U.S. DEPARTMENT OF ENERGY

Office of Science

COMMUNIQUE

11 June 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 recent work promoting research done at universities, national labs, and user facilities throughout the country.
Please note that some links may expire after time.

Ten Years and Nearly a Billion Dollars: How Project Management Made a Massive X-Ray Light Source Possible

Replacing a beloved tool is never easy. Erik Johnson had worked with the National Synchrotron Light Source (NSLS) for nearly 15 years when he and his colleagues began thinking about its replacement. But this switch wasn't a matter of walking down to the hardware store.

The NSLS, an Office of Science user facility at Brookhaven National Lab, opened in 1982. Over 30 years, scientists—three of whom won Nobel prizes for their work—used its intense beams of light over the

course of more than 55,000 visits to study atomic structures and chemical processes. Johnson came to the NSLS in 1985 as a post-doctoral student. By 2000, Johnson and other leaders in the field realized the NSLS would soon be past its glory days.

They began dreaming up its successor: the NSLS-II. After five years of planning and research, SC approved the project to move forward.

"There was elation in the hallways," said Johnson.

Click here to read more about the National Synchrotron Light Source II and the decade it took to build.

NEWS CENTER

The Office of Science posted 87 news pieces between 5/14/2019 and 6/9/2019, including 42 university articles and 43 pieces from the labs and user facilities.

Researchers at Princeton Plasma Physics Lab are using machine learning to create a model for rapid control of the plasma that fuels fusion reactions. On Earth, scientists must heat and control plasma that causes particles to fuse and release energy, a notoriously difficult process. This new research shows that machine learning can facilitate such control, performing rapid evaluations and accurately reproducing behavioral predictions.

Photosynthetic organisms capture energy from sunlight, which they use to tear carbon from atmospheric carbon dioxide. The carbon ends up in sugars and starches that sustain these organisms and the food chain above them. A new study from researchers at the MSU-DOE Plant Research Lab looks at a pivotal sugar molecule that is the first step towards making the starch in leaves that breaks down at night to feed the plant even when the sun is not shining.

An international team including researchers from Brookhaven National Lab has unveiled a new approach for photon trapping that can localize and store one photon, providing another option for unraveling complicated physics and manipulating the quantum state of single photons.

As a recipient of an Office of Science Graduate Research Award, UC Santa Barbara graduate student Selena Staun will study the behaviors of the actinides, elements found at the bottom of the periodic table. Radioactive actinide elements—including uranium and plutonium—are little understood, but may hold the answers to a future of carbon-free energy, strategies for remediating existing nuclear waste, and new therapies for cancer and other diseases.

Using the Stanford Synchrotron Radiation Lightsource user facility, researchers have for the first time detected chemical traces of red pigment in an ancient fossil–an exceptionally

With time on a supercomputer at the Oak Ridge Leadership Computing Facility, a Georgia State University chemistry researcher and his collaborators have created a new structural model of the human

well-preserved mouse. The international collaboration used X-ray spectroscopy and multiple imaging techniques to detect the delicate chemical signature of pigments in this long-extinct mouse.

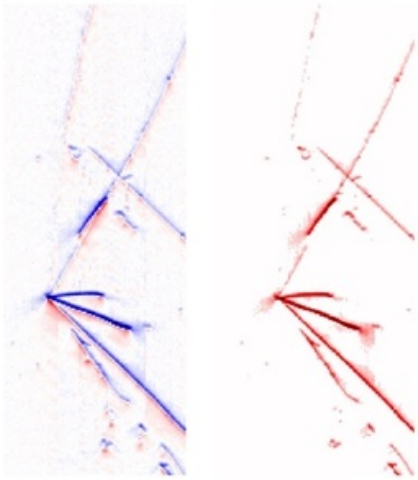
transcription preinitiation complex, an assembly of proteins vital to gene expression. This new model provides insights into how genetic mutations lead to inherited genetic diseases.

SCIENCE HIGHLIGHTS

The Office of Science posted three highlights between 5/14/2019 and 6/9/2019 spotlighting science from NP.

Researchers from Oak Ridge National Lab have found that after extensive purification, radium-226 taken from recycled medical devices can be used in a process to produce actinium-227, an ingredient in a drug that treats prostate cancer.

Laser abaltion, a process in which scientists use lasers to make tiny, clean particles, could be used to kill cancer cells. A team using the Oak Ridge Leadership Computing Facility's Titan supercomputer modeled interactions in this process to differentiate between the mechanisms responsible for generating nanoparticles of different sizes. Finding the source of this discrepancy will pave the way for scientists to control the size of clean nanoparticles, making them cheaper and more readily available for biomedical uses.



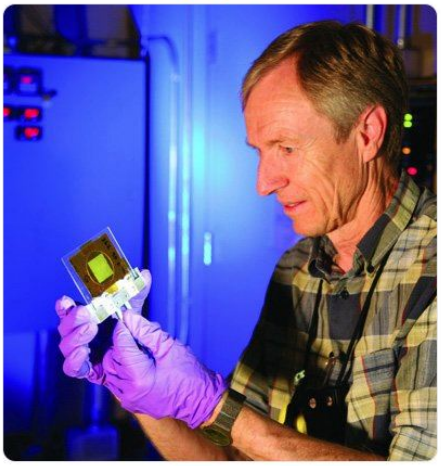
Scientists at Brookhaven National Lab have developed algorithms to track the interactions of neutrinos, elusive subatomic particles that may have played a key role in the evolution of the universe. These algorithms will help provide researchers with cleaner images of how particles move in the MicroBooNE detector and may offer a foundation for precision physics measurements that offer insights into the nature of the universe.

TOP TWEETS

The Office of Science sent out 99 tweets between 5/13/2019 and 6/9/2019. Here are our two most popular from the past two weeks:

DOE Science ✓
@doescience

Using a rare & limited source, @ORNL produces material for a promising #cancer treatment. But it can only produce enough for 100 people/yr! Now w/ @Energy scientists @BrookhavenLab and @LosAlamosNatLab, they've found a new way to produce much more. #ICYMI science.energy.gov/news/featured- ...



DOE Science ✓
@doescience

What are there more of than any other biological entity on Earth? Viruses! @JGI scientists supported by @Energy are using data collected by researchers @UWMadison, @ClemsonUniv & many others to understand viruses' essential role #genomics energy.gov/science/articl ...

BY THE NUMBERS

Class of 26 Fellows Joins Department of Energy Computational Science Graduate Fellowship

The Department of Energy's Computational Science Graduate Fellowship, established in 1991, trains and produces the country's next generation of leaders in computational science. Nearly 500 students have entered the fellowship, going on to support computing's capacity to advance science. This year, 26 fellows from 19 different institutions were selected to study 18 subjects, including computational neuroscience, biological oceanography, and condensed matter physics.

END NOTES

Podcast: DUNE: The Neutrinos Must Flow

The May 7th edition of Direct Current, the Department of Energy's podcast, explores the Deep Underground Neutrino Experiment (DUNE), a massive international research project aiming to unlock the secrets of the neutrino with help from more than 175 institutions in over 30 countries. From Fermilab to the home of the Large Hadron Collider in Switzerland to the bottom of a former gold mine a mile beneath the hills of South Dakota, Direct Current uncovers one of the most ambitious particle physics projects of our lifetime.

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