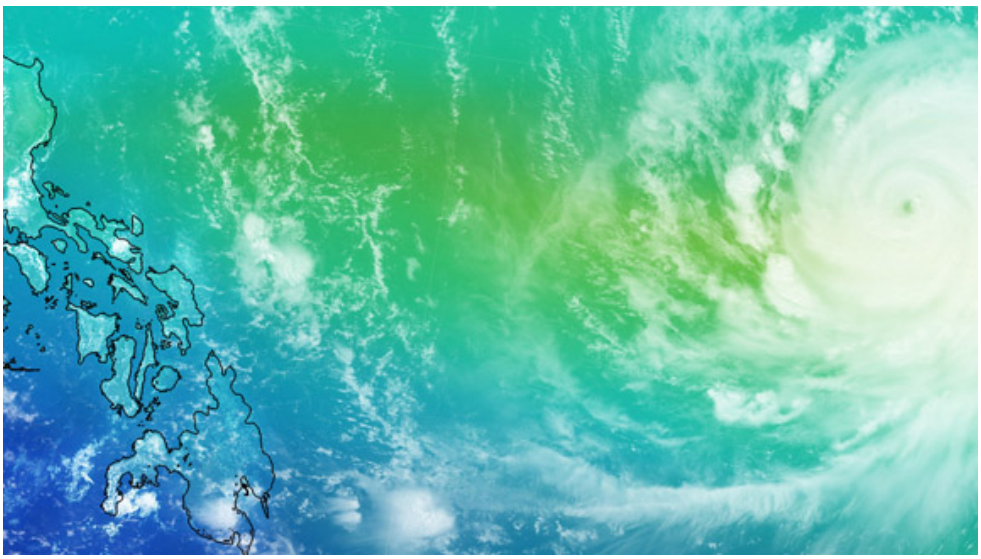
U.S. DEPARTMENT OF ENERGY

Office of Science

COMMUNIQUE

29 October 2018

*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 the research done at universities, national labs, and user facilities throughout the country.
Please note that some links may expire after time.



The Stories Behind the Science: How Does the Ocean's Saltiness Affect Tropical Storms?

Super-typhoon Yutu's path of destruction through the Pacific this week brings new urgency to understanding what makes these powerful storms even stronger. While many of us have seen the images of typhoons, hurricanes, and other tropical storms on TV, for Karthik Balaguru and Greg Foltz, the experience was in person, up close and riveting. Both remember the fear and concern that came with the big storms. But the storms sparked something else in them too: curiosity. Balaguru studies the interactions between the ocean and climate at the DOE's Pacific Northwest National Laboratory, while Foltz researches oceanography for the National Oceanic and Atmospheric Administration. Both scientists explore the factors that cause tropical storms — especially those in the volatile Pacific Ocean — to get stronger or weaker. With support from the DOE's Office of Science and in collaboration with researchers Ruby Leung and Kerry Emanuel, they tackled a question no one else had explored: How does the ocean's saltiness affect tropical storms' strength in the context of climate change?

Click here to read more about the relationships among salinity, ocean temperatures, and storm strength.

NEWS CENTER

The Office of Science posted 65 news pieces between 10/15/2018 and 10/28/2018, including 34 university articles and 30 pieces from the labs and user facilities.

Fermilab's scientists are applying the techniques of quantum metrology to the problem of detecting axion dark matter. Finding an axion would resolve a discrepancy in particle physics called the strong CP problem. Particles and antiparticles are "symmetrical" to one another: they exhibit mirror-image behavior in terms of electrical charge and other properties. One of the four fundamental forces of nature – the strong force – obeys this CP symmetry. But there's no reason, at least in the Standard Model of physics, why it should. The axion was first proposed to explain why it does.

Hampton University physics graduate student, Sahara Jesmin Mohammad Prem Nazeer, is officially the first Hampton University Office of Science Graduate Student Research Awardee. "I am excited to continue my journey in this field in a line of work that truly inspires me. There is so much more for me to learn and I am truly excited," said Nazeer. "I would like to influence and motivate women in Physics throughout my career. I am a young mother and I've realized that life is about the way you react to challenges. I have faced many obstacles, but they have allowed me to have a rewarding path."

To more accurately predict wind in complex terrain, scientists produced physical representations of wind features using the Mira supercomputer at the Argonne Leadership Computing Facility, a DOE Office of Science User Facility. "Mira was critical" to the success of the Wind Forecast Improvement Project II, allowing the team to evaluate the impacts that their observations and the project at large were having on forecasting skill. With the data obtained from this project, researchers have begun new projects to make wind forecasting more reliable, bolstering wind's position as a renewable energy resource.

Transition metal dichalcogenides (TMDCs) possess optical properties that could be used to make computers run a million times faster and store information a million times more energy-efficiently. "There is nothing faster, except light," said Dr. Mark Stockman, lead author of the study at Georgia State University. "The only way to build much faster computers is to use optics, not electronics. Electronics can't go any faster, which is why engineers have been increasing the number of processors. We propose the TMDCs to make computers a million times more efficient. This is a fundamentally different approach to information technology."

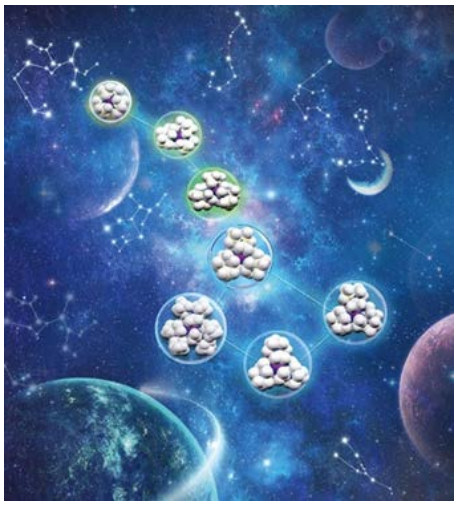
Scientists at Oak Ridge National Lab studying a valuable, but vulnerable, species of poplar have identified the genetic mechanism responsible for the species' inability to resist a pervasive and deadly disease. "Genetic studies can help scientists and forestry experts prepare for a situation when a pathogen enters an ecosystem with little warning and deploy methods to inoculate and potentially save the at-risk species from being wiped out."

In a new approach, a University of Wisconsin–Madison team has designed a fuel cell using cheaper materials and an organic compound that shuttles electrons and protons. The team's solution was to pack a lower-cost metal, cobalt, into a reactor nearby, where the larger quantity of material doesn't interfere with its performance. The right vehicle for this transport proved to be an organic compound,

called a quinone, that can carry two electrons and protons at a time.

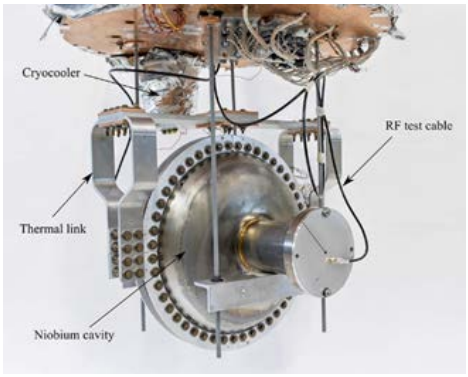
SCIENCE HIGHLIGHTS

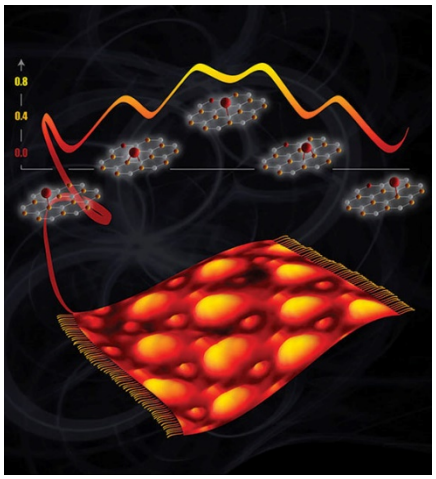
The Office of Science posted 3 highlights between 10/15/2018 and 10/28/2018 spotlighting science from 3 programs: BES, HEP, and ASCR.



Researchers from the University of Pennsylvania and the University of Buffalo have identified key molecular characteristics to potentially separate rare earth metals cleanly and efficiently with light. Methods used to purify the desired elements from natural sources create tons of acidic and radioactive waste and are energy intensive. Knowing how to efficiently use light to separate selected rare earths could reduce waste, lower costs, and diversify the supply chain for these critical elements.

Particle accelerators are made of structures called cavities, which impart energy to the particle beam, kicking it forward. One type of cavity is the superconducting radio-frequency, or SRF, cavity. Usually made of niobium, SRF cavities require extreme cold to operate. A Fermilab team developed a new way of cooling SRF cavities without liquid helium. The new system is simple to construct and easier to operate.





Precise positioning of oxygens could help engineer faster, more efficient energy-relevant chemical transformations. By combining experimental and computational resources, a team from Pacific Northwest National Laboratory examined oxygen binding to carbon atoms on metal-supported graphene, redefining what is known about oxygen binding.

TOP TWEETS

The Office of Science sent out 48 tweets between 10/15/2018 and 10/28/2018 and gained 135 new followers.

DOE Science
@doescience

.@Princeton, @PPPLab, and @utulsa show how to cause or calm small instabilities that can become major disruptions in fusion reactor @AIP_Publishing #ScienceNeverSleeps science.energy.gov/fes/highlights ...

10:48 PM - 20 Oct 2018

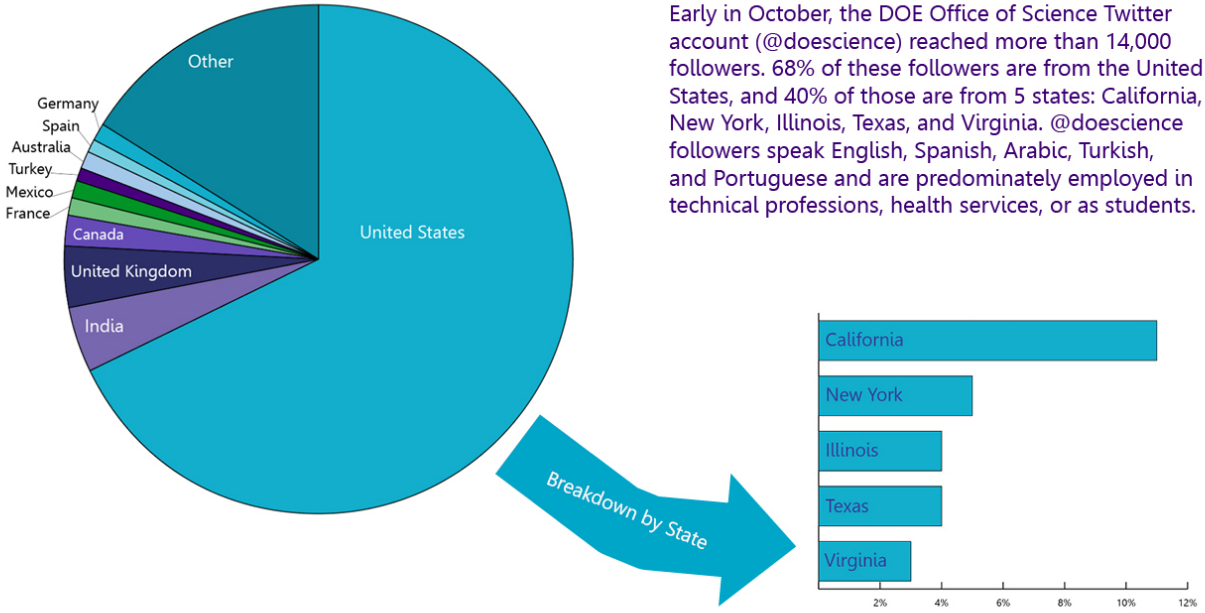
DOE Science
@doescience

At age 19, #chemist Marguerite Perey went to work for Marie Curie. At age 29 she discovered new element francium #Fr. Then she enrolled in university to obtain her PhD at age 37. 1st woman elected to the Académie des Sciences. #Bday #WomenInSTEM #AWIS bit.ly/2P9IydW

10:00 AM - 19 Oct 2018

STATISTICS

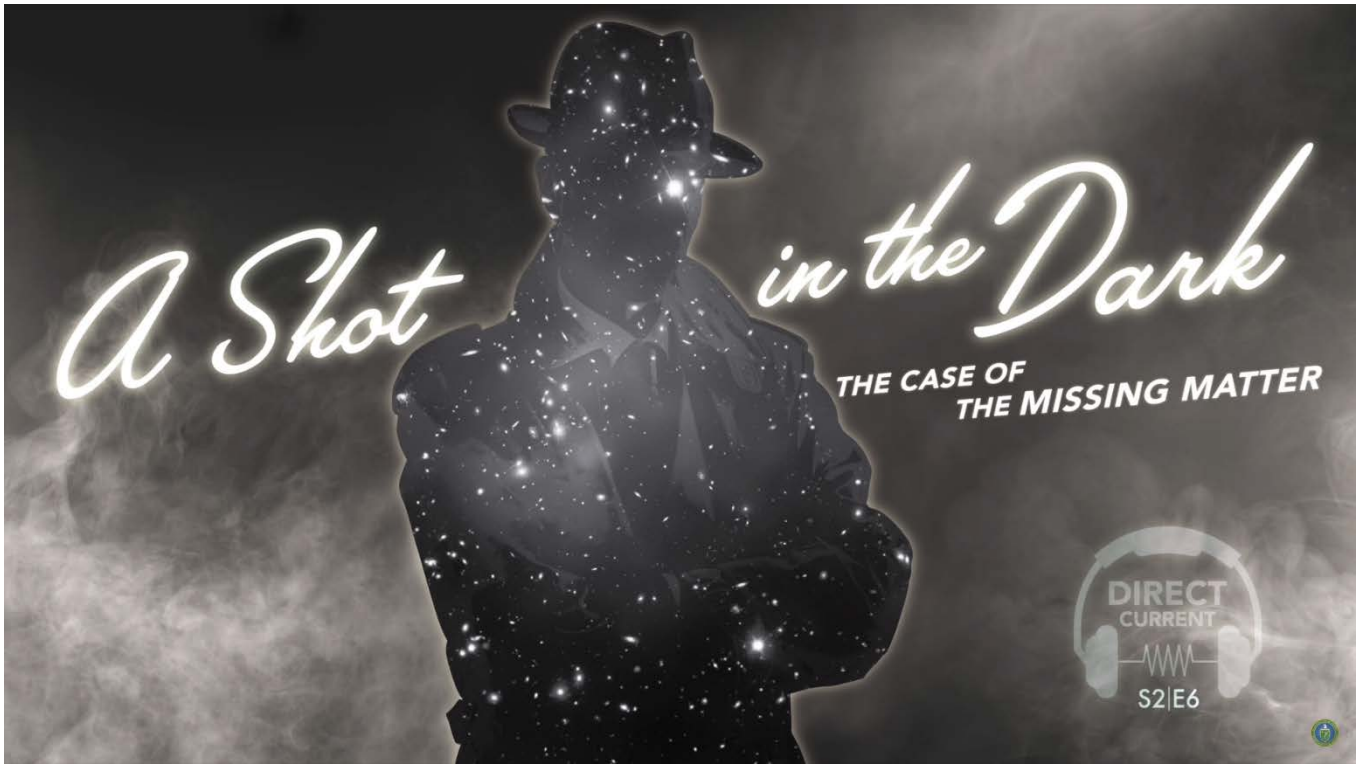
The Office of Science by the numbers.



Early in October, the DOE Office of Science Twitter account (@doescience) reached more than 14,000 followers. 68% of these followers are from the United States, and 40% of those are from 5 states: California, New York, Illinois, Texas, and Virginia. @doescience followers speak English, Spanish, Arabic, Turkish, and Portuguese and are predominately employed in technical professions, health services, or as students.

END NOTES

Podcast: A Shot in the Dark



In honor of Dark Matter Day (10/31/2018), check out the DOE Direct Current podcast on dark matter: "A Shot in the Dark." Written by and featuring OCPA's own Shannon Brescher Shea, this episode follows hardboiled science detectives as they attempt to uncover the mystery of dark matter.

These reports are archived at https://intranet.osc.doe.gov/sites/HQ/Pages/Default.aspx

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