

HOMESTAKE DUSEL AND SANFORD LABORATORY NEWSLETTER

Dear Homestake Collaboration,

Welcome to the November monthly newsletter for Homestake DUSEL and South Dakota's Sanford Laboratory. We are always glad to receive your input on news, links to news articles, upcoming workshops, conference notices, scientific updates, information concerning the Collaboration, and other highlights relevant to our shared goal.

Important Dates

December 7-11: Red Team – Berkeley

January 2010: Draft Experiment Development Plans Due to the Project Office

February 9-11, 2010: Annual DUSEL Review - Berkeley



DUSEL IN THE NEWS

NSF, DOE officials brief Congressional members about DUSEL progress

*Written by Wendy Pitlick (Black Hills Pioneer)
Tuesday, 03 November 2009*

LEAD — Representatives from the National Science Foundation and the Department of Energy briefed members of Congress Monday about progress to develop plans for a DUSEL in Lead and key tasks that still need to be accomplished.

U.S. Rep. Stephanie Herseth Sandlin, D-S.D., organized the briefing to give members of Congress the opportunity to learn about the project from key NSF and DOE personnel who will be collaborating to build Congressional support for the project. Rep. Bill Foster, D-Ill., also hosted the briefing as Chicago-based FERMI National Laboratory will play a key role in one of the major experiments for the deep underground science and engineering laboratory. The Long Baseline Neutrino Experiment will shoot a beam of neutrinos from the Chicago lab down to the 7,400-foot level of Homestake so scientists can study more about the properties of neutrinos. The

experiment has been identified as one of the main priorities for the national scientific community.

The briefing was held in a subcommittee hearing room of the House Science and Technology Committee, and it included staff from several House and Senate offices as well as staff from the Committee on Science and Technology.

"The National Science Foundation and the Department of Energy offered presentations that summarized the work they have undertaken and are planning to undertake to make the creation of DUSEL a reality," said Betsy Hart of Herseth Sandlin's office. "Both presentations addressed the progress that has already been made on the project as well as identifying the key tasks that need to be accomplished over the next 12-18 months to continue making good progress."

Some of those key tasks include the NSF completing a preliminary design for DUSEL in time for a December 2010 preliminary design review; a scheduled spring 2011 design proposal to the National Science Board; both agencies working together to develop a clear understanding of the two organizations' goals and needs for the DUSEL project; and the DOE obtaining approval for the Long Baseline Neutrino Experiment in the agency's 2011 budget request.

Though Congress has committed to providing funds for both the DOE and the NSF budgets to allocate toward research and development for DUSEL, an official Congressional vote for construction is not expected until 2013.

Hart said representatives from the DOE and NSF have briefed the South Dakota delegation about DUSEL progress regularly in the past. However, she said she is not aware of any previous briefings for non-South Dakota delegation, with the exception of those who sit on the science committees.

Members of the DUSEL team, based at the Lawrence Berkeley National Laboratory in California, are diligently working to put together a preliminary design and proposal that includes detailed construction plans and estimates, as well as the initial suite of experiments that will be placed in DUSEL. That proposal is expected to be submitted for NSF consideration by the end of 2010, and the National Science Board is expected to review the plans from January through May of 2011.

While the DUSEL team works on the federal proposal, local officials are diligently working to develop the Sanford Underground Laboratory at Homestake — a state interim laboratory that is being developed at the 4,850-foot level of the former Homestake gold mine in Lead. The lab is being developed as part of the state's strategy to secure the federal facility by demonstrating that early science can be conducted in the mine. Experiments for the Sanford Lab are currently underway, and major neutrino and dark matter experiments are expected to be deployed in early 2010. ♦

To read more about this story or DUSEL in the news:

Black Hills Pioneer: <http://www.bhpioneer.com/www.DUSELwatch.com>



ISE Integration Activities

DocuShare

Accounts and folders have been set up for each of the ISE candidate experiments within DocuShare, the DUSEL document management system. Shortly after the DEDC workshop in October, PIs will have received an email from Dave Turner at Sanford Lab with login and password information as well as instructions for how to access DocuShare. PIs are free to share login information within their collaboration to allow others access.

Within the experiment folder, there are two sub-folders labeled "Private – DUSEL and Collaboration" and "Public". The Public folder will be visible to other collaborations. You may insert documents in this folder that you are willing to share with the community. This folder also contains templates and documents related to project execution plan development. The Private folder will be the primary conduit for sharing and controlling documents between collaborations and DUSEL. There will be at least one document in this folder at this time. At the DEDC meeting, each collaboration was asked to fill out a contact information form. If you have done so there will be a pdf file with your collaboration name, for example "AARM.pdf". If you have not filled out this form the file name will be named "Contact Information Form (Please Fill Out)".

Once logged into DocuShare, you may reach your experiment folder through the following folder tree:

Home
Integrated Suite of Experiments
Earth Science
Experiment specific folders
Physics
Experiment specific folders
Public – contains templates and documents mirrored in experiment public sub folders

ISE Deliverables

At the October DEDC workshop, participants were presented with deliverables required from the ISE candidates for incorporation in the DUSEL Preliminary Design Report (PDR). Deliverables include:

- Science and Project Objectives
- Experiment collaboration team roles and responsibilities,
- Work breakdown structure and dictionary
- Initial cost estimate and range
- Pre-construction milestones, initial version of construction milestones
- Preliminary Project Execution Plan
- Infrastructure requirements
- Preliminary hazard assessment, analysis and mitigation plan
- Preliminary Risk Assessment

The timetable required for incorporation into the PDR is:

- Draft version delivered to DUSEL by end of January 2010.
- DUSEL review with experiments in April and May 2010.
- Final version for PDR inclusion by end of July 2010.

In order to help gather experiment infrastructure requirements and help identify experiment specific hazards, a web-base is being developed. It will incorporate tabs for ISE Infrastructure Interface Requirements and ISE EHS Initial Screening Tool. Our goal is to have this tool available for use by the end of this month. A general announcement will be circulated when it is ready, and each experiment will be contacted by DUSEL science and engineering staff to help generate requirements and hazard information.

To help with communication between DUSEL and experiments a list has been generated for each

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experiment with DUSEL contacts for engineering, science, EH&S, and project controls. The lists have sent via email and inserted into each Private experiment folder.

Education and Outreach Planning

Site selection for the Sanford Center for Science

Education: Project leaders have recently identified the Yates Complex as the preferred location for the Sanford Center for Science Education (SCSE). Locating the education center beside the other science facilities of DUSEL will maximize opportunities for scientist involvement and interaction. Earlier thoughts to locate the education center on Ellison Hill—for ease of access and visibility from downtown Lead—began to be reconsidered after a Phase 1 site assessment found significant additional costs associated with construction on Ellison. In addition, most of the historical buildings at the Ellison site, which had been considered for use as auxiliary facilities (cafeteria, dormitories, etc.) are in poor condition and will be difficult to reuse.

The Yates location provides major advantages, including a closer association between the actual science and the SCSE and synergy between SCSE staff, visitors, scientists, and engineers. The Yates location will also afford more efficient operations, as DUSEL activity will be concentrated on just two campuses (Ross and Yates), rather than three. In order to minimize traffic flow through the residential neighborhoods of Mill and Summit Streets, Ellison Road will be developed as the primary access route to the Yates complex.



Figure 1: Black Hills Mining Museum, Lead, South Dakota. SCSE development team is meeting with BHMM and other area attractions to strengthen regional partnerships and help define target audiences and estimate their size for science education.

Market analysis: Final contract negotiations are underway for a market assessment of potential audiences that could be attracted and served by the SCSE. The successful research firm will develop an Institutional Profile for the SCSE, compile attendance benchmarks for similar institutions, and develop a model for predicting audience sectors,

magnitudes, and seasonality. This is needed to inform planning of the overall facility size, exhibit spaces, number of classrooms, auditorium capacity, cafeteria seating, restrooms, parking, etc.

Content development: Final negotiations are also underway with a firm specializing in the development of science education centers. The successful firm will help in formulating and prioritizing key messages, learning outcomes, approaches, and delivery mechanisms. This input will contribute to fulfilling the SCSE's mission of 'sharing the excitement and promise of deep underground science and engineering at Homestake with learners of all ages worldwide.' Components of the SCSE are expected to include interactive exhibits, an underground experience, online simulations, professional development for teachers, and off-site outreach.

SANFORD UNDERGROUND LABORATORY AT HOMESTAKE

Second Shaft Opened at Sanford Lab: RCS Construction Reaches the 4850 Level

After nearly a year of work, on November 5, a Rapid City construction company reopened the second deep shaft to the 4850 level of Sanford Underground Laboratory at Homestake.

"This is a significant step forward toward creating the Sanford Underground Laboratory," stated Ron Wheeler, South Dakota STA Executive Director. In the underground lab, experiments will be protected from background cosmic radiation. Homestake is 8000 feet deep, and the science authority is also pumping water out of the deepest levels of the mine.

Previously, the only access to the 4850 level was by the 5000 foot Ross Shaft or a series of underground ramps that connect levels in the mine. The project with RCS cost about \$7 million.



Figure 2: RCS Construction President Steve Scull shakes hands with Sanford Lab Operations Safety Officer Tom Regan. Also pictured: Todd Srtksa of RCS.

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RCS President Bob Scull rode the first “cage” or steel construction elevator from the surface to the 4850 level since 2003, when the gold mine was closed. The current cage has two open work decks designed to support repair crews.

“We’re proud of our crew,” Scull said. “Best of all, we didn’t have a single accident because we hired the best guys to do the job.”



Figure 3:

Arrival of first Yates Shaft cage on the 4850 Level. Joe Nonnast, fifth left

Of the 19 crew members, 17 are former Homestake miners. One of the crew, Joe Nonnast, a lead shaftsman with 11 years of Homestake experience, descends from grandfather Art Crowley, who worked in the mine over 50 years ago.

Until this month, the only direct access to the 4850 Level was by the 5,000-foot Ross Shaft. The secondary egress route was through a series of ramps. Now there is fast, direct access through both the Yates and Ross shafts. Rehabilitation work continues on the Yates Shaft itself, so that cage will not be available for routine access for several weeks.

The first Physics experience at the 4850 Level will be a Large Underground Xenon detector (LUX), an experiment to detect dark matter.

Excavations continue on the 4850 Level

The drilling and blasting that began on September 23 continues, as crews drive a new access tunnel to the Davis Cavern. By mid-November the tunnel was 74 feet long. By the end of November crews were expected to carve out a new “transition cavern” that will provide a clean transition area to the LUX experiment and space for electroforming for the Majorana experiment.

Core sampling on the 4850 Level is nearing completion. The samples will help determine how best to build DUSEL caverns on that level.



Figure 4: Drift face of cavern

Sanford Lab water level

The water level at the Sanford Underground Laboratory at Homestake continues to hold steady between 5,020 and 5,030 feet underground, as the 5,000-foot level is cleaned and prepared for the next stage of pumping. “Mucking” -- that is, clearing sand and debris left by water -- is complete to the pump room, and installation of a 12-inch pipe from the 5000 Level to the 3650 Level was started.

LUX Surface Laboratory

The former Homestake warehouse has officially become the LUX Surface Laboratory. Remodeling completed in November includes construction of a Class 1000 clean room and three-story “detector pit” for testing xenon cryostat before xenon goes underground.

Science Liaison Director Jaret Heise expects liquid nitrogen shipments in late November. LUX researchers will use nitrogen to keep equipment clean and to cool xenon to a liquid state. LUX collaboration researchers are expected to arrive in early December with more equipment.



Figure 5: Clean room is the glassed-in enclosure behind Jaret Heise (left) and Tom Trancynger. The grate covers the “detector pit”—a three-storey shaft in the old Homestake warehouse.

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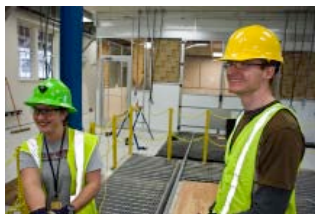


Figure 6: LUX surface facility assistance from Physics grad students Ty Stiegler (left) of Texas A&M and Patrick Phelps, Case Western Reserve.

Public Outreach



On November 17, Dr. Jose Alonso presented a public lecture on "Neutrinos and Dark Matter in the Black Hills" at the Lead-Deadwood High School Auditorium. Using photos and graphics, he reported on the latest progress at Homestake. About 120 people attended.

Dr. Alonso also joined author and former Homestake mine superintendent Steve Mitchell to present a three-hour public seminar on the history and future of Homestake. (Mitchell is working as a consultant on the Sanford DUSEL project.)

2010 Summer Study Opportunity

South Dakota students: High school seniors and college freshman who wish to apply for Davis-Bahcall Scholarships and the chance to study next summer at the Sanford Underground Science and Engineering Laboratory in Lead, Princeton University in New Jersey, and Gran Sasso Lab in Italy. Applications available on South Dakota Dept of Education's Web site: www.doe.sd.gov. Deadline: December 18.

Other Sanford Lab News

Jason Van Beek is well on the road to recovery following his motorcycle-deer accident four months ago. Jason returned to work in October, logging core samples from the 4850 Level, but it took a while longer to get re-certified for underground work. During the week of November 9, he went

underground for the Transparent Earth experiment and for a couple of experiments run by Dr. Larry Stetler of SDSMT. Jason is finishing graduate work at the South Dakota School of Mines and Technology.

ENVIRONMENT, HEALTH & SAFETY

Winter Safety

Drive safely, especially in storm and snow conditions.

Before winter arrives, have your car tuned up, check antifreeze, battery, heater, and tire treads.

Dress warmly for cold weather.

If traveling long distance, carry a winter survival kit in your vehicle: blankets, flashlight, flares, and non-perishable foods.

*** FOR INFO ON WEATHER CONDITIONS IN SOUTH DAKOTA, CALL: 605-722-0002**



Thanksgiving Safety for Pets: Do not give them raw or undercooked turkey. Watch out for small bones as they can choke. Pets can also become sick from sauces, spices, or desserts. The best thing is to feed them their regular food along with a special pet treat.

Happy Thanksgiving!

Cultural Advisory Committee

The Cultural Advisory Committee met at BHSU on November 3. They were welcomed by Dr. Kay Schallenkamp, President of Black Hills State University. Urla Marcus, Director of the Center for American Indian Studies, presented an overview of their American Indian Studies Program.

BHSU has 146 American Indian students, which represents 3.6% of BHSU's student population. BHSU also has an active and impressive American Indian Studies Program.

Bill Harlan gave an update on Sanford Lab and he reviewed the Cultural Committee web page with the Committee. The Committee also reviewed and approved the Cultural Path Forward Strategy and the 2010 goals to start the implementation of the Strategy.



Figure 7: BHSU President Kay Schallenkamp and DUSEL-Sanford Lab Cultural Advisory Committee. Left to right seated: Urla Marcus, Kay Schallenkamp, George Campbell, Peggy Norris. Standing: Lowell Amiotte, Kay Jorgensen, Connie Giroux, K.C. Russell, Kevin Forsch, Bill Harlan

On November 12-14, George Campbell attended the TUSWECA TIOSPAYE second annual Language Summit held in Rapid City. Over 500 were in attendance and many presentations were made on the progress being made to preserve the Lakota Dakota Nakota Languages. The organization was created to revitalize the Lakota language and culture by passing it on to the next generation. Summer camps, pow-wows, and language learning materials are part of this cultural program. Keynote speakers included Darrell Kipp, Co-Founder of the Piegan Institute and author/historian. Language educators and advocates led breakout sessions sharing their stories, learning methods, and strategies. A pow-wow took place on Friday night, November 13, with participants dressed in full regalia sharing language and culture through the medium of song and dance.



Poster announcing the Language Summit

For more information on the Summit:

<http://www.tuswecatiospaye.org/2009-summit>

NEW STAFF



Robert Altes recently joined the DUSEL Project engineering staff working on ISE integration. Previously he was Chief Mechanical Engineer at Pulse Sciences Inc. (PSI), a startup company now a

part of L-3 Communications Inc. for 28 years. At PSI, he led the mechanical engineering design effort and managed many pulsed power system projects with applications including fusion, directed energy, radiography and weapons effects simulation. Noteworthy projects include machine design for SNLA Saturn and PBFA accelerators, NRL KrF laser amplifiers and LANL CYGNUS radiographic accelerators for underground subcritical testing.

Prior to PSI, he worked as a mechanical design engineer in engineering research design and development at William Brobeck and Associates and EG&G.

Bob received his BSME from Cal Poly, San Luis Obispo, CA and holds licenses for Mechanical and Nuclear Engineering in California.



David Vardiman is a Geological Engineering graduate of Colorado School of Mines with 33 years of management experience in the precious/base metal mining industry. His experiences include 20 years with Homestake Company, including the Homestake Mine (12 years) Lead, SD, the Bulldog Mountain Mine (7 years) Creede, Colorado and the Eskay Creek Mine (1 year), remote northern British Columbia. In addition, Dave worked 10 years with AngloGold Ashanti's at the Cripple Creek & Victor Mine, Victor, Colorado and most recently comes to us from Quadra Mining Ltd, (3 years), where he was involved in development of their North America and South America operations.

Dave will support DUSEL activities as the Project Engineer for Geotechnical Design and Excavation and will be leading the underground excavation design efforts for DUSEL including managing our contract for excavation design with Golder Associates and will also be supporting Dr. Zbigniew Hladysz on the Geotechnical Engineering Services Contract with RESPEC.

Dave is recently from Woodland Park, CO where he and his wife Debbie have resided for the last 12 years. They will be moving to Lead in the near future. They have three adult children and one granddaughter. Dave's wife Debbie says; "David

has no one hobby but instead is a collector of hobbies, including but not limited to fossil/mineral collecting, U.S. Civil War history, family genealogy, woodworking, jewelry making, cooking, hunting and fishing". Debbie is a homemaker, Creative Memories Consultant and mine tour guide at the CC&V Gold Mining Operation in Victor, Colorado.

Favorite Quote: What is Man? Man is a noisome bacillus whom Our Heavenly Father created because he was disappointed in the monkey.
- Mark Twain in *Eruption*

WORKSHOPS / CONFERENCES

BGE Meetings in December

Two meetings are planned for the Biology-Geosciences-Engineering groups in December. Both will take place in the Bay Area.

The first is a DUSEL session at the American Geophysical Union Fall Meeting on Tuesday, December 15 in San Francisco. The session has 29 presentations and lasts the full day. www.agu.org.

The second is an S4 PI meeting to share updates on the MREFC process and allow groups to work towards completion of their draft Experiment Design Package (EDP) for January 2010. The meeting is open to all who wish to participate and is arranged for the UC Berkeley campus for Wednesday, December 16. Further details will follow.

International Workshop on Stopping and Manipulation of Ions and related topics (SMI-10), Stanford University – March 21-24, 2010

This workshop continues the series of meetings begun in 1986 in Konnevesi, Finland. The scope of these meetings has followed the evolution and expansion of the techniques related to the stopping of energetic ions in noble gases and the use of noble gases to manipulate ions and atoms, mostly in research involving unstable nuclides. In addition SMI 10 will cover topics of interest for the extraction and identification of ions produced in rare nuclear decays, such as would be desirable for ultra-low background double-beta decay experiments. The many new developments since the last workshop in this series in 2006 in Groningen warrant the organization of this meeting. The SMI-10 Workshop aims at providing a status of the field as well as guidance for future developments. For more

information, contact Ms. M. Keating, mkeating@stanford.edu.

DUSEL Research Association

As the DUSEL project matures, the activities of the DUSEL Experiment Development Committee (DEDC) will transfer to the proposed DUSEL Research Association (DuRA). The principal task of the DEDC has been to coordinate the initial superset of experiments and aid in the compilation of the MREFC. With these tasks nearing completion, the DEDC will sunset its activities and DuRA will begin as the interface between experimenters and operation of the Facility.

A draft charter for DuRA, similar to that rolled-out at the October Science Workshop in Lead is available online:

http://www.ems.psu.edu/~elsworth/dusel/DuRA_charter.pdf

We anticipate opening the charter for online discussion as the Facility and DEDC websites are migrated onto the usel.org domain-name. In the interim, comments can be forwarded to the DEDC and the Facility via: elsworth@psu.edu.



JOBS

DUSEL is seeking an Education & Outreach Director. For more info, please refer to the ad: <https://yourfuture.sdbor.edu/applicants/jsp/shared/frameSet/Frameset.jsp?time=124810512964>

Postdoc or Research Associate position in neutrino physics, Physics Dept, Stanford. Contact Ms. Marcia Keating, Varian Physics, Stanford, CA 94305-4060; email (mkeating@stanford.edu).

Postdoctoral Position in Neutrino Physics. Los Alamos National Laboratory. For further info, visit: (<http://www.lanl.gov/science/postdocs/>). Ref Job number: 218567 or contact Dr. Steve Elliott, elliotts@lanl.gov

Postdoctoral Research Associate position: Physics Dept at Brookhaven National Lab. Participate in group's activities including design of Long Baseline Neutrino Experiment at DUSEL in South Dakota. Under the direction of S. Kettell, Physics Dept. For

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more info: <http://www.bnl.gov/hr/careers/> - Click on Search Job List. Ref: Job ID # 14944.

Postdoctoral position, Experimental High Energy Research Group, Iowa State University. Send CV, research statement and 3 LoRs to Prof. Mayly Sanchez (mayly.sanchez@iastate.edu).

Faculty Position in Experimental Astroparticle Physics. Dept of Physics & Astronomy, University of Alabama. For more info: <http://physics.ua.edu>, or Prof. Jerry Busenitz, busenitz@ua.edu.

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