

Dear Homestake Collaboration,

Welcome to the February 2010 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

April 13-15, 2010: NSF-DUSEL Review - Rapid City, South Dakota

March 19-20, 2010 - FARRM Collaboration Meeting - Berkeley

Geotechnical Site Investigations

The basic site investigations at the 4850 Level for the Preliminary Design have been successfully completed. This includes drift mapping, drilling and coring, *in-situ* testing, preliminary numerical modeling, and laboratory testing. Participating contractors and consultants (Respec, Golder, Connors, Lachel, Maptex, SDSM&T and Four Front Design) performed an outstanding job. Ongoing tasks include monitoring of blasting operations and ground water sampling and monitoring.

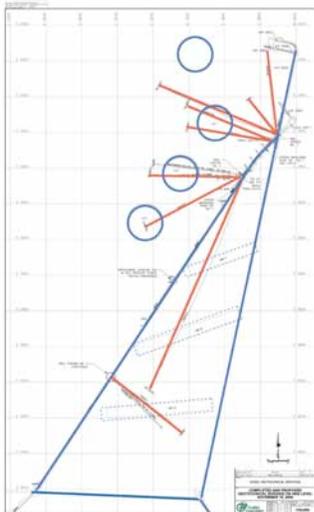


Figure 1: Completed Geotechnical Borings at 4850 Level

Preliminary analysis of the geotechnical conditions at the 4850 level indicates that, regarding the suitability of the placement of the proposed excavations, there are no adverse geological or structural features that could not be mitigated. The current placement of the LC1, LM1 and 2 are favorable.

On January 18-22, the Large Cavity Board (LCAB) convened for its third meeting in Lead. The Board reviewed the geotechnical site investigations program, met with the Geotechnical Advisory Committee, and provided updated recommendations on the next steps regarding the DUSEL geotechnical engineering program and ongoing excavation design efforts.



Figure 2: LCAB takes a look at core

Long-Baseline Neutrino News

Please take a look at <http://lbne.fnal.gov> for information on LBNE which received CD0 from the US DOE in January 2010. The LBNE project includes a new beamline pointed at South Dakota and a detector at Homestake/DUSEL.

LBNE Project Management Team includes Jim Strait (Fermilab) as Project Manager, Regina Rameika (Fermilab) as Project Scientist. Project Manager for New Neutrino beamline will be Vaia Papadimitrou (Fermilab). A near detector and two far detector technologies are also being considered. Project Managers include Chris Mauger (Near detector, Los Alamos), Bruce Baller (Liquid Argon detector, Fermilab) and Jim Stewart (Water Cherenkov Detector, Brookhaven).

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DUSEL IN THE NEWS

Check out:

Sanford Lab water level steady – Rapid City Journal staff - February 2 and 4

Innovative students at Sanford Lab: South Dakota Public Broadcasting – February 12

<http://www.duselwatch.com/> with Wendy Pitlick
NSF Conducting DUSEL review – February 9
Listening to the universe – February 9
Thank you scientists! - February 9

DUSEL Updates

On February 9-11, National Science Foundation officers along with a seven-member review board met with approximately 50 participants and observers at Hotel Shattuck Plaza, one block from the University of California, Berkeley campus. Three days of presentations, review, questions and answers, discussions and breakout sessions focused on preliminary design plans for DUSEL, in particular what the Lab would look like and how it would be constructed. Attendees from University of California, Berkeley, Sanford Lab, and South Dakota School of Mines & Technology, among others, included physicists and engineers as well as underground construction and project management experts. According to Principal Investigator Dr. Kevin Lesko, this represents “a strong affirmation of plans and progress to date.” Co-PI Dr. William Roggenthen also expressed satisfaction with current progress. This is part of a series of routine reviews in concert with the NSF to monitor progress on the DUSEL Project. A Project-wide comprehensive review is scheduled for April 13-15 at South Dakota School of Mines & Technology in Rapid City. At that time, ~20 reviewers will look at preliminary plans for the facility as well as the scientific experiments to be hosted at the Lab.

On February 18, Dr. Kevin Lesko and others spoke to the South Dakota State Legislature House Appropriations Committee in Pierre, South Dakota. on Governor Mike Rounds’ request for \$5.4 million

funding for the SDSTA operations. The funds would provide transitional funding for operating expenses at Sanford Lab, including pumping, hoist operation, administrative costs, water treatment and other associated operations costs.



DUSEL Project meetings

The DUSEL Requirements Management Workshop, led by Richard DiGennaro took place at the Berkeley DUSEL Project Office over three days, February 1-3.

A DOORS WBS Dictionary Demo took place in two sessions on February 3. This system greatly helps those who need to prepare and maintain documentation for the DUSEL project.

The Science Liaison Group led by Dr. Steve Marks, Science Program Engineering Manager meets weekly at the Berkeley DUSEL Project Office. Watch for more details on this group in future issues.

SANFORD UNDERGROUND LABORATORY AT HOMESTAKE

4850 Infrastructure

Infrastructure techs have been testing drilling techniques and equipment in the new access drift and the transition area leading to Davis Cavern.

Crews have been varying the size of drill-hole diameters and drill-hole spacing and burden. They are also testing drill bits and explosives. The new access drift is 30 feet from breaking into the Davis Cavern. This will be a major milestone for the Large Underground Xenon (LUX) Detector to be installed there later this year.



Figure 3:

Infrastructure Tech Luke Scott in the access drift on the 4850 Level.

Jaret Heise, Science Liaison Officer, inspected the 4850 Level station at 4 Winze to explore possibility of lowering temperature and pressure sensors in the shaft. Dr. Larry Stetler of SDSMT is considering a study of a comparison of data between 6 Winze and 4 Winze and how water is moving in the deep pool. Excavations commenced in 1953, and the hoist room was completed in 1955. Blasted rock was removed from the shaft with equipment known as a “clamshell hydro mucker” which took three miners to operate. The 4 Winze was down to the 6800 Level by 1964, and at the 7500 Level in 1990.



Figure 4: Science Liaison

Officer Jaret Heise and SDSMT graduate student Tessa Jones at the 4850 Level station at 4 Winze.

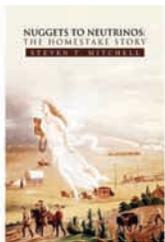


Figure 5: Nuggets to Neutrinos: The

Homestake Story, authored by Steve Mitchell, former Homestake engineer and manager. Released 2009, Xlibris Corporation.

Some of the history of the Four Winze and other excavations appears in a new book by Steve Mitchell, former Homestake engineer and manager. The book, *Nuggets to Neutrinos: The Homestake*

Story was just released by Xlibris Corporation in November 2009. The Homestake history began with the discovery of placer gold in Deadwood Gulch in August 1875—just one year after the discovery of gold in the Black Hills of Dakota Territory by members of the Custer Expedition. The Homestake Mine in Lead, South Dakota was located in 1876. In 1877, George Hearst, Lloyd Tevis, and James B. Haggin purchased the mine and formed Homestake Mining Company. The company's flagship mine produced forty million ounces of gold prior to its closure in 2001. Today, the 8,000-foot-deep mine is being converted into a deep underground science and engineering laboratory where scientists will conduct research on dark matter, astrophysics, double beta decay, and solar neutrinos.



Figure 6: Infrastructure

Tech Luke Scott (left) and Project Engineer Wendy Zawada in the Davis Cavern. Breakthrough to new access drift occurred on February 16.

Education and Outreach

Planning for the Sanford Center for Science Education

A draft of the initial market survey for the SCSE was presented to the Education Governing Board (EGB) on February 4th by the consulting firm David Heil and Associates (DHA). The report includes audience projections based on analysis of comparable institutions locally, regionally and nationally. Together with an upcoming report on key content to be shared through the SCSE, the market study will inform the facility and programmatic requirements for the SCSE.

A workshop of national and international science and education experts was convened in Denver on January 19-21 to discuss key program elements, messages, delivery methods and learning outcomes for the exhibits and programs of the SCSE. The output from this workshop will be used in developing

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the content report referenced above, which will be presented to the EGB on February 25.

Members of the SCSE core planning team attended the kick-off meeting of the DUSEL surface design firm HDR in San Francisco on January 18-19. The meeting focused on design requirements of the DUSEL surface facilities in general and on the SCSE, in particular. These requirements will be used to inform DUSEL's preliminary design and cost estimates. The SCSE facility is expected to house exhibit space, classrooms, an auditorium or theater (to be shared with science groups), a lobby with gift shop and food concession, a teacher resource room, offices and administration space, and shop and storage space. Work continued on the requirements for these spaces at a follow-up meeting on February 18-19, again at the HDR offices in San Francisco.

Ongoing Education and Outreach Activities

Pierre, South Dakota: On January 26, the Deep Science Lecture series hosted a general audience presentation, "Hunting WIMPs in the Black Hills." Live webcast took place from the Ramkota in Pierre, South Dakota. WIMP refers to a "weakly interacting massive particle."

Physicists Rick Gaitskell of Brown University and Tom Shutt of Case Western Reserve University discussed their experiment leading a search for dark matter. They are installing a dark matter detector at the 4850 Level at Sanford Laboratory. The underground depth of the Lab will shield the dark-matter experiment from background cosmic radiation.

According to Dr. Gaitskell, the search is "one of the great challenges of the early 21st century." They have assembled a team of scientists and engineers from nine universities and two national laboratories to build LUX: Large Underground Xenon detector which will be the most sensitive dark-matter detector of its kind.

Sioux Falls, South Dakota: Physics teachers from across the Sioux Falls School District, together with Peggy Norris and Drew Alton (Augustana College), met on January 28th at Roosevelt High School to continue planning for a new Conceptual Modern Physics course. An earlier workshop led to a proposal to pilot the new course in Sioux Falls as a means to incorporate the physics that will be

happening at DUSEL into the high school curriculum. That proposal was approved by the SFSD Board of Directors, and at the January meeting, after a review of the field of particle physics by Professor Alton, a productive session ensued in which a one-semester course syllabus was generated. Lesson plans are now under development, and the course will be piloted at two schools in the Fall of 2010.

The 2009 Davis-Bahcall program was featured in South Dakota Public Televisions series 'Dakota Life', airing throughout the month of February. The 10-minute segment can be viewed at:
<http://www.sdpb.org/tv/shows.aspx?MediaID=57796&Parmtype=TV&ParmAccessLevel=sdpb-all>

ENVIRONMENT, HEALTH & SAFETY

The SDSTA mission state emphasizes our priorities and our continued focus on Health, Safety and Protecting the Environment.

On February 19 Ron Wheeler and Kevin Lesko addressed the combined Sanford Lab, DUSEL and on-site contractors staff to discuss Health and Safety priorities and to emphasize the need to craft the appropriate culture of safety across all these activities and projects.



FOR INFO ON WEATHER CONDITIONS

IN SOUTH DAKOTA, CALL: 605-722-0002

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Security Safety

Keep outside doors locked. Lock your office doors and windows when you leave, and take your keys with you.

Keep your equipment such as laptops locked with an approved lock-down device.

Do not leave backpacks or purses in plain sight.

If you see anyone suspicious, please report it.

NEW STAFF



Paul Bauer joined DUSEL at the Lead office in late January as Project Engineer for Underground Infrastructure Electrical Design and Construction. He is a native South Dakotan growing-up in Sturgis and eventually settling on a small ranch near Piedmont, SD where he currently resides with his wife Noemi, two teenage children, Chezka (15) and Josh (13), and a cat, Kity, who appears to be the dominant "person" in the family.

Paul began his career by studying electronics technology at Western Dakota Vo-Tech and training in Computer Systems Engineering at Sperry Univac Federal Systems in Eagan, Minnesota. In 1981 he began a 26-year career at Dacotah Cement where he held positions as electrician, instrument technician, engineering technician, and electrical engineer. Paul attended South Dakota School of Mines and Technology part-time and received a Bachelor's degree in electrical engineering in 2002. In 2007 he started working for KL Energy where he worked on the design and construction of an experimental wood-to-ethanol pilot plant in Upton, Wyo. Paul completed his Master's degree in electrical engineering in 2009. His experience encompasses industrial power distribution, process control and plant automation.

Paul enjoys metal and woodworking, mechanics, and reading science, mathematics and psychology journals. "I have an insatiable curiosity for science

and my passion is to continue to learn about everything."

Favorite Quote: I hear and I forget; I see and I remember; I do and I understand. - Chinese Proverb



David Taylor recently joined the DUSEL Project engineering staff working on ISE integration in areas of Dark Matter and Neutrino Double Beta Decay. He will utilize his past experience both managing and designing mechanical components and systems to assist with integration of experimental equipment into the DUSEL facility.

David comes to DUSEL from General Electric where he was Technical Leader for combustion components used in F-Class 400 MW gas turbines. Prior to his work at GE, he worked at STI Optronics, Bellevue, WA and Oak Ridge National Lab, Oak Ridge, TN. At STI, David was Technical Director for Engineering supporting design of magnetic insertion devices and the fuel system for the COIL laser used in Airborne Laser. At ORNL, he supported magnetic fusion research by designing components and systems for RF heating and stellarator support structures.

David received his BME from Georgia Tech and his BS in Business and Economics from Lehigh University. He is a registered Professional Engineer in Washington State.

For the coming year, David will be working at the DUSEL Project Office in Berkeley. After completion of PDR, he plans to move to Lead where his wife, Linda, also intends to relocate.

Favorite quote: Genius is one percent inspiration and ninety-nine percent perspiration. - Thomas Edison

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JOBS

Tenure-track Assistant Professor in Physics. University of South Dakota. Faculty in the department are involved in the LUX, Majorana, DEAP/CLEAN and AARM collaborations. Apply online at <https://yourfuture.sdbor.edu> or mail to Chair of Physics Search Committee, Department of Earth Sciences and Physics, The University of South Dakota, 414 East Clark, Vermillion, SD 57069. Deadline: March 31, 2010.

Two Postdoc positions on the EXO experiment, Physics Dept, Stanford. Contact Ms. Marcia Keating, Varian Physics, Stanford, CA 94305-4060; email: mkeating@stanford.edu.

Postdoc Research Associate position: Physics Dept at Brookhaven National Lab. Participate in activities including design of Long Baseline Neutrino Experiment at DUSEL in South Dakota. Under the direction of S. Kettell, Physics Dept. For more info: <http://www.bnl.gov/hr/careers/> - Click on Search Job List. Ref: Job ID # 14944.

Postdoctoral Research Position in experimental particle/nuclear physics, University of South Dakota. Apply online: <https://yourfuture.sdbor.edu>. Contact: Vincente Guiseppe, vincente.guiseppe@usd.edu

WORKSHOPS / CONFERENCES

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.

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Photo Credits: Fig. 1: Dr. Zbigniew Hladysz; Fig. 2: Steve Babbitt; Figs. 3&6: Will McElroy; Fig. 4: Jack Stratton.

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