

## Result of the Week

### Subatomic color



Colored rubber bands are not just for your child's wrist. They serve as an apt analogy for how the strong nuclear force works.

Today's article describes a tricky result, involving details of how the strong force works, the color charge of the proton and its constituents, top quarks and fancy statistics. This analysis probes the dynamics of the strong force in a hadron collider (like the Tevatron or the LHC) environment and may lead to improved Higgs boson observation and characterization techniques.

The strong nuclear force influences only particles that carry the strong charge, which we call color. Color is similar to the more familiar electric charge. Just as objects can be electrically neutral (i.e. have no net electric charge), objects can also be color neutral.

Protons are color neutral. However, protons consist of three particles called quarks. Quarks do have color. The colors of the three quarks cancel each other out to make the proton color neutral. It's a little like how a positive and negative electric charge can cancel each other and produce a neutral particle. The fact that there are three quarks complicates things a bit, but not in a way that is essential here.

In Tevatron collisions, protons collide with antiprotons. When that happens, a quark is knocked out of the proton and into our detector. Because the quark has color, and the proton doesn't, the two remaining quarks that continue to travel the beam pipe must have the opposite color. We can simplify this if we think of the quark and proton debris as two particles with opposite nuclear charge, [moving away](#) from each other; one into the detector and one down the beam pipe.

[Read more](#)

-Don Lincoln

## Special Announcement

### Police to calibrate on site gunfire detector Friday

Kane County Sheriff's deputies will conduct controlled handgun shooting on site at about 10 a.m. Friday, Dec. 17, to help the laboratory install a high-tech system designed to put an end to illegal gunfire here.

Fermilab officials have found bullet holes in buildings and equipment this year and last. No one has been hurt, but the shooting did damage buildings where employees work. Residents in surrounding neighborhoods also have reported occasionally hearing brief gunfire near the laboratory on weekends.

In an effort to prevent further shooting incidents, Fermilab has hired a California company to set up a series of acoustic antennas that will triangulate the origin of gunfire. To calibrate the antennas, deputies will need to shoot a total of 48 bullets at two locations inside the Main Injector. In the off chance that this does not fully calibrate the antennas, deputies will fire up to an additional 12 shots at a third location outside the Main Injector, but still well within inside the laboratory boundary with Kirk Road.

Each series of shots will last about three minutes. The entire exercise is expected to take two hours at most. Deputies will fire the bullets into a protective box that allows the sound to travel but not the ammunition. Once calibrated, the antennas should help police quickly locate the origin of future gunfire, potentially aiding in an arrest. Deputies will be stationed along the Ring Road at areas where test firing is occurring. The shooting won't interfere with laboratory operations.

Anyone with questions about the calibration should

## Calendar

### Have a safe day!

Thursday, Dec. 16

2:30 p.m.

[Theoretical Physics Seminar](#) - Curia II

Speaker: Ayan Paul, University of Notre Dame

Title: LHT and c: Gambling in Standard Model's Backyard

3:30 p.m.

DIRECTOR'S COFFEE BREAK - 2nd Flr X-Over THERE WILL BE NO ACCELERATOR PHYSICS AND TECHNOLOGY SEMINAR THIS WEEK

Friday, Dec. 17

1 -5 p.m.

[Tevatron 25th Anniversary of first collisions symposium](#) - Ramsey Auditorium

3:30 p.m.

DIRECTOR'S COFFEE BREAK - 2nd

Flr X-Over  
4 p.m.  
THERE WILL BE NO JOINT  
EXPERIMENTAL-THEORETICAL  
PHYSICS SEMINAR THIS WEEK  
5:30 - 8:30 p.m.  
[Potluck party](#) - Wilson Hall atrium

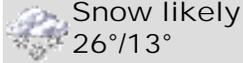
Click here for [NALCAL](#),  
a weekly calendar with  
links to additional  
information.

[Upcoming conferences](#)

## Campaigns

[Take Five](#)

## Weather



Snow likely  
26°/13°

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

[Current Security Status](#)  
[Sec 2 Level 3](#)

## Wilson Hall Cafe

Thursday, Dec. 16

- Breakfast: Chorizo burrito
- \*Chunky vegetable soup w/ orzo
- Buffalo chicken wings
- Cajun breaded catfish
- \*Teriyaki pork stir-fry
- Honey mustard ham & swiss panini
- Assorted sliced pizza
- \*Carved turkey

*\*carb-restricted alternative*

[Wilson Hall Cafe Menu](#)

## Chez Leon

Thursday, Dec. 16  
Dinner

- Shrimp cocktail
- Prime rib
- Baked potato
- Steamed broccoli
- Chocolate mousse pie

Wednesday, Dec. 22  
Closed

[Chez Leon Menu](#)

Call x3524 to make your reservation.

## Archives

contact the Fermilab Office of Communication at (630) 840-3351.

-*Tona Kunz*

## Feature

### Apply now for URA Visiting Scholars awards program

Universities Research Association, Inc. has announced a deadline of Feb. 18 for the submission of applications for the spring 2011 cycle of awards in the URA Visiting Scholars Program at Fermilab. Successful applicants will be notified at the end of March.

These awards provide financial support for faculty and students from URA's 86 member universities to work at Fermilab for periods of up to one year. URA makes two rounds of awards each year, in the spring and fall. The application deadline for the fall 2011 cycle is on Aug. 19. Successful applicants will be notified at the end of September 2011.

Proposals may range from attendance at conferences or summer schools to year-long research stays. Support from this program can include transportation costs, local lodging expenses during a series of shorter visits or salary support during a longer visit. Individual awardees may receive up to a maximum of \$50,000 in any 12-month period. URA has made a total of 104 awards since the beginning of 2008, including 17 awards conferred in September 2010.

The program is a corporate commitment to Fermilab made by URA under the FRA contract with the Department of Energy. The 86 URA-member universities each contribute \$5,000 a year for five years in support of joint Fermilab-URA research and education initiatives.

For details on the URA Visiting Scholars at Fermilab Program, including eligibility, application procedure, award administration and names of award recipients, visit the [URA Visiting Scholars Web site](#).

-*Rhianna Wisniewski*

## Special Announcement

### Potluck Party takes place Friday

Don't forget to get a dish ready for the laboratory Potluck Party tomorrow, Friday, Dec. 17.

Between 5 and 6:45 p.m., Fermilab employees, retired employees, users, contractors, funding-agency employees and their families and friends will gather in the Wilson Hall atrium to enjoy a wide variety of cultural cuisine. Please bring to share an appetizer, side or main dish that can supply at least 20 tasting portions. Foods representing your ethnicity or culture will be appreciated. The laboratory will provide non-alcoholic beverages.

A talent show will take place from 5-8:30 p.m., following the potluck.



Andy Haas  
Columbia Univ/SLAC

Yvonne Peters  
U. Manchester/FNAL  
UK

Andy Haas and Yvonne Peters performed this challenging analysis.



James Agnew  
Univ. Manchester  
UK

Patrice Lebrun  
IPNL  
France

Björn Penning  
Fermilab



Jan Stark  
LPSC, Grenoble  
France

Siqi Yang  
USTC, Hefei  
China

Hang Yin  
USTC/Fermilab  
China

These physicists have played a key role in calibrating the calorimeters. This effort is crucial to get an accurate enough measurement of the energy flow necessary to perform this analysis.

## Accelerator Update

Dec. 13-15

- Three stores provided ~36 hours of luminosity
- Store 8361 aborted due to a CIA (vacuum) crate failure
- MI-20 power supply door switch repaired
- Cryo system techs worked on wet engines at TeV sectors A3 and C1
- MI-52 Septa tripped off, which held off the T-944 beam

[Read the Current Accelerator Update](#)

[Read the Early Bird Report](#)

[View the Tevatron Luminosity Charts](#)

## Announcements

[Fermilab Today](#)[Director's Corner](#)[Result of the Week](#)[Safety Tip of the Week](#)[CMS Result of the Month](#)[User University Profiles](#)[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)

Visit the Fermilab  
[home page](#)

[Unsubscribe](#) from *Fermilab Today*

Please see the [Potluck Party website](#) for information about what to bring, where to store food and the list of performances.

[In the News](#)

## No black holes, but extra time at LHC

From *Nature*, Dec. 14, 2010

The end of the world is not nigh after all. Flouting predictions from some theorists, microscopic black holes have so far failed to appear inside the Large Hadron Collider (LHC), scientists there have revealed.

The result, which will be posted this week on [arXiv.org](http://arXiv.org), comes as researchers make plans to keep the LHC running until the end of 2012, rather than 2011 as previously scheduled. The 27-kilometre collider at the particle-physics laboratory CERN near Geneva, Switzerland, had endured delays and a crippling breakdown before finally surging to life late in 2009, and physicists say it is now performing above expectations.

Predictions of mini black holes forming at collision energies of a few teraelectronvolts (TeV) were based on theories that consider the gravitational effects of extra dimensions of space. Although the holes were expected to evaporate quickly, some suggested that they might linger long enough to consume the planet. But scientists at the Compact Muon Solenoid (CMS) detector now say they found no signs of mini black holes at energies of 3.5–4.5 TeV. Physicist Guido Tonelli, the detector's spokesperson, says that by the end of the next run, the LHC should be able to exclude the creation of black holes almost entirely.

[Read more](#)

[Reserve now for extra Chez Leon lunch on Friday, Dec. 17](#)

[Annual potluck party and skits Friday](#)

[Transportation services holiday service closed Dec. 23 and 30](#)

[Timecards due early for Week of Dec 13 - 19](#)

[Symposium celebrates 25th anniversary of first collision at Tevatron today](#)

[Timecard instructions for non-exempt employees working on half holiday](#)

[Reminder: timecards due early for week of Dec. 20 - 26](#)

[Eastbound Butterfield Road closed until Dec. 20](#)

[School's Out day camp - Dec. 21-22, 27-29](#)

[Fermilab Blood Drive - Dec. 20 & 21 \(Walk-in only\)](#)

[Movie tickets make gift giving easy](#)

[Medical Department holiday schedule](#)

[Weight Watchers introduces new PointsPlus program](#)

[Guided practicas for Argentine Tango thru Dec. 29](#)

[Submit a topic suggestion for Disability Awareness Seminar](#)

[Fermilab Today holiday schedule](#)

[Open basketball at the gym](#)

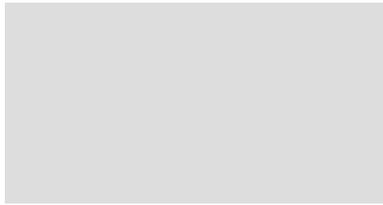
[Folk dancing on Thursdays in December](#)

[Fermilab Arts and Lecture Series box office winter schedule](#)

[Users Office holiday hours](#)

[Accelerate to a Healthy Lifestyle Program through Dec. 31](#)

[Disney On Ice presents "Toy Story 3"](#)



[Feb. 2-13](#)

[Submit an announcement](#)