

Calendar

Thursday, June 10

THERE WILL BE NO THEORETICAL PHYSICS SEMINAR THIS WEEK

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

THERE WILL BE NO ACCELERATOR PHYSICS AND TECHNOLOGY SEMINAR TODAY

Friday, June 11

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

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

Speaker: K. Yorita, Waseda University

Title: Top Mass Measurement in Run II at CDF Using the Dynamic Likelihood Method

Wilson Hall Cafe

Thursday, June 10

Tomato Florentine

Grilled Chicken Cordon Bleu Sandwich
\$4.75

Peachy Pork Roast \$3.75

Chicken Marsala \$3.75

Maryland Crab Salad \$4.75

Italian Sausage Calzones \$3.75

SW Chicken Salda with Roasted Corn

Salsa \$4.75

[Wilson Hall Cafe Menu](#)

[Chez Leon](#)

Weather



Heavy Rain **71°/63°**

[Extended Forecast](#)

[Weather at Fermilab](#)

Day of Mourning For Reagan Declared

In honor of the passing of former President Ronald Reagan, tomorrow has been declared a National Day of Mourning.



Ronald Reagan

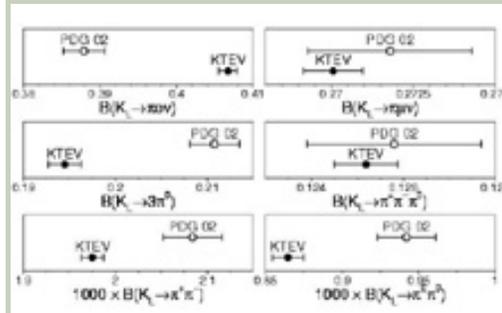
Fermilab will remain open tomorrow, but all employees are encouraged to honor the memory of the former President in their own ways. Visit the official [Ronald Reagan Memorial website](#), which includes access to funeral service information, a condolence book, tributes, and a memorial fund.

Fermilab's 15-Foot Bubble Chamber Relocated



Fermilab Result of the Week

A New Determination of V_{US} by KTeV



Comparison of KTeV and PDG averages for the six largest K-long branching fractions. (Click on image for larger version.)

Although the neutral kaon was discovered more than 50 years ago, it continues to be a unique tool for particle physics. The KTeV collaboration has recently completed a series of measurements of neutral kaon decay, resulting in a new determination of the CKM matrix element V_{US} .

The CKM matrix describes the coupling of the u, c, and t quarks to the d, s, and b quarks. Much recent attention has been given to the possible deviation from unitarity in the first row of this matrix. There has been particular interest in checking the V_{US} element (describing the coupling of s quarks to u quarks), because it was based on averages of dozens of experiments done over a 40 year period.

To determine V_{US} , KTeV has measured the six largest K_L branching fractions (accounting for more than 99.9% of all K_L decays) and the form factors in semileptonic kaon decays. This work marks the first time these measurements have all been performed together in a

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

Send comments and suggestions to
today@fnal.gov

[Fermilab Today archive](#)

[Fermilab Today PDF Version](#)

[Fermilab Today classifieds](#)

[Subscribe/Unsubscribe to Fermilab Today](#)

With the help of a contractor, FESS engineers used a hydraulic lift to move the 15-foot bubble chamber to the SiDet courtyard. (Click on image for larger version.)

A 281-ton bubble chamber, Fermilab's oldest particle detector, has become the lab's most valuable lawn ornament. From 7:00 a.m. to noon on Tuesday, FESS and contractor Belding Walbridge used a hydraulic lift to move the enormous metal sphere from its holding space in Lab A and placed it outside on a concrete pedestal in the SiDet courtyard, where it will remain on display. "It cost \$200 million to build Fermilab, and the bubble chamber was \$25 million on top of that," said John Cooper of the Particle Physics Division. "Bubble chambers were the premier detectors -- the CDFs or DZeros of the 1960s."

Installed in 1973, the 15-foot bubble chamber allowed Fermilab physicists to track elusive high-energy particles like kaons, lambdas, and electrons, and provided detailed views of decay vertices. Particles penetrating the superheated hydrogen inside the chamber left bubble tracks, which could be photographed and reconstructed in 3D. Though the chamber was unable to process multiple, or even successive particle collisions, its high quality imaging has been surpassed only recently by the newest generation of particle detectors. It was used in 17 experiments over a period of 15 years. "Bubble chambers played an instrumental role in several early discoveries," said Dixon Bogart, associate head of the Accelerator Division. "It was one of the first major pieces of experimental equipment built at the lab."

The move prompted nostalgia. "I saw the

modern, high statistics experiment. The KTeV branching fraction measurements are about a factor of two more precise than the averages of all previous measurements, but are not in good agreement with the averages. In particular, the important K_L to $\pi e \nu$ branching fraction is about 5% higher than the previous world average. This shift is consistent with the higher semileptonic branching fraction recently measured in K^+ decay by Brookhaven experiment E865. The new KTeV results are consistent with unitarity of the first row of the CKM matrix.

Articles reporting these results were submitted to Physical Review Letters and Physical Review D on June 1.

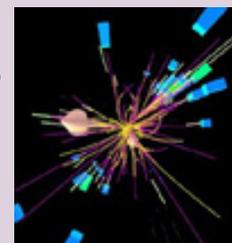


This analysis was done by (left to right) Rick Kessler, Ed Blucher, and Sasha Glazov of the University of Chicago. (Click on image for larger version.)

[Result of the Week Archive](#)

Fermilab Results Change Higgs Mass Estimate

Scientists at Fermilab announced on June 9, 2004 new results that change the best estimate of the mass of the postulated Higgs boson from approximately 96 GeV/c² to 117 GeV/c². Compared to the previous value, the



Visualization of a Run II collision that produced a top quark in 2002, recorded by DZero.

chamber first lowered into the ground when I was a little kid," said Pete Simon, building manager at DZero. His father, George Simon, who was also present yesterday, had operated the device from 1973 to 1987. "It was hard work, but always interesting," George Simon said. "But you had to keep an eye on it constantly."

[Streaming Video: Fermilab Bubble Chamber Moved](#)

In the News

From *Nature Magazine*, June 9, 2004

Particle physics: From the top...

by Georg Weiglein

The basic building-blocks of matter, as far as we know, are quarks and leptons, together with the force-carrying particles that mediate their interactions. Quarks and leptons (the latter group including the electron) are grouped in three generations; the particles in the second and third generations seem a perfect copy of those of the first generation, except that their masses are much larger. The top quark is the heaviest of all quarks and leptons, and is central to some of the most pressing questions in particle physics. For instance, why is the third-generation top quark more than 300,000 times heavier than the first-generation electron? Why are there two other quarks with precisely the same properties as the top quark but with very different masses? And what is the origin of mass itself?

[read more](#)

new value is in better agreement with direct searches - such as those conducted by CERN experiments - that excluded a mass below $114 \text{ GeV}/c^2$. In a paper to appear in the June 10 issue of *Nature* magazine, physicists of Fermilab's DZero experiment report on results obtained by applying a new analysis technique to data obtained from 1992 to 1996 during Collider Run I at the Fermilab Tevatron, the world's highest-energy particle accelerator.

[read more](#)

Accelerator Update

June 7 - June 9

- Operations established one store during this 48 hour period that combined with an existing store provided approximately 42 hours and 21 minutes of luminosity to the experiments.
- TeV sets NEW initial luminosity record of $76.8446E30$
- TeV registers mysterious beam spike on Tuesday morning
- Off site power glitch causes many devices to trip off. Store remained intact.
- TeV, MI, Pbar, and Recycler prepare for Mixed Mode antiproton transfers.

[View the current accelerator update](#)

[View the Tevatron Luminosity Charts](#)

Announcements

New Book in the Fermilab Library

New books in the Fermilab Library for the week of June 8 are now on display in the Library near the front desk. An [online list](#) of the new books is now available. New books may be reserved by using the [online Library catalog](#) or by calling the library at x3401, or by filling out the reserve card in the book.

Fermilab June Golf Outing

The first golf outing of the year will be on Friday, June 25th. This outing is open to everyone (no handicap is required). It will be a 1:00 shotgun start at Mill Creek Golf Club in Geneva. The entry fee is \$55 per person and includes green fees, cart, and all event contests. Deadline to sign up is June 14th. For more information or to sign up, contact [Tim Gierhart](#), x5070 or [Jerry Leibfritz](#), x8779.