

HOMESTAKE DUSEL AND SANFORD LABORATORY NEWSLETTER

Dear Homestake Collaboration,

Welcome to the January 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

**Requirements Management Workshop:
February 1 & 2- Berkeley**

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

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

January 26: Don't miss it!

Dr. Rick Gaitskell and Dr. Tom Shutt of the LUX Collaboration will talk about "Hunting WIMPs" at the Ramkota in Pierre, South Dakota on January 26, 7 pm. The talk will be webcast live by South Dakota Public Broadcasting.



DUSEL IN THE NEWS

LBNE Elects Spokespersons

(From *Symmetry Breaking* (blog), By Tona Kunz)



Bob Svoboda, Courtesy of Bob Svoboda

Building a team of experts to create the world's most intense, long-distance neutrino beamline takes time, forward thinking and good leaders.

That is especially true when that beamline is aimed at a US-based particle detector more than 10 times the size of the largest LHC detector.

With the election of its first spokespersons, the proposed Long Baseline Neutrino Experiment has cemented its bid to unlock the mysteries of the neutrinos that permeate the world around us. Studying the light-mass neutrino could reveal an imprint of asymmetric behavior from a heavier cousin neutrino that existed at the time of the Big Bang and tipped the scales of the universe to allow baryonic matter to dominate antimatter.

Bob Svoboda from the University of California, Davis and Milind Diwan from Brookhaven National Laboratory were tapped three years ago by the National Science Foundation to put together an experimental team for LBNE. The collaboration elected them to continue working closely as spokespersons on the experiment's research goals and infrastructure needs. The duo plan to work toward increased collaboration with Fermilab and Brookhaven.



Milind Diwan. Courtesy of Brookhaven National Laboratory

They bring a breadth of experience working with neutrinos for about 25 years each. Svoboda serves as co-spokesperson on the Double Chooz experiment in France. Diwan participates in the MINOS experiment at Fermilab and the Daya Bay experiment in China. These are crucial experiments that will set the stage for LBNE.

Diwan was one of the original proponents of building LBNE in 2001 to take advantage of the recent discovery that neutrinos had mass. That discovery opened the door for neutrinos to become dark matter candidates and the linchpin to the evolution of visible matter.

“Just that discovery is of tremendous importance in how we understand the workings of the world. This has multiple consequences for our understanding,” Diwan says. “Detection of CP violation in neutrinos as well as unambiguous determination of the mass ordering of neutrinos needs a next-generation accelerator and detector facility; there is no question about that. The same detector could discover a lot of other physics: decay of a proton, for example.”

The LBNE project will include building a neutrino beamline at Fermilab and a detector of unprecedented size and capability at a laboratory located more than 700 miles away. One proposed location for this detector is the proposed Deep Underground Science and Engineering Laboratory (DUSEL) in the Homestake mine near Lead, South Dakota.

“This is an opportunity for us to push the boundaries of technology,” Diwan says.

The collaboration has already met several times at Brookhaven, UC Davis, Fermilab and in South Dakota; the next meeting is set for the end of January at Fermilab. The scale of the project, the distance between the beam source and the detector, and the international makeup of the collaboration mimics the complexity of the Tevatron collaborations CDF and DZero.

“It requires a large team so you have to look at things differently,” says Svoboda who had experience managing large projects while in the Navy. “You have to bring people together. You have to be flexible but not lose sight of your goals. It is easy to get distracted by little things.”

Collaborators hope to get approval for construction in 2012, which would mean results could start pouring in by 2017 at the earliest.



Neutrinos are mysterious particles that rarely interact with matter. Yet they might be the reason we exist.

Along with providing a crucial link to the matter/antimatter asymmetry we see in the universe today, LBNE could determine the ordering of the three light neutrino masses, a puzzle that has befuddled physicists.

If LBNE finds the ordering to be inverted, so that the heaviest neutrino has a large mixing angle with the electron type of neutrino. That will give a boost to the current round of neutrinoless double beta decay experiments, which are more sensitive to that mass ordering.

“These double beta decay experiments could determine if neutrinos are their own antiparticles, or in the language of physics, Majorana particles,” Svoboda says. “The combination of discoveries – that neutrinos are Majorana particles and that they violate CP symmetry — would be an astonishing glimpse into the way the universe works.”

LBNE collaborators hope to get the first stage of DOE approval, Critical Decision-0, soon.

“This is going to be exciting, but it is also going to be a lot of work for the next five or six years,” Svoboda says. ♦

Check out these Videos at
<http://www.duselwatch.com/>

Governor Mike Rounds: South Dakota State of the State message in which he discusses the importance of Sanford Lab not only to the state of South Dakota but also to the nation and scientists around the world. DUSEL is mentioned in the video. The Lab will not only grow the economy but will increase knowledge and opportunity for the next generation.

Joe Wang from LBNL interviewed by Wendy Pitlick

Comic superhero **Neutrino Man** and his sidekick, Underground Lab, search the world for a new home

To read about these and other DUSEL stories:
Governor Offers his swan song - www.yankton.net
Alumnus Stacy Phelps - news.sdsmt.edu/stories
President Obama Honors Outstanding teachers - www.nsf.gov/news
Stacy Phelps – www.lakotacountrytimes.com/news

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Focus on Connie Giroux: LUX Experiment

Connie Giroux is the Science Liaison Specialist for SDSTA/DUSEL. She primarily assists scientists in completing hazard analyses which are required for the installation of their experiments both on the surface and underground. She also provides site specific training and assistance to scientists and other groups when traveling underground. She is actively involved with the EH&S department and assists them with various projects.

Recently, she assumed the duties of the Interim Laboratory Coordinator assigned to the LUX experiment. For the LUX experiment, she supervises the installation and operation of equipment at the surface lab and ensures that collaborators are working in a safe work environment. She reviews procedures to ensure that they are thorough and that hazards have been identified and control measures are in place prior to work commencing. When collaborators have requests or questions, she works with various departments or contractors to come up with viable options or solutions that will accommodate the needs of the LUX collaboration and the surface laboratory. Connie graduated from South Dakota School of Mines and Technology in December 2007 with an MS in Technology Management.



Figure 1: Surface Lab during construction



Figure 2: Surface Lab today



Figure 3: Sign at Surface Lab



DUSEL Project meetings

The Large Cavity Board (LCAB) met January 18-21 in Lead, South Dakota. The group made an underground site visit with the participating DUSEL Team at the 4850 Level. Over the next few days, they held discussions with the Geotechnical Advisory Committee (GAC) as well as contractors, consultants, and various pertinent members of the DUSEL Team and Sanford Lab staff. The Infrastructure Design team also participated in the meetings. The LCAB, joined by additional mine engineering experts, also reviewed aspects of the facility infrastructure concurrently with an EH&S site visit.

Simultaneously, in San Francisco, the Surface Program Design Kick-off Meeting took place January 18-20, at the HDR office in downtown San Francisco. HDR is an architectural, engineering and consulting firm which has been involved with the DUSEL Project.

On January 21, the EH&S Safety Committee met for a Review and Dry Run presentations in anticipation of the DUSEL NSF Review in February. Other Dry Run rehearsals will take place in Berkeley on January 29, February 1 and 2.

On February 1 and 2, Richard DiGennaro will lead a Requirements Management Workshop, hosted at Berkeley.

SANFORD UNDERGROUND LABORATORY AT HOMESTAKE

Progress at 4850 Level

Dr. Dongming Mei of the University of South Dakota and Dr. Frederick Gray of Regis University will fill the space pictured in Figure 5 with instruments to measure background muons, neutrons and gamma radiation. Those measurements will help experiments like LUX and Majorana establish baseline radiation levels. The Majorana team will install a temporary clean room in the shop right outside this space, where they will electroform copper uncontaminated by cosmic radiation. Interesting historical note: During the mining era, this was the office of Homestake electrical crew foreman Bob Harlan (brother of current Sanford Lab Communications Officer Bill Harlan).



Figure 4: Shortly after the 4850 Level dewatering and before the office clean up



Figure 5: After office cleanup on the 4850 Level, near the Ross Shaft and Six Winze

Majorana Collaboration Meets

On January 6-7, eight members of the Majorana Collaboration and others met with four reviewers at Homestake Sanford Lab to evaluate progress. The group also toured the former electrical shop at the 4850 Level where they plan to install a modular clean room as mentioned above. Look for the video interview link of Majorana Principal Investigators John Wilkerson of University of North Carolina and

Steve Elliott of Los Alamos National Laboratory in the next newsletter issue.

Snow in South Dakota



Figure 6: Outdoor snow scene with deer near the Yates Administration building



Figure 7: Indoor snow at the 800 Level

DUSEL Project Engineer Bryce Pietzyk, Ventilation Tech LeEtta Shaffner, graduate student Tessa Jones, and SRK hydrology consultant Larry Cope were surveying water inflow on the 800 Level when they ran across a snowdrift (Figure 7). It was directly under an exploration hole that was just a few inches in diameter. The hole surfaces in the Open Cut near the old Star Shaft.

The airflow through the exploration hole was downcast, so snow was sucked into it and deposited on the sill. The inflow study will help engineers capture water before it drops to the lower levels of the Sanford Laboratory.

Education and Outreach

Ben Sayler Named Director of Education

DUSEL is pleased to announce that Dr. Ben Sayler of Black Hills State University has accepted the position of Director of Education and Outreach for DUSEL. He will assume this role beginning February 1. Dr. Sayler has been working on the DUSEL project since 2001, serving most recently as Acting Director of Education and Outreach for DUSEL on a

part-time basis. He maintains his faculty appointment at BHSU as Professor of Physical Science and Mathematics, but he will step aside from his ten-year stint as director of South Dakota's Center for the Advancement of Mathematics and Science Education (CAMSE). Dr. Saylor will now focus full attention on development of the Sanford Center for Science Education, to be the education and outreach arm of DUSEL. Dr. Saylor holds BS and MS degrees in Geology and Geophysics from Yale University and a PhD in Atmospheric Sciences from University of Washington. Prior to joining the BHSU faculty in 1999, he worked in close collaboration with Seattle Public Schools as an NSF Postdoctoral Fellow in Science, Mathematics, Engineering, and Technology Education.

Ongoing Education and Outreach Activities

Spearfish Science Teacher Day at Sanford Lab:

Twenty-five science teachers and student teachers from the Spearfish school district attended a science inservice day at Sanford Lab on January 18. The teachers ranged from elementary school through high school physics. The teachers learned about cosmic rays and underground biology in the morning. In the afternoon, they toured the Waste Water Treatment Plant. They then constructed their own filters for the mine water, purified it and conducted testing to determine its purity through measurements of pH, turbidity and measures of dissolved oxygen and solids.



Figure 8: Spearfish science teachers and student teachers filter and run tests on mine water and Sanford Lab

Planning for the Sanford Center for Science Education

SCSE development: The planning team for the SCSE has been engaged in determining the programming and requirements for the SCSE and its functions. To this end, they took part in the HDR

kick-off and programming meeting to discuss the facility requirements with HDR and DUSEL architects and engineers. The functions of the SCSE will also be informed by a workshop that brought together national experts in science and science education for a Content Development Workshop, including experts in Lakota education, biology, physics and earth science curriculum, education directors of a NASA education center, a Science Center, and the National Science Digital Library, as well as the former Executive Director of the National Science Teachers Association. The workshop examined compelling topics and major scientific themes to be addressed through exhibits and programs (onsite, offsite and virtual) at the SCSE. It began to lay out target audiences, how best to reach those audiences, and what the learning outcomes of those interactions should be. The results of the workshop and other planning efforts will be summarized in an initial Content Development report scheduled to be finished in February.

ENVIRONMENT, HEALTH & SAFETY



Winter Safety

Due to the cold and stormy weather, winter presents many safety challenges.

Indoors: In the workplace, watch for slippery floors, tripping or other possible hazards whether near entryways, on the stairs, or floors. Keep portable space heaters at least three feet from anything that can burn.

Outdoors: If your pet goes outdoors, be aware of the temperature. Pets can get frostbite very easily. Prepare your vehicle for the winter season. Avoid driving in snow or ice storms. If you must travel in bad weather, drive slowly and stay alert.

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

Cultural Advisory Committee

Stacy Phelps Receives Presidential Science Mentoring Award



Figure 9: Stacy Phelps (Second right, back row) with President Obama and other recipients in the White House Blue Room (White House Photo)

Stacy Phelps, enrolled member of the Sisseton Whapeton Oyate tribe, and engineering graduate of the South Dakota School of Mines and Technology is a recipient of the 2009 Presidential Award for Excellence in Science, Mathematics and Engineering Mentoring. Phelps received the award from President Obama on January 7 at an award ceremony at the White House in Washington DC. Stacy is the Chief Executive Officer of the American Indian Institute for Innovation.

In addition, he is the program coordinator for South Dakota GEAR UP, a college readiness program working with 24 middle schools and 14 high schools. SD GEARUP or the South Dakota Gaining Early Awareness for Readiness of Undergraduate Programs Honors Program is housed on the South Dakota School of Mines campus during June and July. In 2009, the program served over 220 students in grades 9-12. Of those that graduate from the program virtually 100% graduate from high school with 87% attending college after graduation and 9% choosing military service.

DUSEL and Sanford Lab have participated in the summer GEAR UP program and DUSEL is excited about the prospect of participating in the All program.

NEW STAFF



Robert W. (Bob) Kaufman, P.E. has joined DUSEL as Project Engineer for Surface Facilities Infrastructure Design and Construction.

Bob grew up in western Wyoming and graduated from the South Dakota School of Mines and Technology in 1979. He brings 30 plus years of experience in surface type improvements while working in both the private sector and for municipal government. He has been involved in all aspects of project development starting with preliminary design, final design, contract document preparation and management, construction management and through to project close-out. Most recently, he was the Project Manager for the "LUX Surface Facility Renovation" project on the campus of the South Dakota Science and Technology Authority in Lead. This was a great project to expand the "early science" activities at the old "Homestake" site.

Life Philosophy: *We mold our character by the choices we make. Everything that happens in our lives, good or bad, happens for a reason. We may not like the event or the outcome, but through each event, we are given an opportunity to change and grow. Whether we take advantage of these opportunities is our choice.*



John Matthesen recently began working for the DUSEL office in Lead, South Dakota as the Construction Manager for the Deep-Level Campus. In addition to those duties, he will be completing the current Yates Shaft Rehab project, the Underground Hazard Mitigation project, and outfitting of the LUX on the 4850 level. John previously worked for the past two years as a

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Project Manager with the South Dakota Science and Technology Authority Ross Shaft and Yates Shaft Rehabilitation projects. Prior to that, he worked for the South Dakota Department of Transportation in various engineering and supervisory roles.

Favorite Quote: *"Learn from yesterday, live for today, hope for tomorrow. The important thing is not to stop questioning."* - Albert Einstein



William McElroy has joined the DUSEL team as the Construction Manager for the 4850L. Prior to joining DUSEL, William has been the Engineering Project Manager overseeing the Davis Campus Infrastructure Development Project with responsibilities over the removal of the existing Davis Cavern tank and the excavation required to house the LUX and Majorana experiments.

Prior to moving to the Black Hills area, he was a Project Manager at the USGS/EROS Center in Sioux Falls, South Dakota. His projects included management over the technical services support contract portion of the Landsat Ground Segment and Emergency Operations.

When not working, William is usually keeping fit in preparation for his annual hunting trips somewhere out West.

Favorite Quote: *"If it is to be, it is up to me."* - William Johnson



Charing Townsend recently joined the DUSEL engineering staff as the Systems Engineer for Requirements and Configuration Management. Previously, Charing worked as a contractor for nearly eight years at the USGS EROS Data Center in Sioux Falls. Her experience includes engineering of a new Landsat

satellite planning and scheduling system, engineering of a data warehouse, and designing and implementing comprehensive requirements and configuration management across the Landsat satellite systems project.

Charing is a graduate of Dakota State University and holds a B.S. in Computer Information Systems. She is also a certified Project Management Professional (PMP).

In her spare time, she enjoys spending time with her family, friends, and pets. Charing's favorite quote comes from Dr. Seuss: *"Be who you are and say what you feel because those who mind don't matter and those who matter don't mind."*

Lou van der Ree is our newest Berkeley staff addition to the DUSEL Project as the Business Manager. Lou will manage the research administration/operations and ongoing responsibility for management and control of all aspects of the current operating budgets, financial reporting, and program/project expenditure allocation and tracking and will provide support on a variety of operational and planning issues, including development of long range plans, DUSEL policies, procedures and standards.

Lou has a 20 year history of research administration and management within the UC system. She was heavily involved in the funding, renovation and management project of a new Center for Imaging of Neurodegenerative Diseases (CIND) at the San Francisco VA Medical Center where she was also the MSO for four years. Lou comes on board with substantial experience in subcontracting and grants management (a portfolio which included a \$20M/yr NIH cooperative agreement). She is well versed in UC policies and procedures and interpretation of governmental regulations. She is located at the UC Berkeley Bancroft Way Building, Suite 301D and her telephone number is 510-643-6807. If you have the opportunity, please stop by and say hello – her door is always open.

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JOBS

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

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

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.

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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Contributors: Kevin Lesko, Bill Harlan, George Campbell, Bob Kaufman, Tona Kunz, John Matthesen, Willy McElroy, Peggy Norris, Ben Sayler, Charing Townsend, and Lou van der Ree.

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NEW ADDRESS

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HAPPY NEW YEAR!