

Dear SURF Readers,

Welcome to the April 2012 Sanford Underground Research Facility (SURF) monthly newsletter. In the coming months, this newsletter will be posted online, but a pdf copy will be available. You will also receive an email reminder every month providing the link to the newsletter and SURF news updates. We will still be glad to receive your input on news, links to news articles, upcoming workshops, conference notices, scientific updates, information concerning SURF, employment opportunities, and other highlights relevant to our shared goal.

Important Dates

**May 8-10: MAJORANA DEMONSTRATOR
Collaboration meeting – Lead, South Dakota**

**May 30: Davis Campus 4850 Level
Opening ceremony – Lead, South Dakota**

Long-Baseline Neutrino Experiment (LBNE) - The Path Forward

LBNE reached a significant milestone in January 2012 when its technology decision-making process was completed. After many meetings and discussions, a CDR review, various reports, and weighing the pros and cons for all the possibilities, LBNE Project Manager Jim Strait of Fermilab selected the Liquid Argon far detector (LAr), rather than the Water Cerenkov Detector (WCD). Although both designs were considered to be sound and would perform the measurements needed, the Science Capabilities Review unanimously concluded that the capabilities of the LAr detector exceeded those of the WCD, so the decision was made in favor of the LAr. All parties concerned concurred with this conclusion. The plan was then presented to DOE's Office of Science Director Bill Brinkman for his approval on how to proceed, and whether or not the detector would be installed at the 4850 Level Davis Campus at SURF in Lead, South Dakota.

LBNE has experienced a few ups and downs since then, especially after Fermilab Director Pier Oddone received word from Office of Science Director Brinkman that the Department of Energy could not

support the LBNE project as it is currently configured. The main issue is an economic one, as the proposed science is generally agreed to be of significant value. A large size detector, built deep underground, is necessary to explore fundamental issues in particle physics and astrophysics in the specific areas of neutrino oscillations, proton decay, and supernova neutrinos. Brinkman requested a phased approach and a consideration of alternative LBNE configurations.

LBNE held a Director's Review at Fermilab on March 26-30, to review the Independent Conceptual Design and CD-1 Readiness Review of LBNE. LBNE project members presented their review to Fermilab Director Pier Oddone in advance of the CD1 review. By understanding all the issues and costs involved, collaboration members hope to better develop future options.

Following on these events and concerns, a Fermilab Steering Committee and two working groups have been formed, led by Fermilab Deputy Director Young-Kee Kim in order to guide the LBNE implementation. Mel Shochet of University of Chicago will chair the Physics Working group of approximately 15 members, and Mark Reichenbacher of SLAC will chair the Cost/Engineering Group of 10 people. The new committee will study phased approaches and consider alternative LBNE configurations. Committee members include SURF Principal Investigator Kevin Lesko and LBNL Associate Lab Director James Symons in the Steering Committee, LBNL SURF Physicist M.G. Gilchriese in the Physics Working Group, and SURF Director Mike Headley in the Cost Group. The committee plans to deliver its draft report by June 1, and a final report by July 1.

An LBNE Reconfiguration workshop took place at Fermilab on April 25-26, and was open to all interested parties. The workshop's goal was to inform the community, discuss the status of the work in progress, and request community input on the project. An LBNE collaboration meeting followed on April 26-28.

For more on LBNE and upcoming events, see <http://lbne.fnal.gov/>, and *SURF in the News* on page 2.

DOE Site Visit

On April 2, SURF Laboratory Director Mike Headley welcomed Department of Energy (DOE) and Lawrence Berkeley National Laboratory (LBNL) officials to SURF for a site visit to evaluate progress.

Figure 1 shows DOE visitors Facilities Division Director Michael Procaro and Program Manager for LBNE Eli Rosenberg, and LBNL visitors Physics Division Director Natalie Roe, Deputy Physics Division Director Tony Spadafora, and Associate Lab Director James Symons. This was the first time Roe, newly appointed, had been to the site. The tour focused on the Davis Campus.

"I think they were impressed with the transformation from what was a mine into a modern laboratory," said Kevin Lesko, SURF Principal Investigator and Head of the Operations Office at SURF.



Figure 1: At the Ross Shaft station on the 4850 Level. Left to right: James Symons, Tony Spadafora, Natalie Roe, Michael Procaro and Eli Rosenberg

SURF: Supplement Articles

As Sanford Lab prepares for research operations to be housed at the 4850 Level, a series of SURF Newsletter Supplement articles will explore some of the science basic to the Sanford Underground Research Facility, e.g. the LUX and MAJORANA DEMONSTRATOR experiments. The first paper, "The Construction of a Low-Background Underground Laboratory at the 4850 Level" is now available at: <http://www.dusel.org/html/early-science-progress.html>.



SURF IN THE NEWS

Nature.com: [US physicists fight to save neutrino experiment](#) (Eugenie Reich, March 26)

Physicsworld.com: [Fermilab told to rein in planned neutrino experiment](#) (Hamish Johnston, March 26)

Fermilab Today: [Long-Baseline Neutrino Experiment](#) – Director's Corner (April 3)

Symmetry Magazine: [Physicists mobilize to rescue U.S. neutrino experiment](#) (Kathryn Grim, April 4)
[Dark-matter search goes deep underground in South Dakota](#) (Bill Harlan, April 2012)
[Moving day for experiment examining whether neutrinos are their own antiparticles](#) (Bill Harlan, March 28)

Keloland TV.com: [Dark Matter Project in Lead Close to Launching](#) (Derek Olson, April 15)

KDLT News, News Center1.tv (AP): [Dept. Of Energy Officials Tour Sanford Lab](#) (April 4)

National Geographic Daily News: [Dark Matter Blob Should Not Exist](#) (Ker Than, March 6)

Black Hills Pioneer: [DOE pulls back from major Sanford Lab experiment](#) (Wendy Pitlick, April 13)
[DOE calls for even larger dark matter experiment](#) (Wendy Pitlick, April 10)
[DOE officials view progress at Sanford Lab](#) (Wendy Pitlick, April 3)
[Sanford Lab employs 116](#) (Wendy Pitlick, March 22)
[MAJORANA scientists plan to move underground Monday](#) (Wendy Pitlick, March 20)
[MAJORANA scientist explains fundamental importance of experiment](#) (Wendy Pitlick, March 19)
 – also on duselwatch.com

Rapid City Journal: [Daugaard appoints SDSM&T president to board overseeing Sanford Lab](#) (April 5)

For twitter updates see: www.sanfordlab.org

Reports Available: The National Research Council report – "An Assessment of the Deep Underground Science and Engineering Laboratory":
http://www.nap.edu/catalog.php?record_id=13204

Marx-Reichanadter Committee report to DOE:
http://science.energy.gov/~media/np/pdf/Review_of_Underground_Science_Report_Final.pdf

SANFORD UNDERGROUND LABORATORY NEWS

Dewatering Levels

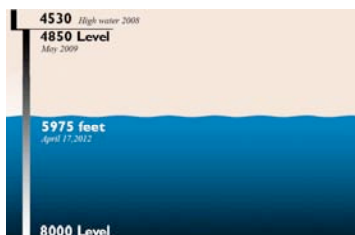


Figure 2: Progress of dewatering at Sanford Lab

The Figure 2 graphic indicates the dewatering progress made at Sanford Lab. As of April 17, the water level was at 5975 feet, its lowest point ever. The high water mark, in August 2008, was at 4350 feet underground.



Figure 3: Steve Elliott (at right, on ladder) takes a measurement to install framework for a soft-wall clean room inside the MAJORANA assembly area

MAJORANA moves into Davis Campus

On March 26, the MAJORANA DEMONSTRATOR collaboration began moving their experiment into the Davis Campus on the 4850 Level. Los Alamos National Laboratory physicist Steve Elliott is the MAJORANA spokesperson. Elliott and other members of the collaboration began planning their experiment in 2000 so this is a major milestone for the project. The experiment will run through 2017, with the goal to detect neutrinoless double-beta decay.

Elliott (shown in Figure 3) said that one of the first steps underground will be the installation of a soft-wall clean room, consisting of wide plastic strips hanging from the ceiling of the MAJORANA assembly room. Extra HEPA filters inside the soft walls will be used for air purification.

Rope-Dog Tower Update

During the last week in March, the rope-dog tower was completed, and the Yates Shaft is much closer to becoming the main entryway into the SURF underground laboratory. SURF personnel began staging materials in preparation for the next step: lowering two 5200-foot steel-wire ropes down the shaft. Until April, the Ross Shaft served as the main entrance. This will shorten the trip, as visitors to the Davis Campus at the 4850 Level have to walk or ride for about one kilometer to reach their destination.

Staff will use a winch, installed in the Yates Shaft yard, to lower each of the 35,000-pound dog ropes down the shaft and into position. The Yates Shaft will be out of service during that phase of the project. Once the Yates Shaft is in full service, replacement of steel in the Ross Shaft will begin. On April 9, technicians (Figures 4 and 5) began lowering one of the two 5200-foot dog ropes that will anchor the new safety system in the Yates Shaft.



Figure 4: Project Engineer Mike Johnson, who is overseeing the rope-dog project, inspects the top of the rope-dog tower. Photo by Matt Kapust is a composite of two frames from a time-lapse video sequence.



Figure 5: Infrastructure technicians Bill Heisinger (kneeling) and Trevor Ray attach a "cheese weight" to the end of the steel-wire rope to stabilize it

EDUCATION AND OUTREACH

Recent Activities

Classroom Visits: In the last month, the Yates Education Building at SURF has hosted high school classes studying a variety of subjects ranging from government to physics. These include:

Lead-Deadwood High School students visited the lab on March 12 for Government Day, hosted by SURF Communications Director Bill Harlan.

Professor Kara Keeter of BHSU hosted two Quarknet Master Classes at the Yates Education Building on March 12 and 21. Local high schools participating with their students included Hill City, Lead-Deadwood, Spearfish, and Timber Lake. In addition to analyzing data from the ATLAS experiment at CERN, students took part in a surface tour organized by SURF Science Liaison Director Jaret Heise, and were joined at lunch by Sanford Lab scientists.

On Friday, April 13, Chamberlain High School brought 13 students for a lucky day of science (shown in Figure 6). They attended workshops on radiation and waste water treatment, and toured the Waste Water Treatment Plant, the LUX Surface Lab, and the Yates Hoist Room. Deputy Education and Outreach Director Peggy Norris arranged the visit with Chamberlain physics teacher John McEnelly, who had previously attended a professional development course taught by Norris. Chamberlain English teacher Amy Donovan also took part in the visit, along with chaperones Lyle and Lorna DeHaai.

The students were divided into two groups. One took part in a radiation workshop with Norris, and then

visited the SURF surface laboratory, where University of California Davis graduate student Jeremy Mock took time out from packing up the LUX detector for deployment underground to talk to the students about the LUX dark-matter detector. (A special thanks to him!) The second group worked with SURF Education Specialist Julie Dahl and SURF Environmental Consultant Jim Whitlock to create their own small water filtration systems, and then toured the water treatment plant.

At the Yates Shaft hoist room, the students watched a hoist operator lower the Yates Shaft service cage for the first time since the installation of the new rope-dog safety system. While this is a milestone for SURF, the students were most impressed with a 1960s era "Fallout Shelter" which holds 760 people. The vintage sign and shelter are located in the basement of the hoist room. Norris took advantage of the opportunity to educate the students about radiation—then and now.



Figure 6: Before heading back to Chamberlain, the physics class (in middle) pauses in front of the Yates Shaft for a group photo. From the left: Julie Dahl, Amy Donovan. From the right: John McEnelly, Jim Whitlock, Lyle DeHaai, Peggy Norris, and Lorna DeHaai.

Undergraduate Activities: SURF Environmental Consultant Jim Whitlock and South Dakota School of Mines and Technology (SDSMT) Instructor Cabot-Ann Christofferson jointly spoke to approximately 35 undergraduates attending the American Institute of Chemical Engineers meeting at SDSMT on March 31. They presented an overview of the SURF facility, discussed the treatment of waste water, and described the MAJORANA DEMONSTRATOR electroforming laboratory on the 4850 Level.

Davis-Bahcall Scholars

The 2012 Davis-Bahcall Scholars have just been selected for the Summer program. They will spend two weeks at SURF during the first part of July, followed by a week at Gran Sasso Laboratory in Abruzzo, Italy, and finally, a week in the Chicago area visiting Fermilab and Argonne National Laboratories. This year's program is funded by 3M Corporation and the South Dakota Space Grant Consortium. Selected participants are listed in Figure 7.

Figure 7: 2012 Davis-Bahcall Scholars

Name	School	Hometown (SD)
Adelyn Crabtree	T.F. Riggs High School	Pierre
Stacy Deibert	Brandon Valley High School	Brandon Valley
Sophia Elia	Stevens High School	Rapid City
Nicholas Kantack	Brookings High School	Brookings
Alex Rickel	Washington High School	Sioux Falls
Esteben Rodriguez	Andes Central High School	Lake Andes
Abraham Schwartzrock*	South Dakota State Univ.	Wolsey
Mark Sperry*	Northern State Univ.	Bath
Jaysen Spurlock*	South Dakota School of Mines and Technology	Spearfish
Erin Yellow Hair	Chamberlain High School	Pine Ridge

* South Dakota Space Grant Consortium Davis-Bahcall Scholar

The monthly *Brown Bag Seminar* series continued at SURF in Lead, on Wednesday, April 18. SURF Environmental Consultant Jim Whitlock and Education Specialist Julie Dahl facilitated activities with talks on Water Filtration, discussing the water level report, the water treatment process, and different aspects of the water treatment plant. Participants worked in teams to design, construct, and test a basic filter made from everyday materials. Participants also had the opportunity to sign up for a tour of the water treatment plant, to be taken at a future date.

Upcoming classroom visits in South Dakota include a chemistry class from Lemmon, a physics class

from Spearfish, physics and biology classes from Wall, and middle and elementary school classes from Bison, Wall, Lead-Deadwood, Rapid City, Sturgis, and Gillette (in Wyoming).

Cultural Advisory Committee



The Cultural Advisory Committee (CAC) participated in American Indian Awareness week, which took place at Black Hills State University (BHSU) in Spearfish, South Dakota from April 10-15. Activities included many lectures, an annual run, and a buffalo feed. The *Lakota Ominiciye* student organization also hosted the 29th annual "*Lakota Ominiciye Wacipi*" (powwow) to educate the community about Indian culture.

The CAC participated in the ranking and rating of applicants for this year's South Dakota Hagen-Harvey Scholarships awarded to recent high school graduates who are enrolled members in one of South Dakota's nine American Indian tribes. Recipients must attend an institute of higher education located in South Dakota. Recipients are chosen based on qualities such as leadership potential, demonstration of exceptional talent, ACT test score, high school grade point average, and other indicators. Approximately seven scholarships will be awarded for this school year.

Other activities included a CAC meeting held at SURF on April 16 to establish goals for the coming year for outreach and partnership to underserved populations in the area, a meeting with the outgoing Crow Creek Tribal Superintendent in central South Dakota, and a presentation on SURF CAC activities to the South Dakota Tribes and schools.

ENVIRONMENT, HEALTH & SAFETY



Bike Safety

- Warm weather is here and bicycling is a good way to have some family time and get some fresh air.

- Wear a helmet: Make sure the helmet fits correctly and has adjustable straps. Pick a bright color so you will be visible to drivers.
- Wear safe clothing: Lightweight clothes, pant legs that are not too loose fitting, and shoes that will grip the bike pedals.

Safety pages on Sanford Lab website:

www.sanfordlab.org - Use the left hand menu to open individual pages

STAFF NEWS

Duane Ennis, SURF Maintenance Technician and twenty-year Homestake mine veteran, was selected to serve as the Safety Committee's new Chairperson. He brings a strong background in SURF facility operations, understands the challenges involved in maintaining and operating a safe facility, and recognizes the health and safety issues among the SURF workforce. Thanks also to SURF Director of Operations Greg King, who has served as Committee Chairperson for over three years, during which time he exhibited great leadership abilities in promoting safety at SURF. Greg will continue to participate in the Committee.

New SDSTA Board Member

South Dakota Governor Dennis Daugaard has appointed South Dakota School of Mines & Technology (SDSMT) President Robert Wharton to the Board of Directors of the South Dakota Science and Technology Authority (SDSTA). This board oversees the operation of the SURF facility in Lead, South Dakota.

He replaces Charles Shank, a former Director of Lawrence Berkeley National Laboratory who resigned from the board earlier in April. Dr. Shank now resides in Hawaii, and has served on the SDSTA Board of Directors since 2009. Shank has agreed to continue to advise the SDSTA. Executive Director Ron Wheeler acknowledged Shank's service and thanked him for all he provided to the project.

Wharton has been president of SDSMT since 2008, and has decades of experience in the fields of higher education, private enterprise, and scientific research. He received his Doctorate in Botany from

Virginia Polytechnic Institute, and also attended the Harvard Institute for Education Management and Stanford Executive Program at the Stanford Graduate School of Business. SDSTA board members are appointed to six-year terms.

UPCOMING EVENTS & ANNOUNCEMENTS

Conferences and Workshops

LBNE Reconfiguration Workshop - April 25-26, 2012, Fermilab, Batavia, IL.

<https://indico.fnal.gov/conferenceDisplay.py?confid=5456>

LBNE Collaboration Meeting - April 26-28, 2012, Fermilab, Batavia, IL. For agenda and more information:

<https://indico.fnal.gov/conferenceDisplay.py?confid=5214>

Underground Science Experiments & Research Seminars (USERS) continue bi-weekly on Thursdays, 1:30-2:30 PM. Alternate sessions will be held at LBNL and UC Berkeley, 325 Old LeConte Hall. If you are interested in attending these seminars please subscribe to this email list for future announcements:

<http://dusel.org/mailman/listinfo/ugsseminars>

DURA Events

IDUST2012 on Inter-Disciplinary Underground Science and Technology International Conference - May 9-11, 2012, Apt, France.

<http://lsbb.oca.eu/spip.php?rubrique267>

EUROCK2012, Rock Engineering & Technology for Sustainable Underground Construction International Symposium - May 28-30, 2012, Stockholm, Sweden. <http://www.eurock2012.com/>

46th U.S. Rock Mechanics Geomechanics Symposium - June 24-27, 2012, Chicago, IL. <http://www.armasymposium.org/>

AAPG: Fundamental Controls on Flow in Carbonates - July 8-13, 2012, Saint Cyr-Sur-Mer, Provence, France.

<http://www.aapg.org/education/hedberg/france2012/>

IWAA12: International Workshop on Accelerator Alignment - September 10-14, 2012, Fermilab, Batavia, IL.

<https://indico.fnal.gov/confLogin.py?returnURL=https%3A%2F%2Findico.fnal.gov%2FconferenceDisplay.py%3FconfId%3D4712&confId=4712>

NNN12: Next Generation Nucleon Decay and Neutrino Detectors - October 4-6, 2012, Fermilab, Batavia, IL.

<http://www-ppd.fnal.gov/conf-w/FermilabSponsoredConferences.htm>

NSF announcement of funding opportunities for underground experiments and development:

http://www.nsf.gov/publications/pub_summ.jsp?ods_key=nsf12043

The target date for submission is May 1, 2012. Applicants are requested to contact the relevant Program Director in PHY prior to submission.

Please send information regarding upcoming meetings of interest or presentations from DURA members, as well as other related events to Richard_Gaitskell@brown.edu or jswang@lbl.gov.



JOBS

Physicist Postdoctoral Fellow – Direct Dark Matter Search, Lawrence Berkeley National Lab. LUX dark matter search experiment. Amy Pagsolingan, AVPagsolingan@lbl.gov.

<https://academicjobsonline.org/ajo/jobs/1326>

Postdoctoral Fellow - EXO Double Beta Decay Experiment, Physics Department, University of Illinois. Working on EXO-200 data analysis and R&D for full EXO. Prof. Liang Yang, liangyg@illinois.edu.

<http://inspirehep.net/record/1091455>

Postdoctoral Researcher position – Center for Neutrino Physics, Virginia Tech. Study of neutrino oscillations, working primarily on the Daya Bay Reactor Neutrino Experiment in China. Prof. Jonathan Link, jmlink@vt.edu, Virginia Tech Physics Dept., 317 Robeson Hall, M/C 0435, Blacksburg, VA 24061. Job #0121584. <http://www.jobs.vt.edu>

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Contributors: Kevin Lesko; Bill Harlan (SURF local news); Rick Gaitskell, Duane Moser (DURA News); Peggy Norris, Ben Saylor (Education and Outreach); KC Russell (Cultural Advisory Committee).

Photo/Graphic Credits: Fig. 1: Bill Harlan; Figs. 2-6: Matt Kapust; Fig. 7: Ben Saylor, Peggy Norris

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