Fermilab Today

Friday, March 24, 2006

Calendar

Friday, March 24

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

4:00 p.m. Joint Experimental Theoretical Physics Seminar - 1 West

Speaker: S. Burdin, Fermilab

Title: First Direct Two-Sided Bound on the Bso Oscillation Frequency

Monday, March 27

2:30 p.m. Particle Astrophysics Seminar - Curia II

Speaker: E. Baltz, Stanford Linear Accelerator Center

Title: Measuring Dark Matter Properties at High-Energy Colliders

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

THERE WILL BE NO ALL EXPERIMENTERS' MEETING THIS WEEK

Weather

Chance of Snow **40°/29°**

Extended Forecast

Weather at Fermilab

Current Security Status

Secon Level 3

Wilson Hall Cafe

A Peek Behind the Scenes: In the Lab's Clean Rooms

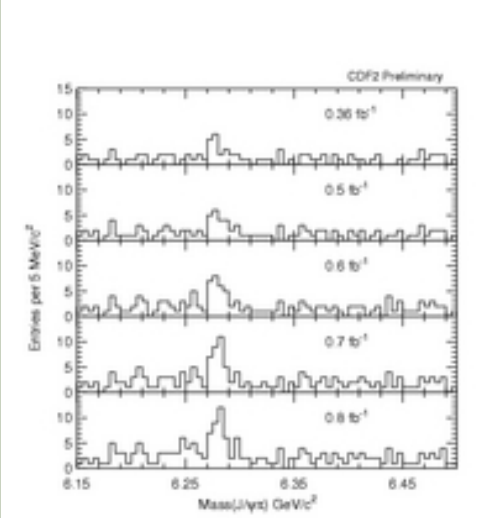
Janina Gielata, a technician with the University of Rochester, monitors the assembly of a silicon component at SiDet.

Every day they don blue booties, a face-mask, head cover, and smock before entering a class 100000 clean room: that's a room with 100,000 or fewer 0.5-micron-sized dust particles in one cubic foot of air per minute. (Typical office air contains about 300,000 dust particles per cubic foot.) The meticulous work of assembling and testing silicon components for detectors takes precision, proficiency, and above all else, patience.

Actually, by keeping the room clean and requiring people to gown up, SiDet Center's Lab D maintains something closer to a class 10000 rank. Technicians at the SiDet Center are currently assembling 2700 silicon modules for CMS at CERN. Physicist Leonard Spiegel compares putting a silicon component into a detector to sending a satellite to Mars. "You don't want to send something up and find out too late that it doesn't work. So you test it a lot. Projects here are paced by all the testing." Technicians use computers to put

Fermilab Result of the Week

The "last meson" shows its full beauty and charm!



CDF's B_c signal, found in fully reconstructed "J/Ψπ" events, grows as more and more data is added to the sample. At first, there was only a hint of a signal. With 0.7 fb^{-1}, the signal was large enough to claim a statistically significant observation. The signal continues to grow and become even more significant as CDF collects additional data. (Click on image for larger version.)

The B_c meson is the last ground state meson with distinct quarks, the bottom quark and the charm anti-quark. CDF was the first experiment to observe this "last meson" in 1998 when it observed about 20 decays of the B_c with a neutrino in the final state. In these "partially reconstructed" decays, the neutrino escapes undetected and it is difficult to measure precisely the mass of the B_c. Now in Run II, these partially reconstructed decays are firmly established by both CDF and DZero with several hundred events observed.

However, the "fully reconstructed" decay, where all the decay particles are detected, has been elusive. About a year

Friday, March 24
-New England Clam Chowder
-Western BBQ Burger
-Tilapia w/Tortilla Crust
-Swedish Meatballs
-Bistro Chicken & Provolone Panini
-Assorted Personal Size Pizzas
-Carved Top Round of Beef

Upcoming Menu

Chez Leon

Wednesday, March 29
Lunch
-Northern Italian Lasagna
-Mixed Greens w/Tomatoes
-Olive Oil Almond Orange Cake

Thursday, March 30
Dinner
-Lobster Bisque
-Beef Medallions w/Morel Sauce
-Potato Daugenions
-Steamed Asparagus
-Fresh Strawberries w/Champagne Syrup

Chez Leon Menu
Call x4512 to make your reservation.

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Fermilab Result of the Week archive

together silicon sensors with readout microchips via microbonding. If problems are found during testing, technicians often must remove a microbond and repeat the entire process.

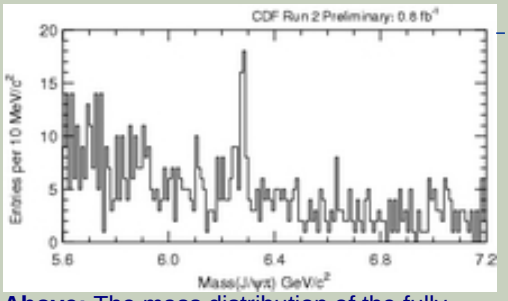
Soon, however, the SiDet Center will lose its claim as the cleanest rooms at the lab to an ILC cavity string assembly clean room being constructed at building MP9 as a part of the Cryomodule Assembly Facility (CAF). This series of clean rooms will include a class 1,000 "ante clean room," class 100 "clean storage area" and class 10 "assembly area." Here technicians will interconnect eight dressed RF cavities to create a cavity string that will eventually become part of a cryomodule. "The most important critical point is that each of these cavities was individually tested before they arrive to the assembly clean room," says Tug Arkan, Cryomodule Production Engineer. "Once they become a series of eight, there is no test for this string until the cryomodule is complete. When you put high RF power in the cryomodule, if there are particles inside the cavities, they'll create problems."

Not only must the ILC clean room be much cleaner, the work will be trickier. "In our clean room, we want to turn bolts and nuts, not really clean-room compatible work," explains Arkan. "You turn a nut, it's metal-to-metal. You'll get thousands of particles turning a nut on a screw thread." He estimates the cavity string assembly clean rooms will be ready by mid-April.
—Dawn Stanton

ago, CDF first reported a small excess of events in the fully reconstructed B_c decay mode with 0.36 fb^{-1} of data. This was enough to provide "evidence for" this decay mode but not to be deemed as a conclusive "observation."

The B_c signal has emerged more strongly with each additional new chunk of data calibrated, processed, and added to the analysis, so that with the current 0.8 fb^{-1} of data, the chance that the B_c signal is due to random fluctuations is less than one part in a billion--a clear "observation!"

"It's a clear case when a factor of two more data really helped," said William Wester, one of the scientists performing the analysis. Fellow CDF physicist Pat Lukens added, "This is an example of an extremely rare process that was only observable because of the improvements in luminosity made by the Tevatron in Run II."



Above: The mass distribution of the fully reconstructed decay (B_c -> J/Ψ π) from 0.8 fb^{-1} of CDF data. Using this data, CDF makes a precise B_c mass measurement of $M(B_c)$ = 6275.2 4.3 2.3 MeV/c^2. (Click on image for larger version.)
Below: Fermilab physicists, William Wester, Pat Lukens, and Slawek Tkaczyk, who have a combined history of 51 years on CDF, performed this "old-school" analysis. (Click on images for larger version.)

Fermilab Safety Tip of the Week archive

Linear Collider News archive

Fermilab Today classifieds

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Workers are currently installing a raised, perforated floor (on left) at the future cavity string assembly clean room. Air flow from above fan filer units will push air into vents below to ensure continuous laminar air flow, which will help to keep the area clean as required by its clean room class.

Milestones

Fermilab's Office of Public Affairs intern, Dawn Stanton (right), finishes her term today, March 24, after a job well done. Jennifer Lauren Lee (left), will take her place on Monday. Good luck Dawn; we will miss you! (Click on image for larger version.)

In the News

The Beacon News Online March 24, 2006:

Fermilab cautioned over tritium release

BATAVIA — The Illinois Environmental Protection Agency has issued a permit violation notice to Fermi National Accelerator Laboratory regarding radioactive materials found in Indian Creek last year.

Result of the Week Archive

ILC NewsLine

Dark Matter Determines the Universe

You may see thousands of stars or countless numbers of galaxies in the night sky. The universe is so vast that it would seem like just an infinite number of galaxies are out there. But in fact, what a human observes in the universe as visible light or any other form of radiation is just a fraction of what actually exists.

Yasuhiro Okada, KEK

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Announcements

Memorial service for Doug Michael

Employees and users are invited to attend a memorial service at Fermilab for neutrino physicist and MINOS co-spokesperson Doug Michael on Friday, March 31, at 1:30 p.m. Michael died on December 25, 2005 after a year-long battle with cancer. The service will be held at the MINOS detector building (a short walk from the Lederman Center) and includes the planting of 5 trees.

New classified ads have been posted on Fermilab Today.

However, officials at Fermilab say there is no reason for alarm and that levels of that material have remained below detectable levels for months.

Small amounts of tritium, a radioactive isotope of hydrogen, were discovered in December 2005 by lab staff performing routine environmental tests, according to Judy Jackson, Fermilab's public relations director. The leak was traced to a pipe connecting two cooling pools.

Indian Creek begins on Fermilab property and runs southwest into a pond at the center of the Savannah subdivision at the corner of Kirk and Butterfield Roads.

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Upcoming Activities