

SD EPSCoR UPDATE

SOUTH DAKOTA ESTABLISHED PROGRAM TO STIMULATE COMPETITIVE RESEARCH

QUARTERLY NEWSLETTER
WINTER 2019

A Look At the SD EPSCoR
REACH Committee

2019 South Dakota
Science Fair Schedule

Researcher Spotlight:
Paul Gaillard

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SD EPSCoR REACH Committee

The South Dakota Research, Excellence: A Critical Hallmark (REACH) Committee was formed to serve as a liaison organization between South Dakota institutions of higher education, the National Science Foundation and other federal organizations, private science and/or engineering research organizations, state government and industrial and commercial interests.

The REACH Committee also provides an independent and unbiased coordination of the SD EPSCoR initiatives:

- Seek funding and assess the requirements for improved academic research initiatives supported by the Committee,
- Formulate programs and procedures to stimulate and maintain a sustained, viable research infrastructure in the state of South Dakota emphasizing its impact on economic development,
- Serve as an educational resource for the general populace concerning scientific research and its economic value,
- Seek to achieve competitive research in science, math, engineering, and technology transfer including the encouragement of increased entrance into such fields by the state's youth, and
- Serve as a catalyst to stimulate the collaboration between the federal government, state government, and industry dedicated to scientific research and infrastructure development within the state.

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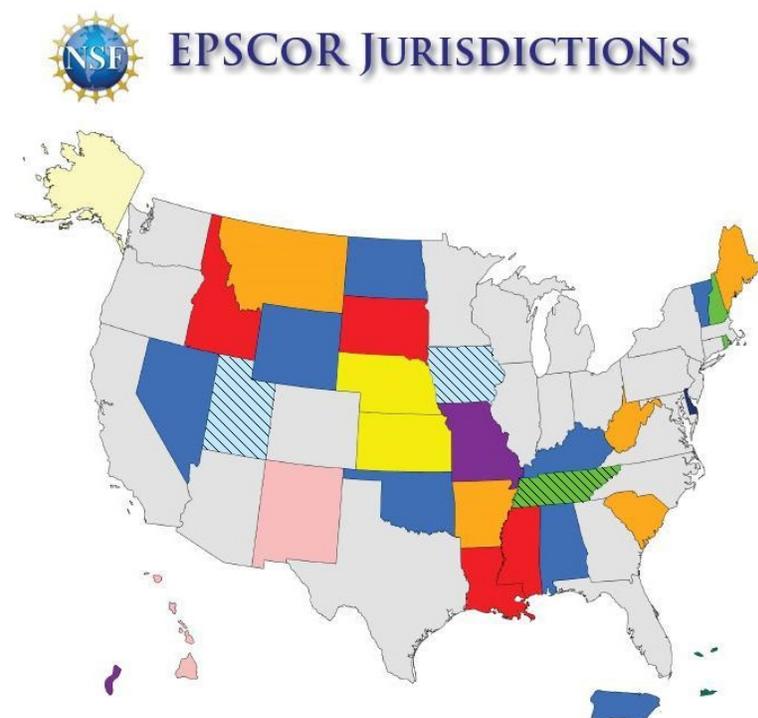
Vice President for Research,
South Dakota State University

Mel Ustad

Director, SD EPSCoR

The National Science Foundation created the Established (formerly Experimental) Program to Stimulate Competitive Research (EPSCoR) in 1979 because Congress was troubled by the uneven distribution of federal research and development grants. After World War II, federally funded academic research grew dramatically, but national science policy, at the time, tended to funnel resources to a small number of states with centers of excellence. This status quo ignored the dramatic growth in regional educational and research institutions. In every state, talented young people aspired to careers in science, technology, engineering and mathematics, but the nation wasn't profiting fully from the wealth of ingenuity and skill embedded across the country. EPSCoR provided a solution.

EPSCoR is now a federal-wide initiative spanning five agencies. Through EPSCoR, participating states and territories are building a high-quality, university-based research infrastructure, which serves as a backbone to their scientific and technological enterprises as well as a strong and stable economic base. Today, the EPSCoR programs are accelerating science and technology for U.S. global competitiveness, prosperity and security.



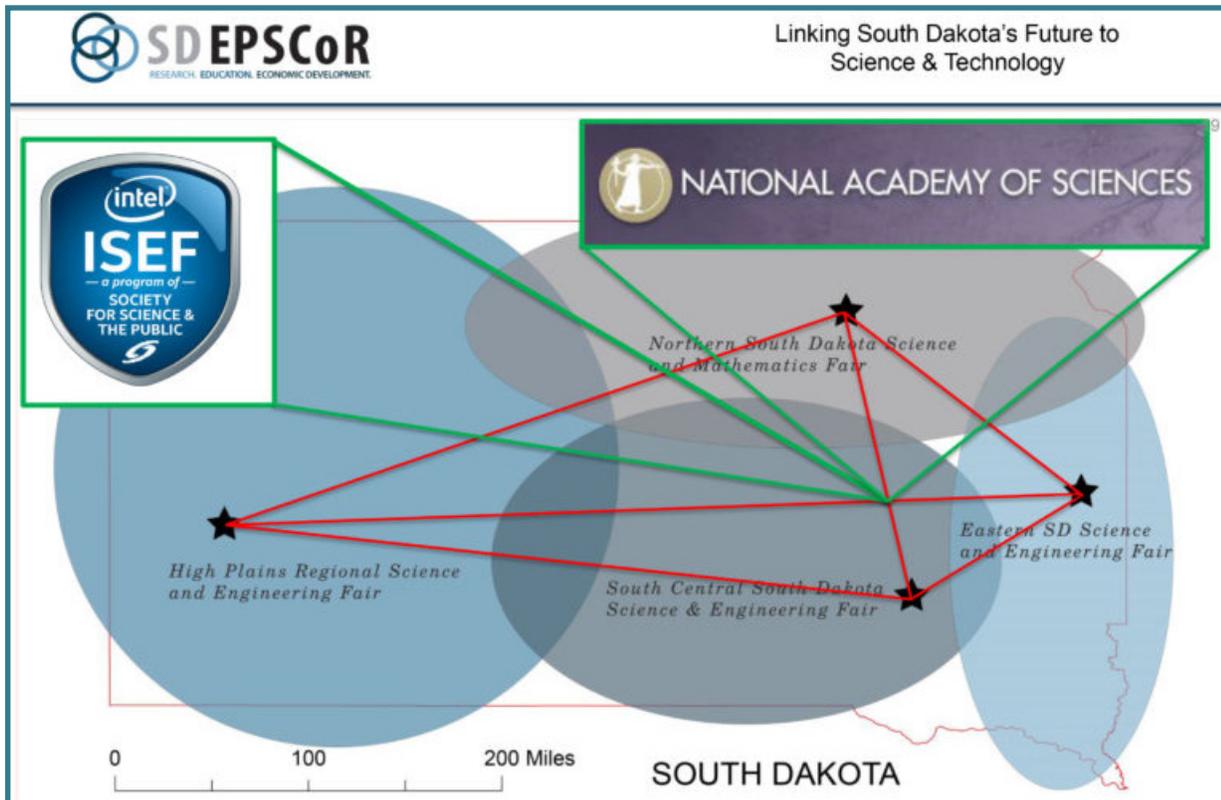
2019 South Dakota Science Fairs



SD EPSCoR is strengthening its work with STEM education in K-12 classrooms in South Dakota's schools by establishing a network among the state's four regional science fairs and South Dakota Junior Academy of Science (SDJAS). The infrastructure investments that have been made contribute to hands-on, inquiry-based problem-solving research experiences for students and provide them with an opportunity to apply what they've learned.

A science fair research project is a cornerstone activity that helps students understand and apply the scientific method, develop their problem-solving skills, and serve as the basis for exploring STEM careers.

The goals of expanding the participation of South Dakota's schools and their students in the state science fair program are to ensure there will be a strong STEM workforce. Science fairs build a pathway to STEM careers for South Dakota's future leaders.



- **Eastern SD Science and Engineering Fair**
Brookings, SD • March 19, 2019
- **High Plains Regional Science and Engineering Fair**
Rapid City, SD • April 9, 2019
- **Northern SD Science and Mathematics Fair**
Aberdeen, SD • March 28, 2019
- **South Central SD Science & Engineering Fair**
Mitchell, SD • March 19, 2019

Student Spotlight: Paul Gaillard

Paul Gaillard is a South Dakota State University (SDSU) Ph.D. Candidate in the Department of Agronomy, Horticulture and Plant Science. He grew up on a farm and used to spend as much time as possible outside foraging for food, so he naturally decided to study biology as an undergraduate student. It was then that he discovered the symbiosis between plants and bacteria, which led to him spending several years researching the topic.

After receiving his master's degree in France, Gaillard made the voyage to South Dakota when he received a position in Senthil Subramanian's laboratory at SDSU. Currently, the group's research addresses one of the biggest challenges in agriculture today: ensuring food safety in an ecofriendly way.

"Fertilizer usage provides nutrients to the plant such as nitrogen, but it is also source of pollution," explained Gaillard.

The research looks at the interaction between legumes such as soybeans with soil bacteria called rhizobium. In particular, plants provide sugar and a home called a "nodule" to the bacteria, and in exchange the plant receives nitrogen.

The group is focusing on nodule development in hopes of growing plants that have more efficient nodules that require less chemical fertilizer. Learn more about the [Subramanian Lab](#) here.



One thing about research Gaillard loves is microscopy, and being able to display groundbreaking discoveries in artistic ways. The main approach the Subramanian Lab used to characterize nodule development was through a multi-photon microscope that was funded by SD EPSCoR.

"My work highly depends on EPSCoR and I am grateful for the support."

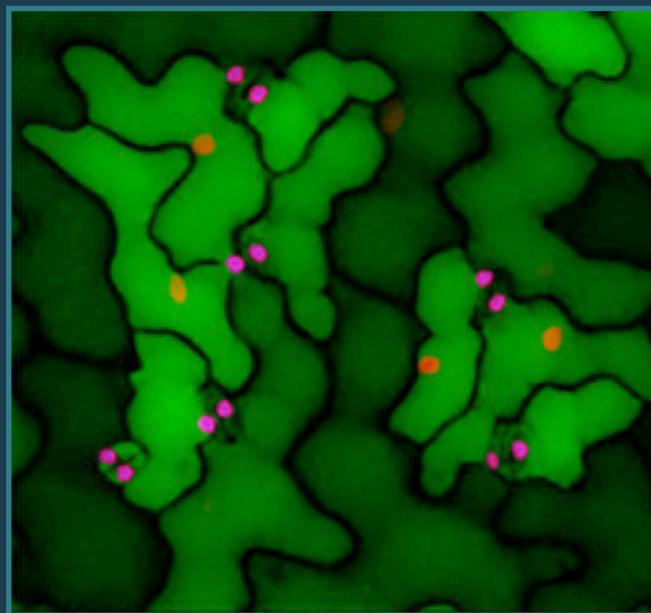


Image of an Arabidopsis leaf taken by Paul Gaillard. The BioSNTR team developed methods to monitor the activities of two major plant hormones, auxin and cytokinin by imaging fluorescent protein markers (red and magenta dots).

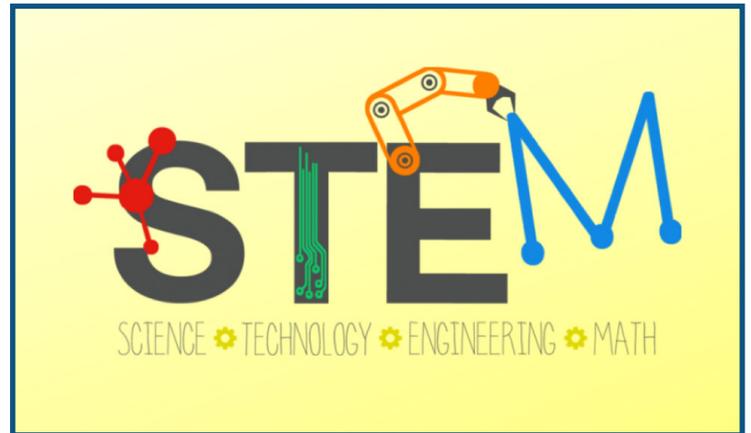
South Dakota Organizations Receive STEM Diversity Grants

This past November SD EPSCoR announced recipients of their STEM Diversity Grants. Applications were submitted by school districts, post-secondary institutions, educational service providers, non-profit organizations and other entities supporting STEM education and outreach activities in South Dakota.

A key component of the EPSCoR project is to increase the number of individuals from underrepresented groups engaged in STEM activities. In addition to increasing the number of students involved in STEM, the grants are designed to increase student awareness, knowledge and skills through participation in science fairs and other activities exposing participants to a range of STEM careers available in South Dakota. This year's recipients include:

- **Augustana University – Gama Zeta**
- **Black Hills State University – Women in Science Conference**
- **Dakota Wesleyan University – Science Fair**
- **Lake Area Technical Institute – Women in Science Conference**
- **Oglala Lakota College**
- **South Dakota Code Camp**
- **South Dakota Discovery Center**
- **South Dakota Future Farmers of America (FFA) Foundation**
- **South Dakota School of Mines & Technology – Science Fair**
- **South Dakota State University Biology**
- **Todd County School District – Science Fair**
- **White River School District – Science Fair**

“The awards assist in developing meaningful partnerships between state government, K-12, higher education and the private sector to strengthen STEM education for diverse audiences,” said Mel Ustad, SD EPSCoR Director. “Utilizing statewide initiatives to improve instruction for underrepresented groups and those in remote regions will help us diversify South Dakota’s STEM workforce.”



NSF EPSCoR Regional Outreach: All About Research Center Programs

The NSF EPSCoR Regional Outreach: All About Research Center Programs (AARCP) meeting will be held on Tuesday, April 2, 2019, at the Renaissance Mobile Riverview Plaza Hotel in Mobile, Alabama.

This event will be attended by up to five NSF Center Program Officers and two to three Center Directors who will provide extensive information about the various Centers sponsored by the NSF. The event will also feature breakout sessions where attendees can ask questions about Centers and speak with the attending Program Officers and Center Directors.



Registration

The registration fee is \$75 and covers participation in the meeting, reception on April 1, and continental breakfast and coffee breaks on April 2. To register for the AARCP Meeting, [click here](#).

NSF RII Track 4: EPSCoR Research Fellows

NSF's Research Infrastructure Improvement (RII) Track-4 provides opportunities for non-tenured investigators to further develop their individual research potential through extended collaborative visits to the nation's premier private, governmental, or academic research centers. During these visits, the EPSCoR Research Fellows will be able to learn new techniques, develop new collaborations or advance existing partnerships, benefit from access to unique equipment and facilities, and/or shift their research toward potentially transformative new directions. The experiences gained through the fellowships are intended to have lasting impacts that will enhance the Fellows' research trajectories well beyond the award period.

These benefits to the Fellows are also expected to in turn improve the research capacity of their institutions and jurisdictions more broadly. Those submitting proposals must either hold a non-tenured faculty appointment at an institution of higher education or an early-career career-track appointment at an eligible non-degree-granting institution.

Only three RII Track-4 proposals may be submitted in response to this solicitation by any single organization in a RII-eligible jurisdiction. If more than three proposals are received from any single institution for the RII Track-4 competition, all proposals from that institution are subject to return without review. Please contact the SD EPSCoR Office or your institution's office of sponsored research for more information.

Current Closing Date for Applications: **March 12, 2019**

South Dakota School Districts Receive Career & Technical Education Grants

South Dakota EPSCoR and the South Dakota Department of Education recently announced recipients of their Career & Technical Education (CTE) Grants.

The grants are designed to assist educators looking to create, improve and innovate on programs that allow students to explore STEM disciplines for students in grades 7-12. This year's recipients include:

- **Deubrook School District**
- **Edmunds Central School District**
- **Lead-Deadwood School District**
- **Madison School District**
- **Tea Area School District**
- **Wilmot School District**

“Students that are exposed to STEM disciplines through these grants will help South Dakota as we look to expand economic opportunity by creating jobs through improved education and technology,” said Mel Ustad, SD EPSCoR Director.

Often times when individuals think about STEM, they think of scientists and engineers which is right on target.

However, what doesn't come to mind are the numerous high-wage, high-skilled, high-demand careers for which CTE is preparing students. CTE serves as a fantastic catalyst for STEM education.

SD EPSCoR and the SD Department of Education solicited proposals for the program from schools with the overall goal of increasing high school graduates skilled in STEM, with focus on informatics and biosciences. Criteria prioritized awareness of STEM careers in the state, partnerships with business and industry, diversity, and cooperation with postsecondary education. Approximately \$170,000 was awarded through the program.



DSU Cyber Training Center for Cybersecurity Summer 2019

The gap between necessary cybersecurity skills and the demands placed on cybersecurity professionals is not only a challenge for the information technology industry, but also a challenge for the scientific research enterprise of the nation. The North Central Region (NCR) Cyber Training Center (CTC) for cybersecurity at Dakota State University was created and funded through the National Science Foundation. The goal of CTC is to create a scalable online cyber training program to assist with the development of scientific cyberinfrastructure professionals in cybersecurity. The CTC includes three programs, i.e., CyberTraining Students, CyberTraining Faculty, and CyberTraining Professionals.



The CyberTraining Faculty program is offered to post-docs, research scientists, and faculty researchers and educators from 2-year and 4-year colleges in the North Central Region. The program will offer online summer courses to help faculty develop expertise in cybersecurity. The program also includes funds to help participating faculty host cybersecurity workshops on their campuses and develop new courses in cybersecurity. These summer courses are free to all faculty participants! They are now accepting applications for the summer 2019 program. [Click here](#) for more information.

Important Dates

- Application deadline: April 1, 2019
- Notification of acceptance: April 8, 2019
- Summer program: May 13 - August 2, 2019

SD EPSCoR DIGEST

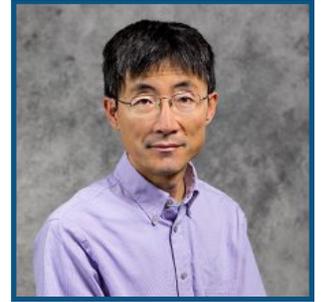
The SD EPSCoR Digest is our biweekly e-bulletin to provide you with vital and timely news and information. Subscribe for grant announcements, event listings, organizational impacts, research information, STEM Ed opportunities and more!

The Digest is distributed via the [organizational listserv](#) and [archived online](#).

New High-Performance Computing Cluster Thrills Researcher

When Xijin Ge learned South Dakota State University was not only going to add a high-performance computing cluster and a 100-gigabyte internet connection, he was excited.

“I was like a kid in a candy store, just so excited about the speed in which I was going to be able to download and analyze genomic data,” said Ge, an associate professor in the Department of Mathematics and Statistics. As a bioinformatician, he develops and uses computational tools to mine public data to investigate complex biological processes, such as what causes cells to divide at the beginning of life. “After downloading and analyzing more than 2,000 large data sets in a couple of days, I have enough results to start writing a paper. Without the new cluster, it would have taken months.”



Xijin Ge

Mike Adelaine, the university’s vice president of technology and security, said the new cluster is like having 3,000 high-performing desktop computers working in unison. He added the new internet connection is similar to comparing the autobahn to a county highway.

The university previously had only a 10-gig internet connection. South Dakota State is the first university in the regental system to have the 100-gigabyte speed. According to Dave Hansen, director of information technology for the South Dakota Board of Regents Information Systems, Dakota State University, the University Center in Sioux Falls and the University of South Dakota will also be on the 100-gigabyte connection. Plans are to also have a redundant 100-gigabyte connection.

“The R1 research institutions will now look at us as partners because of the 100-gig connection,” Adelaine said, referring to the 130 institutions classified by the Carnegie Classification of Institutions of Higher Education for having the highest research activity. “Our researchers work with colleagues all over the world and that will grow as we have some unique datasets that other people will be interested in. We’re now seeing the building of centers of huge data. Our researchers will either provide data to or get data from those repositories. You have to the capacity to move that data and do in a reasonable amount of time. We can now do that.”

Hansen said the National Science Foundation and research-focused entities took to work with entities that have the 100-gigabyte internet connection.

Ge looks forward to what’s next in research at South Dakota State.

“With a drastically improved infrastructure, plus fantastic support team led by Kevin Brandt, you start to think big about what’s possible,” Ge continued, “There is a massive amount of genomic data available online. If you have a good question, there are a lot of opportunities now. I’m optimistic about what we can do with this almost unlimited resource.”



- Visit our [website](#) for timely news, information and announcements, and subscribe to our [listserv](#) for internal SD EPSCoR correspondence.
- Click [here](#) to view full listings on our [events calendar](#). Click [here](#) to submit an event.
- Make sure to bookmark our [weekly grant announcement archives](#) and check every Tuesday morning for new announcements.

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