The dark matter detector at the Sanford Underground Research Facility is about to get an upgrade.
The LUX-ZEPLIN (LZ) dark matter detector in the Sanford Underground Research Facility (SURF) in Lead, recently reached a major milestone. U.S. Department of Energy approval for the final design of the LZ experiment launches the construction phase and pushes the project toward the completion goal of April 2020. Next-gen dark matter detectors have become sensitive enough that researchers around the world are now more confidently racing to be the first to directly observe the existence of dark matter particles. LZ is in direct competition with two projects in Italy and China. Researchers at South Dakota Mines are playing a key role in the detection and removal of radon from the sensitive equipment to ensure LZ has the cleanest signal possible.

“Physicists at Mines are playing a role in one of the most exciting physics experiments in the world,” said SD Mines President Heather Wilson.

LZ is being placed almost a mile underground to reduce the impact of cosmic rays that can hide the potential dark matter signal. But other types of background radiation and contamination can also produce false signals and hurt the effort to detect dark matter. Researchers must painstakingly measure all components of LZ for naturally occurring radiation.

One challenge is the removal of radon, a naturally occurring radioactive gas that could interfere with dark matter detection.

Mines physics professors Richard Schnee, Juergen Reichenbacher and Xinhua Bai, Ph.Ds., are leading research on planning an underground radon-removal system and on testing whether plans to keep LZ materials free of dust and radon daughters are working properly. Reichenbacher operates a new device that can measure small amounts of radon daughters on the surface of materials without having to break the materials. “It’s a million times more sensitive than the standard swipe tests performed in airports,” said Reichenbacher.

The group also leads the measurement of how much radon is produced from LZ materials. “If a material produces too much radon, it can’t be used in the experiment, and our collaborators will have to find a new material to do the job,” said Schnee.

SD Mines researchers play one part in the overall effort. The total LZ collaboration consists of 250 scientists and engineers from 37 institutions in the U.S., U.K., Portugal, Russia and Korea. Read more on Mines’ Research Blog.
SPRING OPEN HOUSE
MARCH 25
www.sdsmt.edu/visit

SCIENCE FAIR JUDGES NEEDED
TUESDAY, MARCH 28
The first-ever Health Careers Expo will take place from 2-5 p.m. today, Wednesday, March 1, in the Surbeck Center ballroom.

The event is designed to help high school and college students explore healthcare careers and will feature panels of healthcare professionals and Mines pre-health students, as well as an exhibit hall showcasing regional universities offering professional healthcare degrees.

Panelists include: Daniel Engebretson, Chair of the Biomedical Engineering Program at the University of South Dakota (USD); Lyndsi Slusarski, physician assistant; Aaron Studer, dentist at Advanced Dental Professionals and others.

Exhibitors include: the USD School of Medicine, Department of Nursing, and School of Health Sciences; South Dakota State University College of Nursing; University of Minnesota School of Public Health and more.

Launched last spring, SD Mines Pre-Health Pathways strengthens support for students in advising, research, internships and professional experiences, networking opportunities, seminars and student organizations in order to prepare students for graduate studies to become doctors, dentists, physical and occupational therapists, physician assistants and other health-related professionals.

The event is sponsored by SD Mines Pre-Health Pathways Office, the Biomedical Engineering Society and the Future Health Science Professionals.

More information on the Pre-Health Pathways may be found here.
Nearly 100 employers attended the Mines annual spring Career Fair.

For Mines students navigating the large fair with so many employers in a short time can be daunting. Fortunately students had the SD Mines Career Fair app which included a list of employers, majors of interest, positions, information sessions and a map of the fair booths.

Over 1,000 Mines students attended, networking with employers including Barrick Gold, Cargill, Caterpillar, Garmin, GE Healthcare, EchoStar, Nucor and Sanford Health as well as regional companies and engineering firms.

In all, nearly 100 employers from 21 states, including 40 exhibitors from South Dakota, were on hand to visit with Mines students.

South Dakota companies included Daktronics, Raven Industries, RESPEC, TSP and Vishay. Twenty of the employers at this year’s fair were first-time visitors. In addition, many of the employers stayed to conduct next-day interviews.

SD Mines graduates continue to be in demand, with 75 percent landing at least one internship before graduation, a 98 percent placement rate and an average starting salary of $63,500.

The South Dakota School of Mines & Technology is hosting the 53rd annual Concrete Conference on Friday, March 3, attracting over 100 concrete experts from throughout the region and country. The conference is open to the public, who may register the day of the event.

President of the American Concrete Institute, Mike Schneider, who also works at Baker Concrete, will deliver the lunch keynote on “The Complex Construction of the Miami Science Museum.” Other topics will include: concrete lessons from recent earthquakes, load testing, the repair of existing structures and concrete design and construction.

The conference theme is “Evaluation, Repair and Rehabilitation of Concrete.” All events will be in the Surbeck Center ballroom.

For more information, contact Chris Shearer at (605) 394-2268 or Chris.Shearer@sdsmt.edu.
SD Mines Hosts Regional Climate Assessment Workshop

SD Mines hosted the Northern Great Plains Regional Engagement Workshop as part of the Fourth National Climate Assessment process.

During the workshop, key players from across the region discussed information to include in the next National Climate Assessment. Topics of discussion during breakout sessions included the impact of a changing climate on: agriculture and livestock, water resources, land use, fish and wildlife, and tribal and indigenous communities. The meeting sought to engage climate researchers and members of the public across business and government sectors to better understand how climate change is affecting the Northern Great Plains.

“Global climate change’s impacts are felt differently across a country as large as the United States,” said Bill Capehart the coordinator of the Atmospheric and Environmental Sciences Program at SD Mines. “Sea-level rise, changes in extreme event frequency, droughts, deluges and changes in pest migration as they follow rising temperatures and changes in rainfall impact us both at the town-level and as a nation at large. These regional meetings are key to assessing not only these local impacts but also to develop ready, responsive and resilient ways forward to protect our infrastructure, economy, health, safety and national security in the coming decades.”

The National Climate Assessment occurs every four years as part of the U.S. Global Change Research Program. The report fulfills the requirements of the Global Change Research Act of 1990. The next national assessment is set to be published in late 2018. Regional workshops are being held around the country to organize and gather input for the next report. The workshop at Mines includes participants from Colorado, Nebraska and Montana who are taking part in satellite meetings via video conferencing.

Kulas Named to Academic All-District Men’s Basketball First Team

Senior Konor Kulas has been named to the College Sports Information Directors of America (CoSIDA) Academic All-District Men’s Basketball Team First Team – an award that recognizes the nation’s top scholar-athletes for their combined performances athletically and in the classroom.

Kulas, a 6-foot-7-inch post player majoring in industrial engineering from Appleton, Wis., is the first Hardrocker men’s basketball player to receive this honor and is one of just two scholar-athletes from the Rocky Mountain Athletic Conference to be named to the district first team for the 2016-17 campaign.

“Konor is the kind of all-around scholar-athlete whom we are proud to have represent our university. He’s a delight to watch on the court. He’s also a great role model and really decent young man. They couldn’t have made a better choice,” said President Heather Wilson.

Kulas, who qualifies for this honor with a 3.40 GPA, has had an outstanding season on the basketball court. He is leading the Hardrockers men’s hoops team, averaging 17 points per game and coming down with 8.9 rebounds per game. He is in the Top 10 in the RMAC scoring 405 points this season and is the RMAC’s second-leading rebounder with 211 boards on the year. Thus far Kulas has amassed 1,400 career points and ranks 11th all-time at SD Mines. Earlier this season Kulas was named to the RMAC All-Academic First Team.

From here, honorees advance to the CoSIDA Academic All-America Team ballot, where first-, second- and third- team All-America honorees will be selected.
The Apex Gallery exhibit “Communicate, Innovate, Fabricate,” showcases the artistic side of South Dakota School Mines & Technology students and explores the boundaries between art and science.

The exhibition includes original creative expressions like drawings, paintings, fabrications, sculpture and models by students from across campus.

“As I have been teaching art to engineers over the years, I realized that some of our students have a creative side that never occurred to them,” says Deborah Mitchell, an associate professor of humanities at Mines and the director of the Apex Gallery. “While some are very aware and create drawings, sculptures and photographs, I am always looking for ways in which their disciplines are informed by the creative process,” she adds. This is the second year for the student exhibition, “Communicate, Innovate, Fabricate.”

According to Mitchell this exhibit shows that Mines students excel in creativity as well as engineering.

“Art isn’t just about grand statements, rather it can make ideas visible and can help communicate the importance of the work done at Mines,” Mitchell says.

The exhibit is open to the public through March 17 in the Classroom Building on the SD Mines campus.

Intern Spotlight
Brandon Golenda
Barrick Gold

Metallurgical engineering major Brandon Golenda from Pueblo, Colo., interned with Barrick Gold in Elko, Nev. Goldena improved Barrick’s flocculation process within the mill at the Cortez mine, while also having the opportunity to perform maintenance on a heat exchanger, control a large hydraulic jackhammer via joysticks to crush rocks, and detonate explosives for an open pit blast.
The 2017 Engineers Week was celebrated at SD Mines Feb. 21-24, featuring free events for area middle school students and the general public, as well as the university community.

Tuesday afternoon Mines students were inducted in the Order of the Engineer, which fosters a sense of responsibility and pride in the engineering profession.

Faculty and students teamed up Tuesday night for Mines Myth Busters & Super Science to debunk or prove urban legends and offer interactive experiments to hundreds of attendees.

Mines myth busters experimented with fire, tested household items for radioactivity, offered hands-on green chemistry activities, tested whether concrete can really float, if metals have memory and more.

On Thursday, Mines hosted about one hundred middle and high school students for Engineering & Science Day, including tours and demonstrations by academic departments, chemistry shows and a concert.

The day included a NASA presentation, led by Tom Durkin from the South Dakota Space Grant Consortium. Entitled “The Expanding Universe,” the presentation focused on the current understanding of Hubble's Law and the Hubble constant, which measures the expansion rate of the universe where velocity increases with increasing distance from the observer.

Check out photos from Engineers Week on the following page.
SD Mines to Host Pi Day Events on March 24

The South Dakota School of Mines & Technology will host Pi Day events at 4:30 p.m. Tuesday, March 14, in the Surbeck Center ballroom. Celebrated around the world, Pi Day (3/14) honors π, the symbol used in mathematics to represent a constant – the ratio of the circumference of a circle to its diameter – which is approximately 3.14.

The Society of Physics Students will hold a pie eating contest and a “Pie the Professor” event, both to raise funds for the student organization.

Blacksmithing Club’s Steel Roses Quickly Sell Out for Valentine’s Day

Blacksmithing club members finishd up their sixth annual signature fundraiser, forging steel roses for Valentine’s Day. No two hand-crafted roses were alike. Some featured more natural-looking polished steel, while others were painted. Depending on the artist, some roses had fuller blooms than others.

“Love is all about taking ugly things and bringing them together to make something beautiful,” says Joseph Schurch, club president and a mechanical engineering senior from Lakeville, Minn., minoring in metallurgical engineering. “Steel can be rough and stubborn, but with a little fire and hopeful vision, it can be brought to life.”

The Blacksmithing Club sells steel roses for $40 each. The club uses the money raised to pay for safety goggles, leather gloves, metals and other materials for its activities throughout the year.

To find out more about the SD Mines Blacksmithing Club or to place a steel rose pre-order for next year, contact Joseph Schurch, club president, at Joseph.Schurch@mines.sdsmt.edu.

Watch the forging of a rose.

Alumnus Rusty Gray Elected to National Academy of Engineering

Alumnus George “Rusty” Gray III, Ph.D., has been elected to the National Academy of Engineering (NAE). He was cited for contributions to the understanding of the dynamic and shock-loading deformation and damage response of materials. Election to the NAE is among the highest professional distinctions an engineer can attain.

Gray completed his bachelor's in metallurgical engineering in 1976 and his master's in the same field in 1977, both from SD Mines. He earns a place alongside five Mines metallurgical engineering alumni and NAE members: William Griffith, Frank Aplan, Douglas Fuerstenau, Maurie Fuerstenau and Ken Han.

Gray joined Los Alamos National Laboratory in 1985. He pursues fundamental and applied research primarily in the elucidation of the structure and property behavior of materials subjected to dynamic and shock-wave deformation. His research interests are in the structure/property behavior of materials under extreme conditions and the development and validation of predictive models of the strength and damage behavior of materials.

Gray is a fellow of ASM International; American Physical Society; and the Minerals, Metals and Materials Society (TMS). He has been a visiting fellow at Cambridge University and served on several National Academies of Sciences advisory boards and panels. In 2010, he served as the president of TMS. Since 2011, he has served as the Chair of the Acta Materialia, Inc. Board of Governors.

Gray has received a Los Alamos National Laboratory Fellows Prize, two Individual Distinguished Performance Awards and an Award for Excellence in Technology Transfer.

This year, NAE elected 84 new members and 22 foreign members, bringing the total United States membership to 2,281 and foreign membership to 249.
The South Dakota School of Mines & Technology men’s and women’s cross country teams have been recognized as NCAA Div. II All-Academic Teams by the U.S. Track & Field and Cross Country Coaches Association (USTFCCCA) for the fifth-consecutive year. Hardrocker junior cross country runner Kari Radke also earned Individual All-Academic Honors for the 2016 season.

“We are very proud of our scholar-athletes at Mines,” said Mines President Heather Wilson. “It is great to see them be recognized in this way.”

The Hardrocker men’s squad finished the season with a 3.31 team GPA, while the Lady Hardrocker team posted a 3.42 GPA. Teams must have compiled a cumulative GPA of 3.00 or greater and scored at an NCAA Div. II regional meet to qualify for the award.

The Hardrocker teams fulfilled both requirements after competing at the NCAA Div. II South Central Regional Cross Country Championships on Nov. 5 in Denver, Colo. The men’s team placed 19th while the women’s team posted a 17th-place finish.

“We’re very proud of our scholar-athletes and what they’ve been able to accomplish in the classroom and on the course,” said Hardrocker cross country head coach Steve Johnson.

Individual All-Academic honors are awarded to those athletes who have compiled a cumulative GPA of at least 3.25 and finished among the top 30 percent of eligible runners at his or her regional championships and/or the top half of the field at the NCAA Championships.

Radke, who finished 69th out of 182 competitors at the regional meet, is a chemical engineering major from Elk River, Minn.

“Kari’s individual honors show how hard she has worked over the last few years,” Johnson said. “To be in the top 30 percent athletically and maintaining her GPA is an impressive feat made that much tougher by competing at the South Central Region and studying chemical engineering.”

A total of 164 institutions earned Scholar Team honors. There were 137 women’s teams and 104 men’s teams that earned All-Academic honors from the USTFCCCA.
Mines in the News

SD Mines Names New Energy Resources Director

Heather Wilson and the Road To Be Taken

Annual Spring Career Fair Held at Mines

Computer Coding Competition Opens Gate to Overhauling Programming Education

Infrastructural, Agricultural Worries Come out at Northern Plains Climate Workshop

School of Mines Students Recreate an Ancient Art

“Music in Engineering,” Lunchtime Concert at SD Mines

Women Panel Inspires SD Mines Female Students Toward Science Careers

School of Mines host Mines Myth Busters & Super Science Show

About Legacy News

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To submit news or story ideas or to subscribe to the email distribution list, please contact Dani Mason, public relations officer, at 605.394.2554 or at Danielle.Mason@sdsmt.edu.

For more Mines news, visit news.sdsmt.edu