U.S. DEPARTMENT OF ENERGY

Office of Science

# COMMUNIQUE

18 March 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.*

## Meet the Director: Nigel Mouncey, Joint Genome Institute

Biological parents pass down physical traits to their children. Microbial geneticist Nigel Mouncey's father passed down not just his genes, but a love of the science examining them as well. "I've always been into science. My dad was a microbiologist," Mouncey said. He and his father still joke about him inheriting that trait. "It was a no-brainer to pursue microbiology, given the genetic inheritance from my father."

Like his dad, Mouncey first pursued microbiology. But as he finished his Ph.D. at the University of Sussex, scientists were wrapping up the first-ever sequencing of an organism's DNA. This new field sparked his interest. Twenty-four years later, Mouncey is now the director of the Joint Genome Institute, an Office of Science user facility at Berkeley Laboratory. Both Mouncey and the JGI have been studying genomics since the field's early years and evolving along the way. With Mouncey at the helm, the JGI continues to grow as a leader in the field of genomics.

Click here to read more about Nigel Mouncey and his leadership of the Joint Genome Institute.

# NEWS CENTER

**The Office of Science posted 64 news pieces between 3/4/2019 and 3/17/2019, including 28 university articles and 29 pieces from the labs and user facilities.**

Today's batteries, which rely on charge stored in the bulk of their electrodes, offer high energy-storage capacity, but are limited in their application in consumer electronics and electric vehicles by slow charging speeds. Scientists at Oak Ridge National Laboratory, Drexel University, and their partners have discovered a way to improve the energy density of promising energy-storage materials, conductive two-dimensional ceramics called MXenes.

A research team from Old Dominion University is part of an international collaboration that has taken a major step toward explaining the EMC Effect, the discovery that quarks inside nuclei have lower average momenta than predicted. The team focused on the impacts of proton-neutron pairings, finding evidence that powerfully suggests that the quark distributions in the paired-up protons and neutrons are significantly distorted.

During 25 years of work as an atmospheric scientist who specializes in clouds, Paquita Zuidema has studied many things that to most may seem fascinating and exotic, including shortwave-absorbing aerosols, shallow cumulus convection, and the evolution of marine cloud systems. Using observational data from the Atmospheric Radiation Measurement user facility, one of Zuidema's recent projects put forth research on the interaction between aerosols and clouds, postulating why the boundary layer of the remote southeast Atlantic Ocean is smoky.

Northwestern University researchers have developed a blueprint for understanding and predicting the properties and behavior of complex nanoparticles and optimizing their use in catalysis, optoelectronics, transistors, bio-imaging, and energy storage and conversion. In the study, the researchers constructed a new library of nanoparticles that contained up to seven different metals. This tool can then be used to predict and understand phase arrangements in these materials.

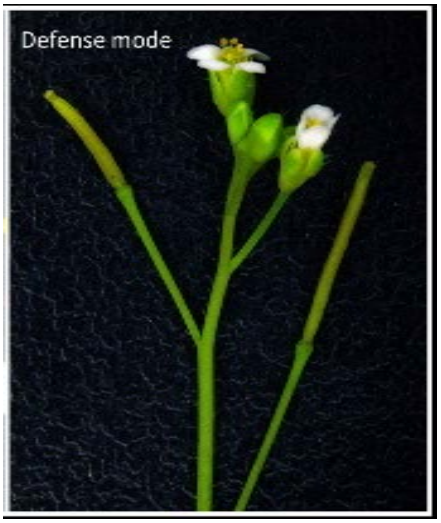
Over the years, researchers have developed and tested thousands of different dyes and pigments to see how they can absorb sunlight and convert it to electricity. Now, thanks to a study that combines the power of supercomputing with data science and experimental methods, researchers at Argonne National Laboratory and the University of Cambridge in England have developed a novel approach to identify promising materials for dye-sensitized solar cells that can be manufactured

Catalysts have traditionally been based on precious metals such as platinum and palladium. Those metals are expensive and their ability to direct a reaction to yield a particular chemical is limited. Oxides, on the other hand, are very abundant and can be relatively inexpensive. A researcher at Oregon State University has been working to advance metal oxides as catalysts, potentially paving the way to chemical processes that are more efficient and less expensive.

with low-cost, scalable techniques, allowing them to reach competitive performance-to-price ratios.

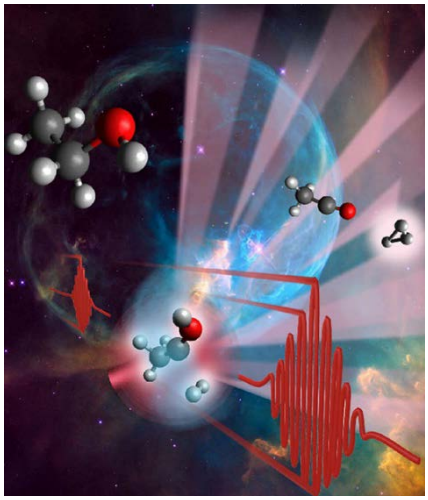
# SCIENCE HIGHLIGHTS

**The Office of Science posted six highlights between 3/4/2019 and 3/17/2019 spotlighting science from two programs: BER and BES.**

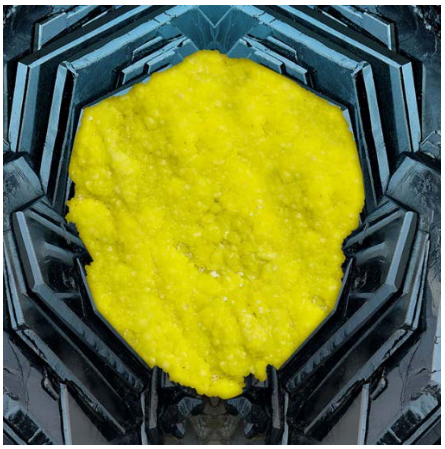



Typically, plants switch on their defense system to ward off attacks as they occur, making a toxin to dissuade the attacker. When the threat passes, plants then use their available energy and resources to grow and reproduce. Scientists from Michigan State University engineered a common weed so that it is always mounting a defensive response—even when it is not under attack. The team showed that the modified plant uses the bulk of its energy and resources for defense and making this toxin, resulting in poor growth and few seeds.

Scientists from Michigan State University have figured out additional ways that the trihydrogen cation, the most abundant ion in the universe, is produced. When organic molecules are hit by a laser pulse, they are ionized and a reaction begins. Sceintists measured the details of this reaction: the timescales, yield, and how chemical bonds are broken and formed. This is one step further to learning how organic



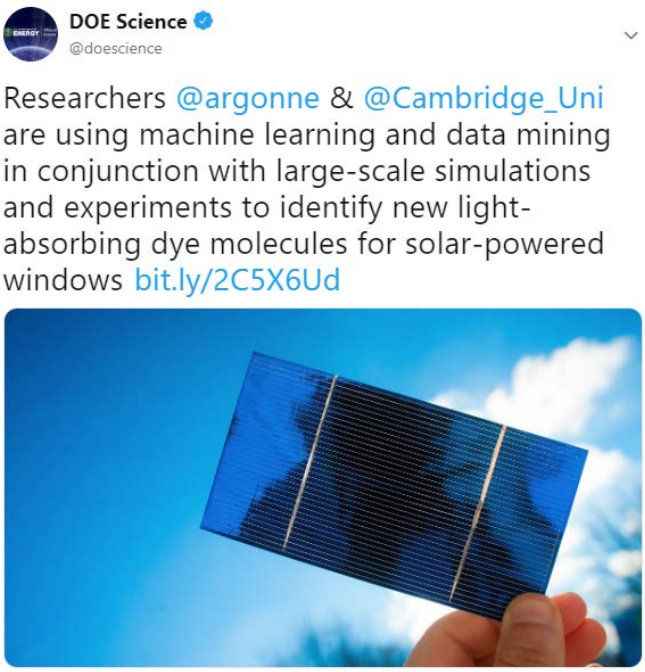
molecules form and behave in the universe at large.



A team from Pacific Northwest National Laboratory has discovered how well uranium binds with iron-based hematite and for how long. Binding uranium with iron oxides would limit its mobility and could enable better predictions of uranium's behavior in the soil and groundwater.

# TOP TWEETS

The Office of Science sent out 74 tweets between 3/4/2019 and 3/17/2019 and gained 231 new followers.





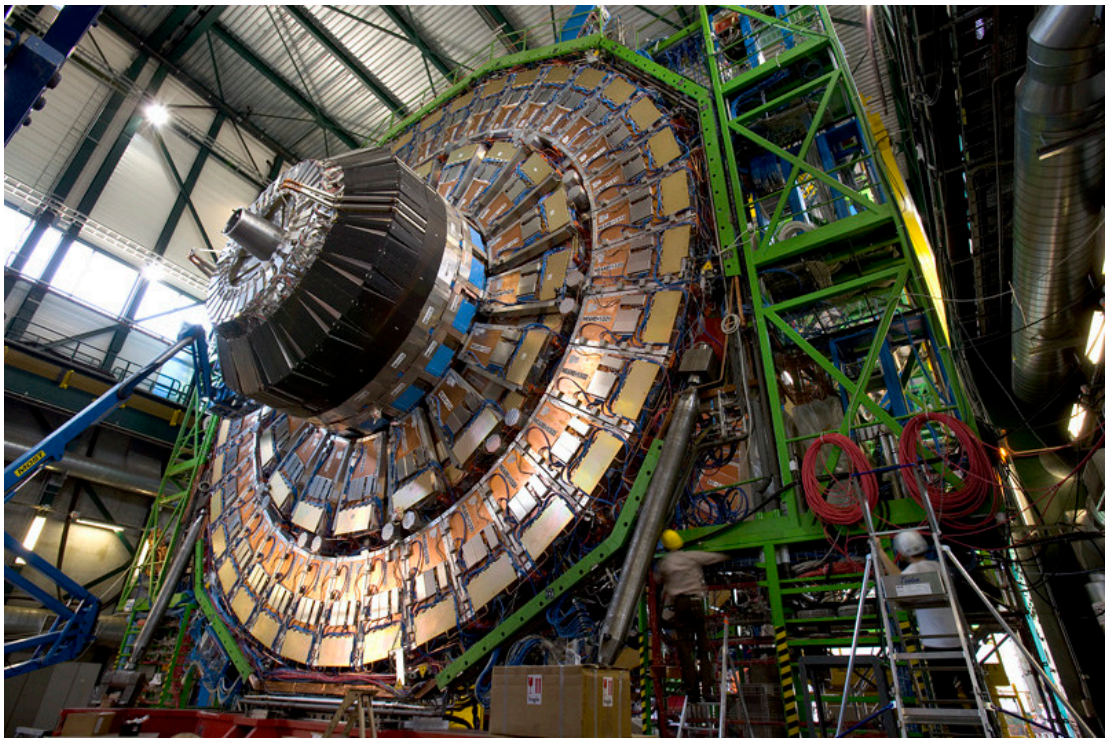
# BY THE NUMBERS

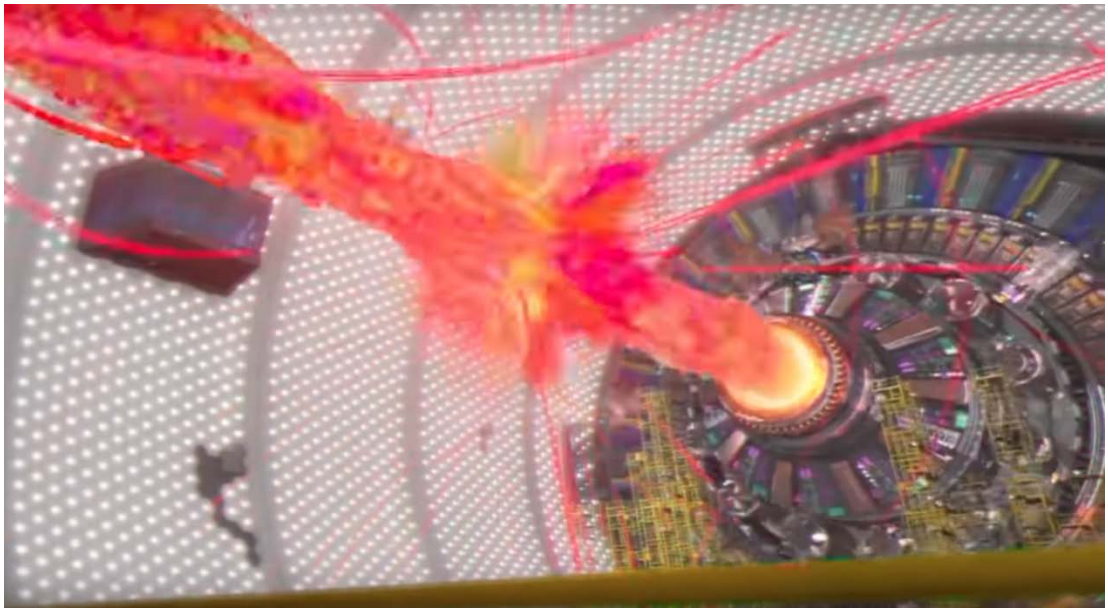
## The Atmospheric Radiation Measurement User Facility


The Atmospheric Radiation Measurement (ARM) user facility is a multi-laboratory Department of Energy scientific user facility. ARM's atmospheric data collection efforts have made the facility a key contributor to national and international climate research efforts, the data from which are available to the public at no charge. This graphic made by OCPA highlights the immense scope and the impact of the work done at ARM. To learn more about the people behind this wide range of science, check out OCPA's ongoing series of profiles of the user facility directors.

# END NOTES

# Fermilab: The Science of "Spider-man: Into the Spider-Verse"





Connecting the work of scientists supported by the Office of Science and popular culture, Fermilab's Don Lincoln explains some of the science behind the real world Large Hadron Collider, Compact Muon Solenoid, and the theories behind multiverses and alternative realities.

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