Fermilab Today

Wednesday, Oct. 1, 2014

Calendar

Have a safe day!

Wednesday, Oct. 1

10:30 a.m.
Research Techniques Seminar - Curia II
Speaker: Kevin Hickerson, University of California, Los Angeles
Title: Precision Electroweak Tests for New Physics using Ultracold Neutrons

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

THERE WILL BE NO FERMILAB COLLOQUIUM THIS WEEK

Thursday, Oct. 2

11 a.m.
Intensity Frontier Seminar - WH8XO
Speaker: Zelimir Djurcic, Argonne National Laboratory
Title: LBNE

2:30 p.m.
Theoretical Physics Seminar - Curia II
Speaker: Daniel Stolarski, CERN
Title: Emerging Jets

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

Visit the labwide calendar to view Fermilab events

Weather

Feature

Going larger than the Large Hadron Collider: first steps toward a future machine

The Next Steps in the Energy Frontier – Hadron Collider workshop met at Fermilab's LHC Physics Center in late August. *Photo: Reidar Hahn*

In 2012, when scientists at CERN's Large Hadron Collider discovered the Higgs boson, the machine was colliding particles at an energy of 8 teraelectronvolts, or 8 TeV. Just imagine what a 100-TeV collider could uncover.

That's what more than 80 scientists in the field of particle physics discussed at a workshop hosted by the LHC Physics Center at Fermilab from Aug. 25-28. Such a collider could unlock profound mysteries of the modern era of physics that remain unanswered. The world's leading experts in accelerators, detectors and particle physics theory gathered to outline how the community could take the "Next Steps in the Energy Frontier" to address these questions.

The global community has put forward two possible initiatives for a 100-TeV hadron collider: one based in Beijing, called the Super Proton Proton Collider, and one based at CERN in Geneva, the Future Circular Collider. If built, such a collider would be the largest ever, capable of probing nature at the shortest possible distance ever explored, 10^{-18} centimeters.

"No matter what the next few years of experiments — in the lab, underground and in space — will unveil, the direct

From the CMS Center

CMS: design, construction, operations

Steve Nahn

Steve Nahn, U.S. CMS detector upgrade project manager, wrote this column.

It's a very busy and sometimes hectic place on Wilson Hall's 10th and 11th floors these days working on CMS. Rather than progressing sequentially through design, construction and operations phases of the CMS detector upgrades, we are going through all three simultaneously. This leads to a certain amount of jumping around.

The design component addresses the high-luminosity LHC era commencing in the mid-2020s, at which time the LHC's total luminosity will increase 10-fold. To exploit the physics opportunities afforded by the more intense beam while coping with increased radiation dose, we must replace or upgrade key components of the detector. A large fraction of the collaboration spent the summer studying what sort of detector we would need in that demanding environment. The result, a 300-plus-page technical proposal, is nearly ready for release, and R&D efforts at Fermilab and collaborating institutes are already framing the technologies needed to make these Phase 2 upgrades a reality.

The construction component, the Phase 1 Upgrade Project, is a set of strategically targeted upgrades to cope with the imminent increased instantaneous luminosity starting next year and continually growing up to the high-luminosity LHC era. The design for this phase is complete, and the job at hand is to build the new sensors, back-end electronics and online triggering system. This project just went through

Mostly sunny 72°/60°

Extended forecast
Weather at Fermilab

Current Flag Status

Flags at full staff

Wilson Hall Cafe

Wednesday, Oct. 1

- Breakfast: breakfast casserole
- Breakfast: ham, egg and cheese English muffin
- Chicken cordon bleu
- Rosemary chicken breast
- Italian lasagna
- Turkey bacon panino
- Mongolian beef or chicken stir fry
- Chunky broccoli cheese soup
- Texas-style chili
- Assorted calzones

Wilson Hall Cafe menu

Chez Leon

Wednesday, Oct. 1
Dinner
- Grilled tilapia
- Smoked paprika and parmesan polenta
- Sauteed green beans
- Walnut tart

Friday, Oct. 3
Dinner
Closed

Chez Leon menu
Call x3524 to make your reservation.

Archives

Fermilab Today

Director's Corner

Frontier Science Result

Physics in a Nutshell

Tip of the Week

User University Profiles

exploration of the shortest possible distances remains the principal probe of the fundamental laws of nature," said CERN scientist Michelangelo Mangano. "Preparing for the next step in this endeavor is a duty, and it's fun!"

It would also be the first particle accelerator to have decisive coverage of exploring a weakly interacting massive particle dark matter candidate. It would also shed light on the mass scale related to the widely discussed naturalness aspects of nature, the asymmetry between matter and antimatter observed in our universe, rare phenomena associated with Higgs boson productions, and symmetry between matter and forces, among other unresolved matters.

The workshop provided a platform where leaders from Beijing and CERN discussed in detail for the first time in the United States the issues attendant in realizing the technology required by such a high-energy collider: strong high-field superconducting magnets, including those that can operate at higher temperatures; precise, fast, high-resolution, radiation-hard silicon detectors only 10 to 30 microns thick; imaging energy-measuring calorimeters; next-generation computing frameworks for trigger systems and analyses and other advancements.

"It was a very special experience to be on the 'ground floor' of such a grand, ambitious and worthwhile collective endeavor. The array of theorists and experimentalists at the workshop included the world's best," said Raman Sundrum from the University of Maryland.

As with any innovation, these technological advancements will have an impact beyond fundamental research, benefiting industrial fields in R&D and cost. Indeed, a project of this magnitude will require synergies between various initiatives and provide international collaboration opportunities not only within the scientific communities, but also with industry. Members of the particle physics community plan to continue efforts toward a 100-TeV hadron collider, with the United States playing a central role.

"This workshop opens a vision for the future of the study of fundamental interactions that points beyond the

Critical Decision 2 and 3 reviews simultaneously. The conclusion was a resounding recommendation for approval after a few technical details are resolved. The approval, which we hope will come through in November, will allow us to transition into production mode, launching activities at SiDet, Wilson Hall and the Feynman Center at Fermilab, as well as at the 30 collaborating U.S. universities, to move the project from design to installation in the next few years.

Lest we forget, there is the ongoing, operating experiment, perhaps the most exciting of the three phases. The LHC is poised to restart in spring 2015, after a two-year shutdown at twice the center-of-mass energy, the last significant step foreseen. The low mass of the Higgs argues for new physics that may appear in the next run, and the collaboration is gearing up to find it. This involves a program of extended running of the entire detector with cosmic rays before the beam returns to bring the detector back to peak efficiency, computing challenges to make sure the offline data production is ready, and increased effort on the analysis chain, particularly for potential early high-profile discoveries. A new discovery in 2015 would be fantastic, full stop, and we are committed to ensuring we are ready for such an opportunity.

There is indeed a lot of exciting work going on. And amid all this, there's still one more thing to mention: Our fearless leader Patty McBride is transitioning from U.S. CMS program manager into her role as head of the Particle Physics Division. We know she isn't going far — only three floors down in Wilson Hall — but we'll miss her anyway. We take this opportunity to give her a giant "thank you" for her leadership and tireless efforts up here on the 11th floor. PPD is lucky!

Related content

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coming decade, continuing to follow our passion for science," said workshop co-organizer Meenakshi Narain of Brown University.

—Sanjay Padhi, Next Steps in the Energy Frontier workshop co-leader, University of California, San Diego Distinguished LPC Researcher

This Day in Fermilab History

October 1, 1989: the beginning of the Computing Division

Heads of Fermilab computing since 1989. Top row, from left: Tom Nash (Computing Division head, 1989-1994), Joel Butler (Computing Division head, 1994-1998), Matthias Kasemann (Computing Division head, 1998-2002). Bottom row, from left: Vicky White (Computing Division/Sector head, 2002-2013), Rob Roser (Computing Sector head/CIO, 2014).

Twenty-five years ago today, the Fermilab Research Division's Computing Department merged with the Advanced Computer Program group and some personnel from other departments to form the Computing Division. The creation of this new division recognized the increasing importance of computing at the lab.

In the November/December 1989 Fermilab Report, the first head of the Computing Division, Tom Nash, stated that "[The Division's] driving goal is to establish a major center of excellence in the operation and development of computing and data acquisition for high-energy physics. This is the key pillar of Fermilab's long-term future."

The new Computing Division comprised five departments: the Central Computing Department (led by Peter Cooper), the Distributed Computing Department (led by Al Thomas), the Data Acquisition Support Department (led by Vicky White), the Data Acquisition Electronics

The operations phase of LHC Run II is only months away.

Photo of the Day

Tintype tunnel

AD's Chris Olsen practices Civil War-era photography. In this wet-plate collodion tintype, he features the Fermilab Booster RF stations. (He received dispensation from radiation safety to take his equipment into the Booster tunnel.) You can view more of his photographs on his Flickr site. *Photo: Chris Olsen, AD*

Safety Update

ESH&Q weekly report, Sept. 30

This week's safety report, compiled by the Fermilab ESH&Q Section, contains two incidents.

An employee caught his hand between a material lift device and some cabinets. He received medical treatment. This is a DART case.

An employee noticed a redness on his skin, which itched. He received first-aid treatment.

See the full report.

In the News

Finding supports model on cause of DNA's right-handed double helix

From University of Nebraska - Lincoln Newsroom, Sept. 18, 2014

The DNA of every organism on Earth is a right-handed double helix, but why that would be has puzzled scientists since not long after Francis Crick and James Watson announced the discovery of DNA's double-helical structure in 1953.

It's a puzzle because no one has been able to think of a fundamental reason why DNA couldn't also be left-handed.

Department (led by Ed Barsotti), and the Computing R&D Department (led by Joe Biel). Jack Pfister, Joel Butler, and Irwin Gaines served as associate division heads.

You can read more about the beginnings of the Computing Division on pages 65 and 66 of the October-November 1989 issue of the Fermilab Computing Division Newsletter and on pages 1 and 3 of the November 24, 1989, issue of *FermiNews*. You can also learn more about the history of computing at Fermilab on the History and Archives Project's finding aids for the Dave Ritchie papers and Computing Division publications. This month's issue of *Computing Bits* celebrates the Computing Division's 25th anniversary.

From the Fermilab History and Archives Project

In the News

Dark matter development — only a matter of time

From *The Stawell Times-News*, Sept. 26, 2014

Confirmation that Stawell [Australia] will become home to an Underground Physics Laboratory — the first of its kind in the Southern Hemisphere, could come as soon as next week.

Anticipation is growing that the site of the Stawell Gold Mine harbours the conditions to support the detection of dark matter.

Such is the confidence and commitment from experts in the field, representatives from the ARC Centre of Excellence for Particle Physics (CoEPP) at the Terascale have developed a 10 year plan based on the proposed Stawell Underground Physics Laboratory.

"I'm fairly confident we'll hear something soon, it could be very soon — even next week, but if not we'll definitely know by Christmas," Northern Grampians Shire Mayor, Cr Kevin Erwin said.

Read more

New research by University of Nebraska-Lincoln physicists and published in the Sept. 12 online edition of Physical Review Letters now gives support to a long-posited but never-proven hypothesis that electrons in cosmic rays — which are mostly left-handed — preferentially destroyed left-handed precursors of DNA on the primordial Earth.

Read more

Announcements

Today's New Announcements

Paul Taylor's Taylor 2 Dance in Ramsey Auditorium - Oct. 11

Lecture Series: Success and Failure in Engineering - Oct. 24

Access 2010: Intermediate - today

Employee discount for Chicago Fire vs. Montreal Impact - Oct. 5

English country dancing Sunday afternoon at Kuhn Barn - Oct. 5

Labwide celebration - Oct. 8

Nominations for Director's Award close Oct. 10

Interpersonal Communications Skills - Oct. 21

Excel 2010: Intermediate - Oct. 29

Writing for Results: Email and More (morning only) - Oct. 30

Managing Conflict course (morning only) - Nov. 5

Access 2010: Advanced - Nov. 12

Excel 2010: Advanced - Dec. 3

Featured eBook on HEP data analysis

Needed: BeV Accelerators: Studies on Experimental Use, vols. 1 & 2

NALWO Playgroup meets Wednesdays at Users Center

Yoga registration

International folk dancing Thursday evenings at Kuhn Barn

Scottish country dancing Tuesday evenings at Kuhn Barn

Indoor soccer

Submit an announcement