

Calendar

Friday, December 3

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. D'Auria, University of Glasgow

Title: Bc: Fully Reconstructed Decays and Mass Measurement at CDF

8:00 p.m. Fermilab Film Series - Auditorium

Tickets: Adults \$4

Title: Sunset Boulevard

Saturday, December 4

8:00 p.m. Fermilab Arts Series - Auditorium

Tickets: \$20/\$10

Bailiwick Theater presents: The Christmas Schooner

Monday, December 4

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

Speaker: M. Viel, Cambridge University

Title: The Lyman-Alpha Forest as a Cosmological Probe

3:30 p.m. DIRECTOR'S COFFEE

BREAK - 2nd Flr X-Over

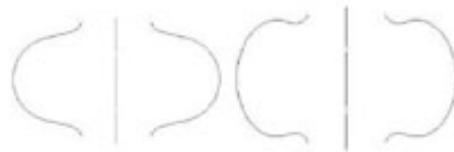
4:00 p.m. All Experimenters' Meeting - Curia II

Wilson Hall Cafe

What's Up with the ILC?

The entire International Linear Collider series is [available online](#).

Going for Higher Gradients as Cornell Makes a Breakthrough



Comparison of TESLA and new shape Upper: Nb Single Cell Cavity, Lower: Cell Profile. (Click on image for larger version.)

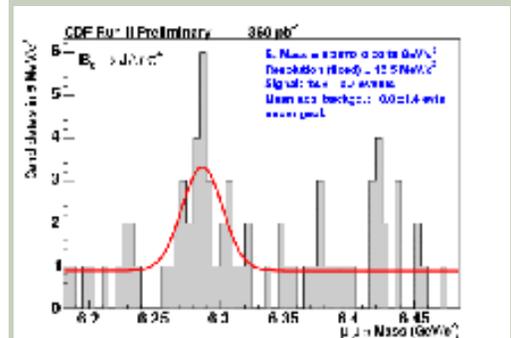
At the Cornell University Laboratory of Elementary Particle Physics (LEPP), Valery Shemelin, Rongli Geng and Hasan Padamsee have reached a world record accelerating field gradient of 46 MV/m in a single superconducting accelerator cavity, expanding the possibilities for the proposed International Linear Collider.

"If we can achieve this gradient in a nine-cell structure with this technique, it would give us more 'overhead' in our design," said Shekhar Mishra, Head of ILC Efforts at Fermilab. "Possible options resulting from this 'overhead' would be that we could make the machine shorter in length at the same energy or higher energy reach at reduced luminosity, keeping the same beam power."

Fermilab Result of the Week

Fermilab Today is featuring a special Result of the Week timed to coincide with today's Wine & Cheese seminar by CDF.

CDF Sees Charmed Beauty Meson in a New Decay Mode



Mass distribution of $J/\psi \pi^+ \pi^-$ combinations observed by CDF after cuts, where the J/ψ decays into two muons. A gaussian peak is fitted, with a width fixed to the known experimental resolution. The signal peak contains 18.9 events, and the mean expected background under the peak is 10.0 ± 1.4 events. (Click on image for larger version.)

The B_c meson, one of the heaviest meson states predicted by the Standard Model, consists of a bottom and a charm quark-antiquark pair. Using semileptonic decays in Run I, CDF published the first experimental observation of the B_c which was recently confirmed by DZero using Run II data. In both cases the mass was only approximately determined because the state was incompletely reconstructed.

The CDF collaboration has now announced the preliminary results of a further search for the B_c , this time using decays into a J/ψ and a charged pion, so that all the final-state particles could be precisely measured. In seeking to detect a rare state of this kind, it is important not to bias the results by making experimental selections that might merely enhance a random fluctuation in the mass

Friday, December 3

New England Clam Chowder

Western BBQ Burger \$4.75

Turkey Tetrazzini \$3.75

Meatballs Teriyaki Over Rice \$3.75 Bistro

Chicken & Provolone Panini \$4.75

Assorted Personal Size Pizzas \$3.25

Carved Top Round of Beef \$4.75

[Wilson Hall Cafe Menu](#)

[Chez Leon](#)

Weather



Mostly Cloudy **39°/28°**

[Extended Forecast](#)

[Weather at Fermilab](#)

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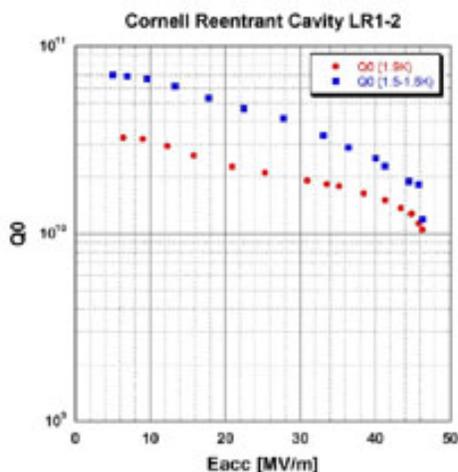
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The current best gradient for nine-cell accelerating structures is 35-40MV/m achieved by the TESLA Collaboration at DESY. New ideas are usually proved in single cell cavities before addressing the technical challenges of multi-cell accelerating units, and an important R&D goal is to push gradients even higher for TeV energies or cost savings.

But above 40 MV/m, the surface magnetic field approaches the limit where superconductivity breaks down.

Shemelin, Geng and Padamsee altered the shape of the cavity, lowering the surface magnetic field by 10% and preserving superconductivity. The new cavity shape has the same beam aperture as the TESLA cavity, meaning the beam dynamics are likely to be similar to those of TESLA. cavity.

Similar projects on the way at Jlab-DESY-KEK have achieved a gradient of about 40 MV/m. But the beam aperture of the new shapes is smaller than that of the TESLA cavity, and hence the effects on the beam need to be evaluated. The working group on the High-Gradient Cavities at the KEK ILC workshop has endorsed the High Gradient R&D efforts.



distribution. Therefore, a 'blind' analysis was performed; the analysis method was implemented using simulations of a possible signal, and only when the method was fully optimized on this basis was the experimental mass distribution examined.

The result shows a narrow mass peak with a probability of less than 0.1% of being due to a chance fluctuation. The position of the peak is at 6287+/-5 MeV. We are in the process of characterizing the signal and performing further checks. Several theoretical approaches have been used to predict the B_c mass: potential models, potential NRQCD and Lattice QCD. Their predictions are in good agreement with this preliminary measurement. Please attend today's 4:00 p.m. Wine and Cheese seminar for more details.



The CDF B_c analysis team, from left to right: Ludovic Nicolas (Glasgow U.), Saverio D'Auria (Glasgow U.), Vaia Papadimitriou (FNAL), Peter Bussey (Glasgow U.), Mario Spezziga (Texas Tech. U.) (Click on image for larger version.)

[Result of the Week Archive](#)

Announcements

New Classifieds on Fermilab Today

New [classified ads](#) have been posted on *Fermilab Today*. A permanent link to the classifieds is located in the bottom left corner of *Fermilab Today*.

Fermilab Film Series Tonight

The Fermilab Film Series presents "Sunset Boulevard" at 8:00 p.m. on Friday, December 3 in Ramsey Auditorium.

Cornell Reentrant Cavity LR1-2 (Click on image for larger version.)

In the News

From the *Nature Magazine*, December 2, 2004

Putting pen to paper

by Virginia Gewin

Careers in journalism can be rewarding for scientists who have a way with words. Virginia Gewin reveals what it takes to be a scribe.

If you love science but hate lab work, trading the monotony of running gels for the creative buzz of writing may sound appealing. But before you abandon the bench and grab your laptop, make sure you understand the odds and options ahead. A staff position as a science journalist is as rare as it is coveted. In fact, many more opportunities exist for public information officers or freelance writers. Whatever the position, the ability to communicate is the common denominator.

[Read more](#)

[more information](#)

Fermilab Arts Series This Weekend

The Fermilab Arts Series presents "The Christmas Schooner" at 8:00 p.m. on Saturday, December 4 in Ramsey Auditorium.

[more information](#)

Hatha Yoga Class

Due to its success, Fermilab's Recreational Office will offer another yoga class. Classes begin on December 9 and go through February 10 (no classes on Dec. 23 & 30). Classes are held on Thursdays from noon to 1:00 p.m. on the 15th floor SW crossover. This 8 week class costs \$80.00. There is a maximum of 25 people for this class. A yoga mat is required. (no Rec. Fac. membership needed) The registration deadline is December 6.

[Upcoming Activities](#)