U.S. DEPARTMENT OF ENERGY

Office of Science

COMMUNIQUE

4 February 2019

*Comm*unique provides a biweekly review of recent Office of Science Communications and Public Affairs work, including feature stories, science highlights, social media posts, and more. This is only a sample of our work promoting research done at universities, national labs, and user facilities throughout the country.
Please note that some links may expire after time.

Chasing a Supernova

Alec Lancaster thought he was bound for a career as a university physicist. But a 10-week internship at Argonne National Laboratory gave him a different vision of the road ahead. “I realized that I would much rather pursue a career in a national laboratory than I would a professorship,” he said. “The internship has definitely shaped my future.”

Lancaster, a theoretical physics and applied mathematics major at Loyola University Chicago, was part of the Science Undergraduate Laboratory Internship program, funded by the Office of Science. He was one of some 400 interns in various programs working throughout Argonne. He spent the summer in Argonne physicist Steve Kuhlmann’s research group looking for a specific kind of supernova in the data from the Dark Energy Survey, an intensive 5-year probe of the southern sky. The ultimate goal of their research is

to use known properties of those supernovae to determine the accelerated rate of expansion of the universe.

Click here to read more Alec Lancaster's experience in the SULI Program.

NEWS CENTER

The Office of Science posted 51 news pieces between 1/21/2019 and 2/3/2019, including 28 university articles and 21 pieces from the labs and user facilities.

Using simulations and calculations, Lawrence Livermore National Laboratory nuclear scientists have, for the first time, accurately predicted the properties of polarized thermonuclear fusion. For decades, nuclear scientists have been trying to harness the energy produced by the thermonuclear fusion of some of the lightest nuclei to power reactors of the future. Analogous calculations could be used to answer some of the most fundamental questions about the origins of the universe and the evolution of stars.

University of Connecticut researchers have suggested a new type of sensor that could lead to artificial skin and someday help burn victims 'feel.' The researchers created such a sensor with a silicone tube wrapped in a copper wire and filled with a special fluid made of tiny particles of iron oxide, just one billionth of a meter long. When this tube is bumped by something experiencing pressure, the nanoparticles move and the electric signal changes. Sound waves also create waves in the nanoparticle fluid, changing the electrical signal in a different way than when the tube is bumped.

Deep convective clouds—the kind that often pack lightning and pour rain—occur nearly everywhere in the world. They are an important feature of the atmosphere, especially in storm systems that dominate the tropics and midlatitudes. Scientists are still struggling to know what goes on inside convective clouds. In particular, many researchers are vexed by how aerosols influence the physics of such clouds, including the precipitation processes and vertical velocities that affect rates of cloud growth, ice formation, and lightning occurrence. Finding out what happens inside deep convective clouds is the aim of a new field campaign at the Atmospheric Radiation Measurement user facility.

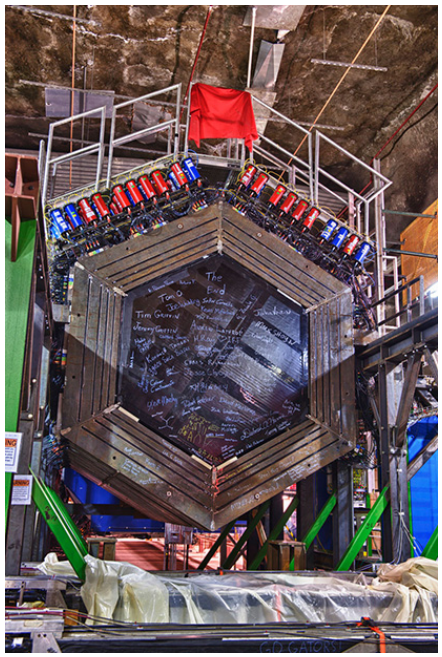
New accelerator-based technology developed by SLAC National Accelerator Laboratory and Stanford University aims to reduce the side effects of cancer radiation therapy by shrinking its duration from minutes to under a second. Researchers received funding to develop two possible treatments for tumors — one using X-rays, the other using protons. The idea behind both is to blast cancer cells so quickly that organs and other tissues don't have time to move during the exposure. This reduces the chance that radiation will hit and damage healthy tissue around tumors, making radiation therapy more precise.

New simulations led by researchers working at Berkeley Lab and UC Berkeley combine decades-old theories to provide new insight about the driving mechanisms in the plasma jets that allow them to steal energy from black holes' powerful gravitational fields and propel it far from their gaping mouths. The simulations could provide a useful comparison for high-resolution observations from the Event Horizon Telescope, an array that is designed to provide the first direct images of the regions where the plasma jets form. The telescope will enable new views of the black hole at the center of our own Milky Way galaxy, as well as detailed views of other supermassive black holes.

Far below the ocean floor, sediments are teeming with bizarre zombie-like microbes. Although they're technically alive, they grow in slow motion and can take decades for a single cell to divide—something that their cousins at the surface do in a matter of minutes. A new study from the Woods Hole Oceanographic Institution is beginning to pick apart how they survive by examining their source of "food"—nearby molecules of organic carbon. The study helps further understanding of the limitations of life on Earth and could help inform how life might exist on other planets.

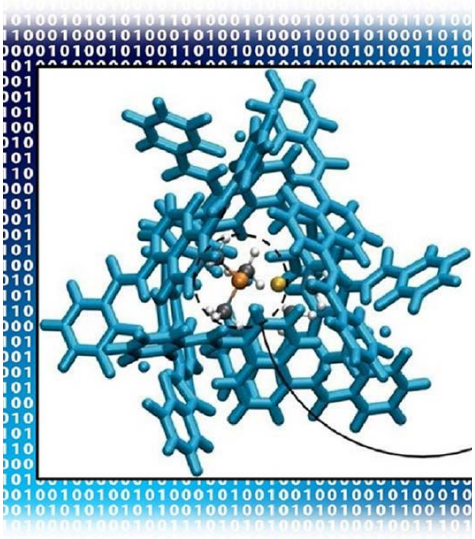
SCIENCE HIGHLIGHTS

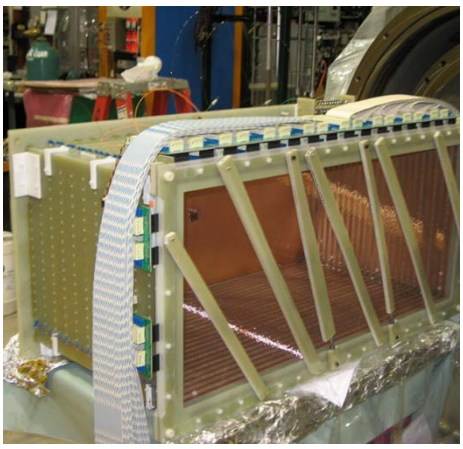
The Office of Science posted nine highlights between 1/21/2019 and 2/3/2019 spotlighting science from three programs: HEP, BER, and BES.



Neutrinos, lightweight particles that rarely interact with matter, are difficult to study, but they're also the very particles that could answer longstanding questions about the creation of the cosmos. By studying the traces that neutrinos leave behind, scientists at FermiLab gathered more information about the meaning of those traces. The more information they have, the better their neutrino measurements—not just at FermiLab's MINERvA experiment, but at other neutrino experiments as well.

A trio of researchers from Berkeley Lab offer a unique view into catalyst design, showing that a careful consideration of electric fields could lead to faster industrial processes that use less energy and release less waste. Industries rely on catalysts and better catalysts would benefit both industries and the environment.

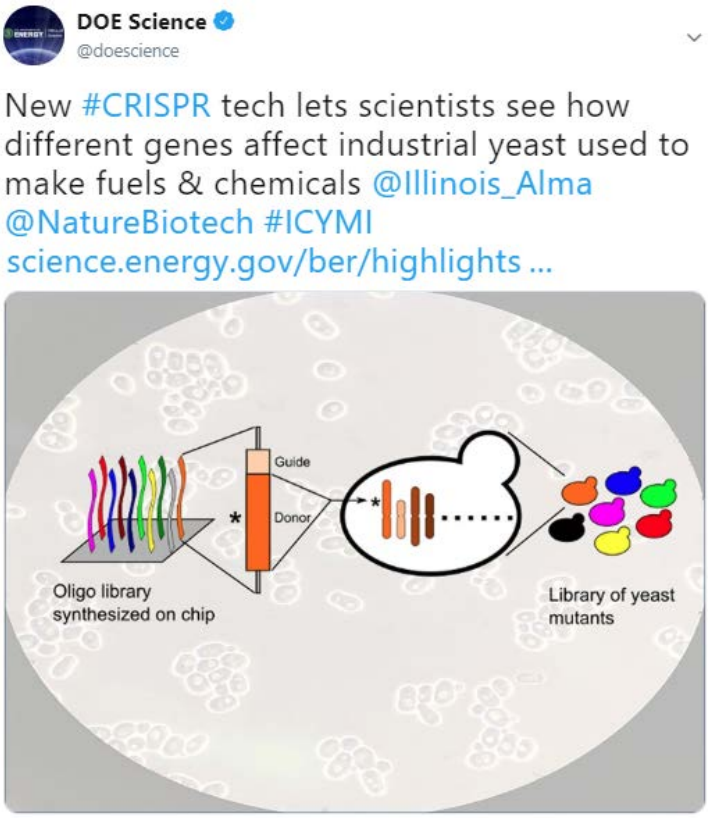




Neutrinos come in three types, but can oscillate from one type to another while travelling. To interpret the outcome of neutrino oscillation experiments, researchers need precise measurements. Scientists from FermiLab and Pacific Northwest National Laboratory improved software and made measurements that will improve simulations, aiding larger experiments in their quest to understand the nature of neutrinos.

TOP TWEETS

The Office of Science sent out 52 tweets between 1/21/2019 and 2/3/2019 and gained 152 new followers.



STATISTICS

The Office of Science by the numbers.

Office of Science User Facilities

User Facility	FY 2018 User Totals
ALCF	954
ALS	2,066
APS	5,704
ARM	1,086
ATF	91
ATLAS	208
CEBAF	1,615
CFN	581
CINT	659
CNM	608
CNMS	640
DIII-D	673
EMSL	561
Esnet	74
Fermilab AC	2,489
HFIR	561
JGI	1,882
LCLS	937
NERSC	7,449
NSLS-II	1,364
NSTX-U	248
OLCF	1,444
RHIC	988
SNS	644
SSRL	1,752
TMF	939
Total: 36,217 Users in FY2018	

A user facility is a federally sponsored research facility available for external use to advance scientific or technical knowledge. In Fiscal Year 2018, 36,217 users came to the Office of Science user facilities to perform research on the most advanced tools of modern science, including accelerators, colliders, supercomputers, light sources, and neutron sources.

Since 2016, OCPA has been running an ongoing series profiling the directors of the user facilities. These directors are the scientists who lead the wide variety of institutions that provide researchers with these tools and with facilities for studying the nano world, the environment, and the atmosphere. OCPA also spotlights news on the research resulting from the user facilities on the Office of Science homepage.

END NOTES

Remastered 1964 films show SLAC's origins

A pair of 1964 films detailing the construction of the Stanford Linear Accelerator Center, later renamed SLAC National Accelerator Laboratory, were recently remastered and are now available on YouTube thanks to a partnership between the films' producer, J. Douglas Allen, and the SLAC Archives, History, & Records Office.

The films provide a look back at the origins of SLAC and the history of particle physics in the United States. At the time of the production, SLAC was the largest civilian basic science project ever undertaken in the United States. The site where it was being built, along Sand Hill Road in Menlo Park, California, was then largely orchards and pasture. Today, the region is known as Silicon Valley.

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