Sanford
Underground Science and Engineering Laboratory at Homestake

Education & Outreach Spotlight

August 2008

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Summer Summary

As the former Homestake gold mine continues its transition into a Deep Underground Science and Engineering Laboratory (DUSEL), educational events and opportunities abound. In this issue of the Education and Outreach (E&O) Spotlight, we highlight just a few of the exciting opportunities that have taken place.

For the most up-to-date information, visit the Sanford Underground Science and Engineering Laboratory at Homestake website.
http://www.sanfordlaboratoryathomestake.org

DUSEL April meeting a success

More than 350 scientists, engineers, educators and administrators from all over the world came together in Lead (April 20-26) to refine plans for the Sanford Underground Laboratory.

This workshop provided insights into what the initial suite of experiments will look like and what physical facilities will be necessary to create a world-class facility for conducting such experiments. Interactions across disciplines and among individual scientific teams allowed for strategic placement of experiments into synergistic groupings that will maximize both space and infrastructure.

This workshop also provided opportunities for scientists, educators and community leaders to work together on plans for education and outreach associated with the different proposed experiments.

No one knows for sure exactly how many experiments will ultimately be housed deep underground, but it is estimated to be about 25 at any given time. Currently, proposed experiments range from the search for 'dark matter' using multi-ton vats of liquid Xenon to the search for extreme life deep underground. The hope is to have the experiments in place by 2010, however, that is dependent on funding and construction.

Dr. Robert Svoboda discusses studying the universe from the bottom of a mine at Black Hills State University.

"Deep science" fills local lecture halls

Nearly 700 people attended the "Deep Science for Everyone" public lecture series held in conjunction with the April DUSEL Workshop in Lead. Geoscientist Dr. Tullis Onstott of Princeton University spoke at Lead High School Auditorium about the search for and discovery of life in extreme environments. Dr. Bob Svoboda, a physicist at the University of California at Davis, spoke at Black Hills State University, about how the former Homestake mine can assist in the search for dark matter in the universe. Dr. Hitoshi Murayama, a physicist from Lawrence Berkeley National Laboratory, spoke at the South Dakota School of Mines & Technology in Rapid City. He explained how a deep lab such as a DUSEL at Homestake could push the frontiers of astrophysics.

Physics of Atomic Nuclei (PAN) – Underground

Science teachers from South Dakota, Iowa and Nebraska spent the week of June 9-13 learning fundamentals of nuclear and particle physics as well as technical and engineering issues associated with constructing experiments in a deep underground environment.

During the workshop at the University of South Dakota, teachers performed several experiments on nuclear radiation, including shielding and half-life measurements, and each teacher received a Geiger counter for their classroom. Teachers also built cloud chambers, which are used for detecting particles of ionizing radiation, to be used in their classrooms for demonstrations. The culminating workshop project included the construction of a cosmic ray detector, which will be housed at USD but available – by request – to science teachers in South Dakota for use in their classrooms.

*Funding for the workshop was provided by the South Dakota Board of Regents, the University of South Dakota, NSF EPSCoR (through Black Hills State University), the U.S. Department of Energy, Lawrence Berkeley National Lab, the American Physical Society Forum on Education and the Contemporary Physics Education Project.

PAN Underground workshop participants, and instructors Dr. Peggy McMahan Norris, senior research scientist at Lawrence Berkeley National Laboratory. Tina Keller, Ph.D., of the USD physics program and Cathy Ezrailson, Ph.D., with the USD School of Education.

Physics of Radiation

Teachers in the physics of radiation workshop check out a physics simulation designed by Dr. Johnson and created by his son Forest.

An enthusiastic group of twenty five middle and high school science teachers joined Dr. Andy Johnson at the Sanford Underground Science and Engineering Laboratory at Homestake for a one week course (July 7-12) on the Physics of Radiation. Through experimentation, reasoning, and interesting activities, participants developed understandings of the properties, effects, issues, and mathematics of radiation encountered in our daily lives.

Teachers who attended also received a basic set of equipment and course materials for teaching radiation in their own classrooms.

InNOVAtion- 'Science Rocks!'

On July 12, close to 600 people attended a free event at the Sanford Underground Lab at Homestake. InNOVAtion celebrated the one year anniversary of the National Science Foundation's selection of the site for the nation's Deep Underground Science and Engineering Lab and highlighted its science future.

South Dakota Public Broadcasting (SDPB), the PBS science series NOVA, Black Hills State University and Sanford Underground Lab provided a chance for the public to "see" cosmic radiation, experience science at work, explore a Radiation-themed discovery area, hear from scientists and miners, ask questions of a NOVA producer, take a surface tour and pick up some mementos. A steady stream of people also took advantage of the Science on the Move semi trailer filled with mind exercising hands-on science learning displays.

Photo Courtesy of Bill Harlan

InNOVAtion attendees with the Yates "skip" hoist in the background. (A "skip" hoists ore.)

Science Demonstration

Try this!

Some favorite experiments from the InNOVAtion event illustrated the concept of inertia (Newton's first law of motion).

You can try this one at home. Collect the following materials: glass bottle with opening wide enough for pennies to fall through (try a flower vase), 12 inch wooden embroidery hoop (you only need 1 ring), stack of coins (about 15 pennies work well).

Balance the embroidery hoop on the opening of the bottle. Stack the coins on the top of the hoop. This will require some practice!

The challenge: get all the pennies into the jar with out touching the pennies and using only 1 hand.

Feel free to download the PDF
and print copies for your friends.

Until next time
Keep up to date

http://www.sanfordlaboratoryathomestake.org