

Dear SURF Readers,

Welcome to the July 2013 Sanford Underground Research Facility (SURF) monthly newsletter. The newsletter is also posted online, and a pdf copy is available. You can read recent and archived newsletters at our website at www.sanfordlab.org. We are 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 underground science.

Important Dates

June 24 – July 26: CETUP* Workshop – Lead, SD

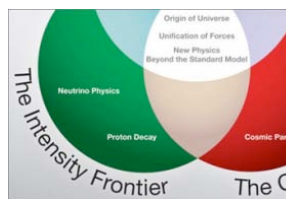
July 29-August 6: Community Summer Study 2013 – Minneapolis

August 19-22: LZ Collaboration meeting – Lead, SD

August 25-30: LZ Collaboration Analysis Workshop – Lead, SD

from Loyola Marymount University, Los Angeles. He brings a wealth of management and leadership experience to the position. Previous to the past five years at Sanford Lab, Headley served as project management officer for satellite systems in the US Air Force for six years, and then joined the USGS Earth Resources Observation and Science Center near Sioux Falls, SD, where he led development of ground systems for the Landsat 8 satellite system.

Headley plans to continue the focus on collaboration and team building, strengthening the science and infrastructure at Sanford Lab. Ron Wheeler has recently been appointed by South Dakota Governor Dugaard to the Board of Directors of the SDSTA, filling a position left vacant by the death of South Dakota School of Mines & Technology's President Wharton last year.



On the Road in Italy

Co-spokespersons Milind Diwan (Brookhaven National Lab) and Robert Wilson (Colorado State University) share the latest LBNE news:

International interest in the US-based Long-Baseline Neutrino Experiment (LBNE) took a big step forward in the first half of this year. This was initiated by two significant events: CD-1 (Critical Decision-1) project approval by DOE at the beginning of the year, followed by a statement in CERN Council's 2013 updated European Strategy for Particle Physics that Europe "...should explore the possibility of major participation in leading long-baseline neutrino projects in the US and Japan." In recent months, LBNE and Fermilab leadership have visited the UK, Italy, Switzerland, Japan, and Brazil to take part in discussions on participation in the project.

One of the most recent ventures was a two-day workshop in Padua, Italy, where ten LBNE scientists and engineers met with representatives of the ICARUS *Istituto Nazionale di Fisica Nucleare* (INFN) groups from Padua, Pavia, Naples, Milan, Milan Bicocca, Catania, and Gran Sasso National Laboratory (see Figure 2). The ICARUS international collaboration, led by Physics Nobel Laureate Carlo Rubbia, has built and operated in the Gran Sasso

Headley named SDSTA Executive Director

Mike Headley was named Executive Director of the South Dakota Science and Technology Authority (SDSTA) which operates Sanford Lab. Ron Wheeler had held the position for the past five years (both are shown in Figure 1). Headley joined SDSTA in August 2008, and was named Sanford Lab director in October 2011. He will continue in that role.



Figure 1: Mike Headley presents Ron Wheeler with a signed photo collage from Sanford Lab staff

Headley is a South Dakota native who earned a Bachelor's degree in Computer Science from South Dakota State University before going on to an MBA

underground laboratory a 760-ton liquid argon time-projection chamber (T600), the largest in the world by far, to study cosmic rays, proton decay, and neutrino oscillation. This technology is the basis on which the planned massive LBNE far detector (to be sited at SURF) is being designed.



SURF IN THE NEWS



Figure 2: Participants in the LBNE-ICARUS/INFN workshop in Padua, Italy on June 17-18

After an intensive exchange of ideas and discussion it was agreed that the two collaborations would work closely together on R&D, and that the members of the ICARUS/INFN groups would join the LBNE collaboration. This very positive outcome greatly strengthens the technical and scientific depth of the LBNE collaboration and deepens its international partnerships. Many members of ICARUS are looking forward to their first visit to Lead!

After the workshop, the LBNE team spread out across Italy, giving seminars in Padua, Milan, Catania, Bari, and Gran Sasso.

Reports/Papers Available

Paper: [“The Large Underground Xenon \(LUX\) Experiment”](#) has been published in *Nuclear Instruments and Methods in Physics Research Section A: Accelerators, Spectrometers, Detectors and Associated Equipment*, Vol. 704, 11 March 2013, pp. 111–126.

Cornell University Library: [Why the US Needs a Deep Domestic Research Facility](#) (Kevin Lesko, April 1, [arXiv:1304.0402](#))

For news, twitter updates, and other features see the SURF website: www.sanfordlab.org
Like SURF on Facebook:
<http://www.facebook.com/SURFatHomestake>

South Dakota Public Broadcasting: [South Dakota Artists Explore Dark Matter](#) (Amy Varland, July 11)
[LUX Takes First Laps](#) (Charles Michael Ray, June 24)

KEVN: [Sanford Lab officials explain enormity of proposed experiment](#) (Tessa Thomas, June 25)

Newser.com: [Secret to Dark Matter May Lie Under South Dakota](#) (AP, May 30)

SLAC Today: [Today's SLAC Colloquium: 'LUX and LZ - Large Liquid Xenon Detectors Searching for Particle Dark Matter'](#) (June 17)

Argus Leader.com: [Ron Wheeler named to board overseeing Sanford Lab](#) (July 17)
[School of Mines president tours Sanford Underground Lab](#) (AP, June 25)

KOTA: [New SDSM&T President tours Sanford Laboratory](#) (Nabil Remadna, June 24)

KSFY (SD State Univ): [South Dakota School of Mines president tours Sanford Underground Lab](#) (AP, June 25)

Keloland: [South Dakota School of Mines president tours Sanford Underground Lab](#) (Associated Press, June 25)

High Country News: [Mining for Dark Matter in Lead, South Dakota](#) (Marshall Swearingen, May 29)

The Daily Republic: [SD Mines new president tours Sanford Underground Lab](#) (AP, June 25)
[Locals speak live with underground physicists at Sanford lab](#) (Braley Dodson, June 21)
[Mitchell residents to chat live via video with physicists underground](#) (Braley Dodson, June 18)

Rapid City Journal: [New Mines president tours Sanford lab](#) (Joe O'Sullivan, June 25)

EDITORIAL: [Neutrinos big news at Sanford](#) (Editorial Board, June 25)

[Ultra clean and one mile underground](#) (Mary Garrigan, June 23)

[Lab plans meetings for neutrino experiment](#) (Joe O'Sullivan, June 19)

Black Hills Pioneer (Wendy Pitick): [Science ramping up at Sanford Lab](#) (July 12)

[Tech biologist to detail biofuels research in Neutrino Day lecture](#) (July 11)

[Lead to mark Neutrino Day with dark matter exhibit](#) (July 10)

[Wilson: 'We are stronger together'](#) (July 1)

[Lead, county explore voluntary annexation request from Sanford Lab](#) (Jaci Conrad Pearson, June 29)

[Keeping momentum](#) (June 28)

[Wheeler steps down as Sanford Lab director](#) (June 26)

[Headley named new director of SD Science and Tech Authority, Sanford Lab](#) (Staff, June 25)

[Lead gears up for Neutrino Day](#) (June 25)

DURA News

To comment on DURA, please contact chair Richard Gaitskell (Richard_Gaitskell@brown.edu). For Bio-Geo-Engineering matters, contact Bill Roggenthen (William.Roggenthen@sdsmt.edu). For further information on DURA, see: <http://sanfordlab.org/dura>

SANFORD UNDERGROUND LABORATORY NEWS



Neutrino Day

Sanford Lab hosted its Sixth Annual Neutrino Day on July 13 in Lead. A record crowd of more than 1100 people showed up for the free science festival. At Sanford Lab, more than 750 people toured the Yates Shaft hoist room and listened to talks by Sanford Lab staff. About 140 people participated in a two-way videoconference with the MAJORANA DEMONSTRATOR (MJD) Project experiment on the 4850 Level underground.

In downtown Lead, at the Historic Homestake Opera House, approximately twenty-five science activities (such as that shown in Figure 3) were conducted in the basement and on the second floor. Three lectures were held at the Opera House Theater. Over three hundred people attended the lecture presented by Astronomer Jose Francisco Salgado of Chicago's *Adler Planetarium* (shown in Figure 4). Events also took place at the Homestake Visitor Center.



Figure 3: Daniel Ostraat and Ashley Wingert demonstrate how carbon atoms bond in graphite by peeling away layers of tape

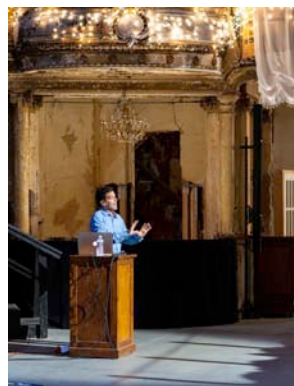


Figure 4: Jose Francisco Salgado of Adler Planetarium gives talk at Historic Homestake Opera House

Thanks to Sanford Lab volunteers and interns, Davis-Bahcall scholars, and sponsors, including *South Dakota Public Broadcasting*, *Black Hills Power*, and the *Lead Chamber of Commerce*.

School of Mines President's Visit

On June 24, the newly appointed South Dakota School of Mines & Technology (SDSMT) President Heather Wilson (shown in Figure 5) toured Sanford Lab. The tour included a round of briefings, a 90-minute tour of the underground facility, and meetings with SURF's top management. President Wilson was

accompanied by SDSMT colleagues (also shown) Dean of Graduate Education Doug Wells, Provost/Vice President Duane Hrcir and Assistant Professor of Chemistry Linda DeVeaux. Sanford Lab enjoys a strong, long-term relationship with SDSMT.



Figure 5: SDSMT President Wilson (right) listens to Brown University Physicist Simon Fiorucci explain the LUX dark matter detector. Colleagues from left include: Doug Wells, Duane Hrcir, and Linda DeVeaux

Other Sanford Lab visitors this summer include Dakota State University President David Borofsky and DSU's Dean of Arts and Sciences, Ben Jones.

MJD update

Copper electroforming continues underground at the MAJORANA DEMONSTRATOR (MJD) Project experiment. The electroformed ultra-pure copper comes off of stainless steel molds (mandrels) as hollow cylinders (shown in Figure 6), which are then cut in half and machined into parts. Copper parts to be used in the experiment assembly include: spring clips, hex bolts, high-voltage rings, cryostat parts, and slabs of shielding. Two years ago, the MJD team began manufacturing pure copper on the 4850 Level, in an electroforming lab near the Ross Shaft. As of July 1, the team has electroformed about 75 percent of the 5000 pounds of copper they will eventually need for their experiment. The process is expected to take another year.

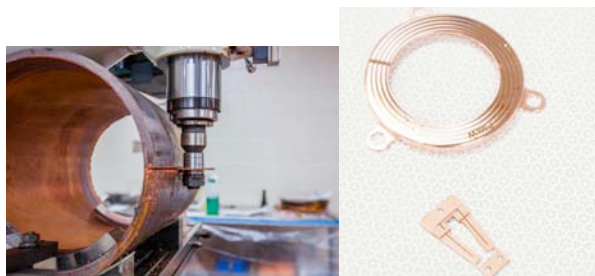


Figure 6: Left: Electroformed copper manufactured from mandrel; Right: (top) Copper spring clip and (bottom) high-voltage ring cut in half and machined from the mandrel

EDUCATION AND OUTREACH

Davis-Bahcall Scholars

Nine Davis-Bahcall Scholars (shown in Figure 7) arrived at Sanford Lab on July 8 for their first two weeks of summer study. The four-week program, made possible by major support from 3M, also includes study at Gran Sasso National Lab in Italy, and Argonne National Lab and Fermilab in the U.S.



Figure 7: Davis-Bahcall Scholars from left: Daniel Ostraat, Eric Roach, Dakotah Simpson, Zachery Crandall, Lia Meirose, Rashyll Leonard, Rachel Nevin, Deputy Director of Education Peggy Norris, Adrian Del Grosso, and Ka Yan (Karen) Lee

Zachery Crandall of Lidgertown, ND, a recent graduate of Britton-Hecla High School, will major in chemistry at SDSMT in Rapid City. Last year, Crandall participated in the South Dakota Boys State program and in the Upward Bound Summer Program, where he received summer honors.

Adrian Del Grosso of Huron, SD plans to major in computer science and engineering at SDSMT. Like four of his fellow scholars, Del Grosso has had a pre-Davis-Bachall internship. Del Grosso's was with *Innovative Systems*, an engineering firm in Mitchell, SD. Last month, during Sanford Lab's public videoconference between Mitchell and the 4850 Level, Del Grosso helped out at the Mitchell end by having a video conversation at the Sanford Lab underground with former Davis-Bahcall scholar and current SURF intern, Sophia Elia.

Ka Yan (Karen) Lee graduated from Aberdeen Central High School (SD) in May. She plans to study architecture at the University of Minnesota, but she also expresses an interest in research. "I'm still open to exploring other options," she said. She will have the opportunity to do this over the next few weeks.

Rashyll Leonard of Montrose, CO, just finished her freshman year at SDSMT, where she is majoring in physics. She learned of the Davis-Bahcall program through a mass email to the Physics Department, and she thinks her experience this summer will help her choose an area of focus for her physics studies.

Lia Meirose is a recent graduate of Sturgis Brown High School (SD). In the fall, she will study mechanical engineering at Montana State University. In high school, Meirose played volleyball, basketball, and golf. She was also on the student council, was a member of Family, Career and Community Leaders of America, qualified for the National Honor Society, and served on the Youth Leadership Team.

Rachel Nevin graduated from Lincoln High School in Sioux Falls, and will major in mathematics and physics at Augustana College in Sioux Falls. She was a drum major for the award-winning Lincoln Patriot Marching Band, a member of the National Honor Society, and the state treasurer for DECA (formerly Distributive Education Clubs of America.). This year, she attended the American Choral Directors Association National Honor Choir in Dallas, Texas. She was also a National Merit Scholarship finalist.

Daniel Ostraat graduated from Canton High School, (SD) in May, and he plans to study engineering at South Dakota State University. His high school physics teacher, who was a Davis-Bahcall chaperone, urged him to apply for the program.

Eric Roach, a graduate of Brandon Valley High School (SD), is majoring in physics at the University of South Dakota (with double minors in Mathematics and Spanish). He is in the Honors Program at USD and is a member of the Lambda Chi Alpha fraternity. Long-term, Roach is considering medical school or graduate school for an advanced physics degree.

Dakotah Simpson, a graduate of Lead High School, is a familiar face at Sanford Lab, where he has participated in internships and other programs. He is also a regular and strong competitor in the West River Math Contest. He played basketball, baseball, and golf in high school, and he is looking forward to his first trip outside the United States.

Recent Activities

In mid-June, staff from SURF's Education & Outreach, and Communications Departments took a road trip to Sioux Falls and Yankton, South Dakota, about a five-hour drive to the east side of the state. At Sioux Falls, about 200 people, including many elementary school students, attended a videoconference between the science festival in Sioux Falls and Sanford Lab's 4850 Level. In Yankton, about 115 people attended a luncheon/videoconference between Yankton and the 4850 Level. This audience consisted mostly of adults. Physicists Rich Ott (LUX), Mark Hanhardt (Sanford Lab), and electrical engineer Chris Bauer organized the Yankton event. Later in June, a similar luncheon/videoconference presentation took place between attendees at the Ramada in Mitchell, SD and Sanford Lab. Mitchell is 300 miles from Lead, also on the eastern side of the state.

ENVIRONMENT, HEALTH & SAFETY



Summer Water Safety

- Always swim with a buddy; never swim alone.
- Wear a lifejacket if you go boating. Obey safety rules and signs.
- Supervise young children, and invest in a pool safety cover.
- Apply waterproof sunscreen before you head into the water.

STAFF NEWS

2013 Summer Interns Report

Eight interns are working at Sanford Lab this summer in various departments. The students, affiliates of South Dakota universities, are funded from a variety of sources. Two of the four Dave Bozied interns are working in Science, with one each in the Education, and Operations Departments. Black Hills State University resources cover one Communications intern, and two others are working in the IT department through an agreement with BHS. Another intern is funded by the South Dakota EPSCoR project, which helps to find internships for the scholars preceding the formal program. Davis-

Bahcall scholar Dakotah Simpson interned at Sanford Lab this year in the Environment, Health, and Safety Department. A few interns share their summer experience below. We will hear additional reports in the August newsletter.

Bennett Prosser

I am a junior at South Dakota School of Mines & Technology studying mechanical and electrical engineering. For the past ten weeks, I have been working as an Operations Intern at SURF. During my time here, I have had the opportunity to shadow some of the surface technicians and electricians, and have been able to explore much of the surface property and see the ins and outs of the infrastructure. One of the large projects that I have been working on is assisting Operations with the Storm Water Pollution Prevention Plan. My roles include conducting inspection of storm water controls, writing and filing reports, and coordinating maintenance of the controls. I have also had the opportunity to assist with operation and maintenance at the Waste Water Treatment Plant. Overall, my experience at SURF has proved to be valuable to my education in providing a practical experience working close to my field of study.

Ashley Wingert

I am one of the Science interns this summer. One of my major responsibilities was to use an AlphaGuard/DataGate radon detector to gather radon data at both the Davis Campus and at the surface in the Yates headframe. I would then take that data and put it into a spreadsheet and compare the results. I have spent the majority of my time working with the MAJORANA crew so a lot of my time has been spent in the clean rooms. Some of my time has been spent in the machine shop where I've engraved and flattened copper parts. In the detector room, I have done some glovebox work such as cleaning and helping with the prototype cryostat, building the tent shield, and then helping out with other little things such as filling a cryostat with liquid nitrogen, inventory, and organization. Outside of the clean rooms, I've gotten to ride on the cart, do a couple of walks to see the Area of Refuge, and go with DUGL to visit the 800 Level of the mine.



Ashley Wingert working in the glovebox

UPCOMING CONFERENCES AND WORKSHOPS

CETUP* workshop, Lead/Deadwood Middle School, Lead, South Dakota. June 24-July 26, 2013. The CETUP* 2013 workshop will address questions in physics, astrophysics, geosciences, and geomicrobiology. Barbara.Szczerbinska@dsu.edu
<http://www.dsu.edu/research/cetup/index.aspx>

Community Summer Study 2013 (SNOWMASS on the Mississippi). Minneapolis, MN, July 29-August 6, 2013. Sessions on five particle physics frontiers: cosmic energy, facilities, instrumentation, and intensity.
<http://www.snowmass2013.org>

DPF 2013, APS Division of Particles and Fields Meeting, UCSC, Santa Cruz, CA. August 13-17, 2013.
<http://www.aps.org/units/dpf/meetings/meeting.cfm?name=DPF13>

Town meeting for the 2nd-phase development of the China Jinping Underground Lab. Asilomar, CA, September 8, 2013. US Contact: Wick Haxton haxton@berkeley.edu

TAUP2013, 13th International Conference on Topics in Astroparticle and Underground Physics, Asilomar, CA, Sept 9-13. Covers recent experimental and theoretical developments in astroparticle physics.
<http://taup2013.lbl.gov>

EUROCK 2013, ISRM International Symposium, Congress Centre, Wroclaw University of Technology, Wroclaw, Poland. September 21-26, 2013. Rock Mechanics for resources, energy, and environment.
<http://www.eurock2013.pwr.wroc.pl/index.php?id=0>



JOBS

Communications Director, Sanford Lab, Lead, South Dakota. Lead SDSTA's communications program in support of Sanford Underground Research Facility activities. Develop, maintain, and execute communications plans. Lead Communications Department team in representing Sanford Underground Research Facility as a premier underground science facility. To apply or read more: <http://www.sanfordlab.org/careers>

Postdoctoral position, University of Alabama, Tuscaloosa. Work on EXO experiment in nuclear physics group. Closing date: 12/1/13. Andreas Piepke, andreas@bama.ua.edu. <https://facultyjobs.ua.edu/postings/30762>

Assistant Professor, Rensselaer Polytechnic, Troy, NY. Tenure-track position in Experimental Particle/Nuclear Astrophysics researching double-beta decay, direct or indirect detection of dark matter. Deadline: 10/20/13. Joan Perras, perraj@rpi.edu. www.rpi.edu/dept/phys/faculty/searches.html

Staff/Assistant Research Scientist, Geobiology Logistics/Laboratory Manager, Desert Research Institute, Las Vegas. In Earth and Ecosystem Sciences, logistical support of NASA's new Life Underground Astrobiology Institute and Lab Manager for DRI's Environmental Microbiology Lab. Review starts 8/1/13 Job No: 0600133 <http://www.jobs.dri.edu>

Cosmology-Data Science Fellows, BCCP, UC Berkeley, CA. Four or five positions from post-doctoral through senior scientist, depending on experience. Members of this group will explore a novel approach to Cosmology Data Science (CDS). Closing date: 8/30/13. <http://jobregister.aas.org/node/45181>

Postdoctoral Researcher, LLNL, Livermore. Research in Experimental Nuclear Physics (ENP) Group/Nuclear and High Energy Physics. Support of CUORE. Nicholas Scielzo (scielzo1@llnl.gov) https://careers-prd.llnl.gov/psp/careers/EMPLOYEE/HRMS/c/HRS_HRA_M.HRS_CE.GBL?Page=HRS_CE_JOB_DTL&Action=A&JobOpeningId=11017&SiteId=1&PostingSeq=1

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