

## Calendar

Wednesday, April 8  
3:30 p.m.

DIRECTOR'S COFFEE  
BREAK - 2nd Flr X-Over  
4 p.m.

[Fermilab Colloquium](#) - One  
West

Speaker: Michael Albrow,  
Fermilab  
Title: Exciting the Vacuum:  
From Glueballs to Higgs

Thursday, April 9  
11 a.m.

[Special Accelerator Physics  
and Technology Seminar](#) -

Curia II (NOTE TIME &  
LOCATION)

Speaker: A. Poklonskiy,  
Michigan State University  
Title: Evolutionary Optimization  
Methods for Accelerator Design  
1 p.m.

Physics and Detector Seminar  
- West Wing, WH-10NW

Speaker: K. Moffeit, Stanford  
Linear Accelerator Center

Title: Report on Workshop on  
Polarized Positrons for Linear  
Colliders (Posipol 2008)

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

[Accelerator Physics and  
Technology Seminar](#) - One  
West

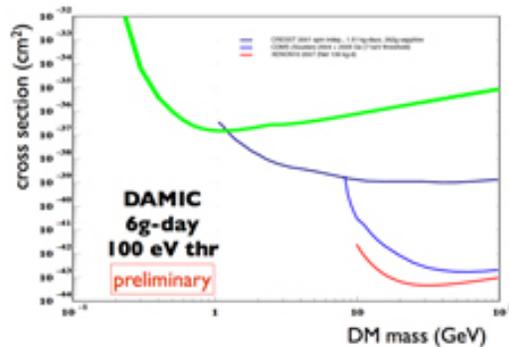
Speaker: M. Conde, Argonne  
National Laboratory  
Title: High Gradients and RF  
Power Generation at the  
Argonne Wakefield Accelerator  
Facility

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

## Weather

## Feature

### DAMIC's search for light mass dark matter candidates



The upper limit on the cross section allowed for weakly interacting dark matter candidates as a function of mass. Preliminary results are shown in green and significantly extend the reach in the low mass region.

Scientists believe that dark matter is five times more prevalent than the visible matter that comprises our stars and planets. Yet scientists do not know much about these mysterious particles, other than the particles' collective effects, for instance, on galactic rotation.

Previous experiments have searched for the tiny recoil of a nucleus that scientists would observe if a high-mass dark matter particle from our own galaxy were to collide with an Earthbound detector as the Earth sails through the Milky Way.

Now, a new Fermilab experiment called DAMIC (Dark Matter In CCDs) is searching for light dark matter candidates with masses less than that of a proton [ $1 \text{ GeV}/c^2$ ] or two. According to theorist Kathryn Zurek, "models that explain why the dark matter and baryon abundances are about the same relate the dark matter mass to the proton mass, so the dark mass is quite generically a few  $\text{GeV}/c^2$  in this class of models."

DAMIC makes use of CCDs originally developed to image a telescope for the Dark Energy Survey experiment. The CCDs are a better version of the same technology used in everyday digital cameras. They record [snapshots](#) of the charge that would be created if dark matter were to collide with the CCD volume. To reduce backgrounds for DAMIC, the tiny detectors are enclosed in 10 tons of

## From the Particle Physics Division

### R&D advances on all frontiers

Mike Lindgren, acting deputy head of the Particle Physics Division, wrote this week's column.

Innovations in detector technology have contributed tremendously to the success of particle physics experiments. They also have laid the foundation for the experiments we are going to build in the next few years. Future experiments, however, will require technology that can make even more sophisticated measurements.

PPD scientists, engineers and technicians already are working on a diverse portfolio of detector R&D for future research at the energy, intensity and cosmic frontiers. Collaborating with universities and national laboratories as well as Fermilab's AD, CD, TD, CMS Center and FCPA staff, we are working on general detector technologies that show tremendous potential to change the field. Two examples are 3-D silicon detectors and liquid-argon neutrino detectors.

Fermilab has long played a leading role in the R&D of silicon detectors and their electronics. Silicon detectors measure with extreme precision the trajectories and origins of charged particles emerging from particle collisions. The goal is to make lighter silicon detectors that make even more precise measurements while consuming less power. Working with industry, we are developing 3-D detectors that have the readout electronics located directly behind highly segmented and thin silicon sensors that will achieve an unprecedented level of performance.

For future neutrino and particle astrophysics experiments, we pursue plans for very large, massive detectors. Those detectors maximize the chance of catching neutrinos or other rarely interacting particles produced by an accelerator or a cosmic source. For neutrino experiments, the limiting factor is the cost per ton of detector.



Mike Lindgren



Sunny  
48°/33°

[Extended Forecast](#)  
[Weather at Fermilab](#)

[Current Security Status](#)

[Secon Level 3](#)

[Wilson Hall Cafe](#)

Wednesday, April 8

- Cajun-style lentil soup
- Cajun chicken ranch
- Tilapa w/jalapeno lime sauce
- Chicken parmesan
- Smoked turkey panini pesto mayo
- Assorted sliced pizza
- Chicken alfredo fettucine

[Wilson Hall Cafe Menu](#)

[Chez Leon](#)

Wednesday, April 8

- Lunch
- Five spice roast chicken
  - Ginger scented rice
  - Snow peas w/toasted almonds
  - Hawaiian cake

Thursday, April 9

- Dinner
- Gourmet greens w/ dried cherries
  - Walnuts & feta
  - Halibut w/dill sauce
  - Lemongrass rice
  - Vegetable of the season
  - Vanilla flan w/raspberry sauce

[Chez Leon menu](#)

Call x3524 to make your reservation.

[Archives](#)

lead shielding, maintained at minus 150 degrees Celsius and kept in a dust-free clean room in a tunnel more than 100 meters underground.

DAMIC spokesperson Juan Estrada explains that with this new CCD technology, "we can set a threshold for nuclear recoils that is lower than others have been able to do, making us more sensitive to lower mass dark matter particles." Preliminary results are shown in the above figure.

Craig Hogan, director of the Fermilab Center for Particle Astrophysics, finds the crossover of innovative technologies exciting.

"It is a delicious irony that these detectors, which are so perfectly adapted for peering to the edge of the universe that we take all the way to Chile for better skies, are now buried in underground caverns to look for invisible particles," Hogan said.

In the next 10 years, physicists from all branches may stumble on the answer to dark matter simultaneously. According to DAMIC collaborator, Ben Kilminster, "A small-scale experiment like DAMIC may directly detect the same dark matter that astronomers observe to fill the galaxies, while at the same time, collider physicists may find that we can produce and detect dark matter at the Tevatron and the LHC."

When that whole picture comes together, you might just see it in one of DAMICs snapshots.



Left to right: Technician Kevin Kuk, physicist Juan Estrada, engineer Herman Cease and physicist Ben Kilminster in their underground lair with the DAMIC detector.

--Ben Kilminster

Photo of the Day

Liquid argon detectors, developed in Italy during the last three decades, show great promise. If the liquid argon is pure enough, the signal created by a charged particle can travel several meters across the liquid before it must be collected by readout electronics. We have begun a very focused and systematic R&D program to improve and master this technology. Our work will feed into plans for a proposed series of ever larger neutrino detectors based on this technology, perhaps leading to detectors weighing 100,000 tons and more.

PPD also is working on general detector R&D efforts such as pixelized photodetectors, bubble chambers for the detection of rare particle interactions and electronics. And we have plenty of ideas for additional R&D work. Ultimately, the R&D we carry out now will drive the discoveries of the future.

[Safety Update](#)

## ES&H weekly report, April 7

This week's safety report, compiled by the Fermilab ES&H section, lists five injuries reported to the Medical Office last week. Three of the five were minor and required only first aid treatment. A fourth case was an injury caused by a goose attack. This injury was serious enough to require time away from work. The fifth case was a head wound that required medical treatment. Find the full report [here](#).

[Safety report archive](#)

[Announcements](#)

## Latest Announcements

[FMUG 04-09 & Apple mobility tour](#)

[Users' Office closing April 8](#)

[Have a safe day!](#)

[Submit an announcement](#)

[Fermilab Garden Club spring meeting](#)

[April is National Humor Month...click on the link for the joke of the day](#)

[Seeking Wellness Advisory Committee members](#)

[Fermilab club & league fair](#)

[Fermilab Today](#)[Result of the Week](#)[Safety Tip of the Week](#)[ILC NewsLine](#)[Info](#)[Fermilab Today](#)

is online at:

[www.fnal.gov/today/](http://www.fnal.gov/today/)

Send comments and suggestions to:

[today@fnal.gov](mailto:today@fnal.gov)**Catch of the day**

CD's Gene Oleynik submitted this photo of a heron snaring a large mouth bass in the Main Ring moat on Monday.

[Readers Write](#)**Letter from the Director of Gran Sasso laboratory**

Dear friends and colleagues,

As you already know, an earthquake has devastated the area around the town of L'Aquila, Italy, causing hundreds of deaths and making thousands of people homeless. The government is deploying all possible resources for the rescue operations, but the situation is still extremely severe.

The epicenter of the shocks lays only a few kilometers from the site of the Gran Sasso National Laboratory.

However, fortunately, the people and the equipment of the Laboratory did not suffer damage. All the running experiments are working smoothly, and the external buildings have been essentially untouched.

I thank you for the messages of solidarity and sympathy.

-- Prof. Eugenio Coccia

[Blackberry Oaks Golf League](#)[Goodrich Quality Theater and AMC Theater tickets](#)[Got golf? Join the Fermilab Golf League](#)[New financial planning & investment services at ACU](#)[Muscle toning classes](#)[Barn Dance April 12](#)[Harlem Globetrotter employee discount April 13](#)[Changes to participating pharmacies Blue Cross Pharmacy Program](#)[Artist within - employee art show '09](#)[MathWorks Seminar - April 21](#)[Word 2007: Styles and Templates class offered April 23](#)[Coed softball season begins May 13](#)[Conflict Management and Negotiation Skills class offered on June 3 and 10](#)[Discount tickets to "1964"...Beatles tribute - June 6](#)[SciTech summer camps](#)[Tartan Day party by Silk and Thistle Scottish country dancing](#)[SciTech summer camps](#)[Additional Activities](#)[Submit an announcement](#)