwanese music, and display news clips about Taiwan."

GSA Halloween Party

GSA will have its annual Halloween party in the Kuhn Barn on Friday, Oct 27 at 7:30 p.m. Come, hang out and enjoy snacks and beverages and candy. You can wear your favorite Halloween costume for a shot at a prize and join in the pumpkin carving contest! RSVP to kendallm@phys.columbia.edu.

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](#).

Upcoming Activities