Fermilab Today

Thursday, June 25, 2009

Calendar

Have a safe day!

Thursday, June 25
8 a.m. - 5 p.m.
DZero collboration meeting
2:30 p.m.
Theoretical Physics Seminar - Theory Conference Room, WH-3NE
Speaker: Thomas Becher, Fermilab
Title: Infrared Singularities of Gauge Theory Amplitudes
3:30 p.m.
DIRECTOR'S COFFEE BREAK - 2nd Flr X-Over
THERE WILL BE NO ACCELERATOR PHYSICS AND TECHNOLOGY SEMINAR TODAY
4 p.m.
Extreme Beam - Physics at the Intensity Frontier Lecture Series - One West
Speaker: Kevin Lesko, Lawrence Berkeley National Laboratory
Title: Deep Underground Science and Engineering Laboratory

Friday, June 26
8 a.m. - 5 p.m.
DZero collaboration meeting
3:30 p.m.
DIRECTOR'S COFFEE BREAK - 2nd Flr X-Over
4 p.m.
Joint Experimental-Theoretical Physics Seminar - One West
Speaker: Andy Haas, SLAC National Accelerator Laboratory/Columbia University
Title: Hunting for Extended SUSY and Hidden Valleys at DZero

Click here for NALCAL, a weekly calendar with links to additional information.

Campaigns

University Profile

University of Pittsburgh

University of Pittsburgh postdoc Istvan Danko (left) and grad student Zeynep Isvan (right) stand in front of the Minerva electronic test stand.

University of Pittsburgh

NAME:
University of Pittsburgh

HOME TOWN:
Pittsburgh, Pa.

MASCOT:
Panther

SCHOOL COLORS:
Blue and gold

PARTICLE PHYSICS COLLABORATIONS:
CDF, ATLAS, MINOS, MINERvA

EXPERIMENTS AT FERMILAB:
CDF, MINOS, MINERvA

SCIENTISTS AND STUDENTS AT FERMILAB:
There are four faculty working at Fermilab, two postdocs and four students.

COLLABORATING AT FERMILAB SINCE:
1992

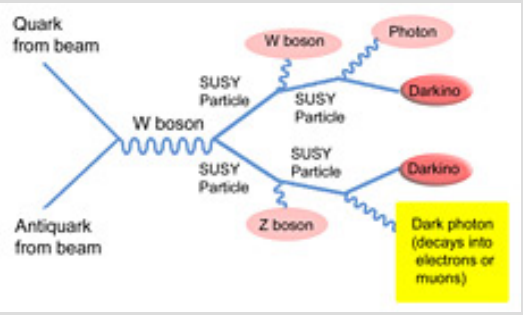
MAJOR CONTRIBUTIONS:
CP violation in B_s->J/psi phi

RESEARCH FOCUS:
B physics, neutrinos

WHAT SETS PARTICLE PHYSICS

Fermilab Result of the Week

Dark photons



In this particular hidden valley model, six particles are created, all indicated by color. The dark photons are shown in yellow. For the other particles, those indicated in light pink will be observed in the detector, while the ones marked with dark pink will escape entirely undetected. If observed, these darkinos might be the dark matter for which astronomers search.

Popular physics abounds with interesting and speculative ideas, with dark matter and dark energy leading the way. Recently another idea has surfaced with a similar name: *dark photons.* While evidence suggesting dark matter and energy came from measurements in space, DZero scientists sought to find evidence for dark photons in their detector.

We know a lot about the familiar photons, quarks, electrons and other particles that make up ordinary matter because they interact strongly with each other. Scientists can even observe the ghostly neutrino. But there remains the possibility that other particles exist that interact much more weakly. Ideas that explore this hypothesis are called “hidden valley” models, a particle Shangri La that has remained thus far undetected.

There are several hidden valley models, including one specific model that incorporates the principle of supersymmetry and was recently studied. In this model, a complicated decay signal could reveal signs of a dark photon. In an example collision in which a dark photon might be created, a W boson creates two gauginos, the supersymmetric equivalent to the common W and Z boson. These two particles decay into six separate particles: a W and Z boson, a photon, two darkinos and a dark photon. The darkinos do not interact with the detector and escape entirely undetected, while the dark photon can decay into a pair of electrons or muons. The mechanism by which

Take Five

Tune IT Up

Weather

Chance of thunderstorms
89°/65°

Extended Forecast
Weather at Fermilab

Current Security Status

Secon Level 3

Wilson Hall Cafe

Thursday, June 25
- Santa Fe black bean
- Steak tacos
- Chicken cordon bleu
- Chimichangas
- Baked ham & Swiss on a ciabatta roll
- Assorted sliced pizza
- Crispy fried chicken ranch salad

Wilson Hall Cafe menu

Chez Leon

Thursday, June 25
Dinner
- Closed

Chez Leon menu
Call x3524 to make your reservation.

Wednesday, July 1
Lunch
- Pork satay
- Jasmine rice
- Peapods
- Coconut cake w/ caramel sauce

Chez Leon menu
Call x3524 to make your reservation.

Archives

AT THE UNIVERSITY OF PITTSBURGH APART?
The strong flavor physics program at CDF, as well as significant contributions to ATLAS simulation/computing.

FUNDING AGENCY:
Department of Energy

FAVORITE NATIONAL LABORATORY:
Fermilab

University of Pittsburgh graduate student Brandon Eberly (right) at work on the Minerva prototype.

View all University profiles

Special Announcement

Wilson Hall near west parking lot closed this weekend

The red line outlines Wilson Hall's near west lot.

The near west parking lot at Wilson Hall will be closed Saturday, June 27, and Sunday, June 28, for seal coating and re-striping. Normal parking will resume on Monday, June 29, weather permitting. Please use the east lot to access the Main Control Room. Drive with caution. The road in front of the of the Main Control Room will be two-way traffic until Monday, June 29. Contact Roads and Grounds at x3303 with questions.

In the News

the dark photons decay involves the principles of quantum mechanics. If dark photons exist, they may explain recent astronomical measurements that claim to have found more antimatter electrons than expected.

DZero physicists searched this Web page for events with a photon, missing energy (the escaping darkinos) and an electron or muon pair. The associated W and Z bosons were not specifically required to be observed in this study. Only a handful of events with these characteristics were seen, and the number observed was consistent with the Standard Model.

The scientists concluded that the data did not support the dark photon hypothesis, although its existence cannot be completely ruled out if the supersymmetric chargino is heavy. While a confirmation of a new theory is very exciting, to rule out an idea (or even a part of an idea) is also crucial. Knowing what is *not* true rules out possibilities and tells physicists where to focus efforts.

I think it's safe to say that DZero has once again shed light on the dark.

-- Don Lincoln

Yurii Maravin [left]
Kansas State
Yuri Gershtein [right]
Rutgers University

Yurii Maravin and Yuri Gershtein performed this dark photon analysis, further exploring the dark side of the subatomic universe.

Efficiently detecting muons is a crucial component of this analysis. These physicists operate the DZero central muon detector and trigger systems and continuously strive to maintain optimum performance. Left to right: Amitabha Das, University of Arizona; Al Ito, Penny Kasper and Norik Khalatyan, all from Fermilab. (Inset: Ivan Kiselevich, ITEP, Russia)

Fermilab Today

Result of the Week

Safety Tip of the Week

User University Profiles

ILC NewsLine

Info

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

Send comments and suggestions to:
today@fnal.gov

Visit the Fermilab
home page

A Higgs boson without the mess

From ***Physical Review Focus***, June 24, 2009

Particle physicists at CERN's Large Hadron Collider (LHC) hope to discover the Higgs boson amid the froth of particles born from proton-proton collisions. Results in the 19 June Physical Review Letters show that there may be a way to cut through some of that froth. An experiment at Fermilab's proton-antiproton collider in Illinois has identified a rare process that produces matter from the intense field of the strong nuclear force but leaves the proton and antiproton intact. There's a chance the same basic interaction could give LHC physicists a cleaner look at the Higgs.

A proton is always surrounded by a swarm of ghostly virtual photons and gluons associated with the fields of the electromagnetic and strong nuclear forces. Researchers have predicted that when two protons (or a proton and an antiproton) fly past one another at close range, within about a proton's diameter, these virtual particle clouds may occasionally interact to create new, real (not virtual) particles. The original protons would merely lose some momentum and separate from the beam. Such an "exclusive" reaction--where the original particles don't break apart--gives unusually clean data because there are so few particles to detect.

Read more

Announcements

Free upper body 30-minute workout - today

East laboratory gate closed through Friday June 26

Bristol Renaissance Faire discount tickets

On-site housing-fall 2009/spring 2010

Six Flags Great America discount tickets

Pool memberships available in the Recreation Department

Conserve water: Support FNA with a rain barrel purchase

Environmental Safety and Health Fair - June 29

Volunteers needed for Fermilab Prairie Quadrat Study - June 30

Interaction Management and Performance Review courses scheduled for summer 2009

Discount for SciTech summer camps - July 6

MATLAB software tools 75 percent off for Fermilab - July 15

Intermediate/Advanced Python Programming July 22-24

Process piping (ASME B31.3) class offered in October

Additional Activities

Submit an announcement