U.S. DEPARTMENT OF ENERGY

Office of Science

COMMUNIQUE

March 22, 2021

*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.*

Columbia Engineers First to Observe Avalanches in Nanoparticles

Researchers at Columbia Engineering have developed the first nanomaterial that demonstrates "photon avalanching." This process is unique in how it combines efficiency and extreme nonlinear optical behavior. Finding photon avalanching in nanoparticles opens up a host of sought-after applications. These applications include real-time super-resolution optical microscopy, precise temperature and environmental sensing, and quantum sensing.

Click here to read more about this discovery from Columbia University and other Office of Science partners.

NEWS CENTER

The Office of Science posted 24 news pieces between 3/9/2021 and 3/21/2021.

Scientists at SLAC National Accelerator Laboratory have developed a new way to harness machine learning to design better batteries. Instead of using machine learning to look for patterns in data, they combined it with knowledge gained from experiments and equations guided by physics to discover and explain a process that shortens the lifetimes of fast-charging lithium-ion batteries.

University of California, Davis researchers determined the crystal structure of part of the blue-light receptor in the model plant *Arabidopsis thaliana*. They found that the light-detecting part of the molecule changes its structure when it reacts with light particles, going from a single unit to a structure made of four units linked together, or tetramer.

Researchers are using the ultrabright X-rays of the Advanced Photon Source, a U.S. Department of Energy (DOE) Office of Science user facility at Argonne National Laboratory, to help turn naturally generated llama antibodies into potentially effective therapies against SARS-CoV-2, the virus that causes COVID-19.

Chemists at Emory University have developed a nanomaterial that they can trigger to shape shift — from flat sheets to tubes and back to sheets again — in a controllable fashion. The nanomaterial holds potential for a range of biomedical applications, from controlled-release drug delivery to tissue engineering.

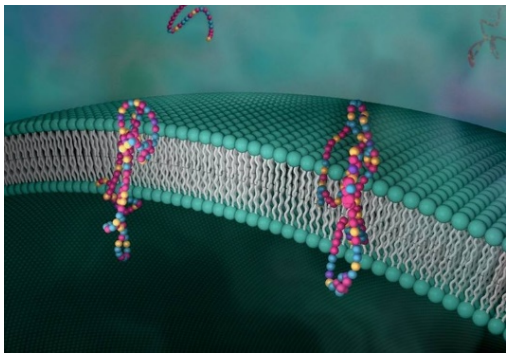
A new analysis of collisions of gold ions at the Relativistic Heavy Ion Collider (RHIC) at DOE's Brookhaven National Laboratory conducted at different energies shows tantalizing signs of a critical point in the phases of nuclear matter. This point would be a change in the way that quarks and gluons, the building blocks of protons and neutrons, transform from one phase to another.

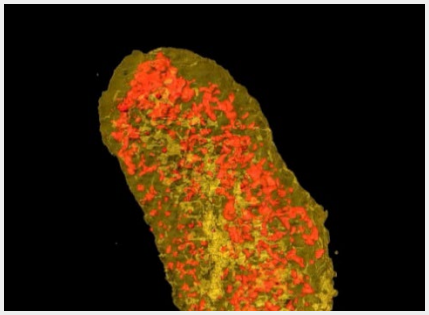
A team of Northwestern University engineers is using ideas taken from paper-folding practices to create a sophisticated alternative to 3D printing. The researchers demonstrated for the first time that structures at microscales using kirigami can achieve unusual 3D shapes and present broader functionality.

SCIENCE HIGHLIGHTS

The Office of Science posted four new highlights between 3/9/2021 and 3/21/2021.

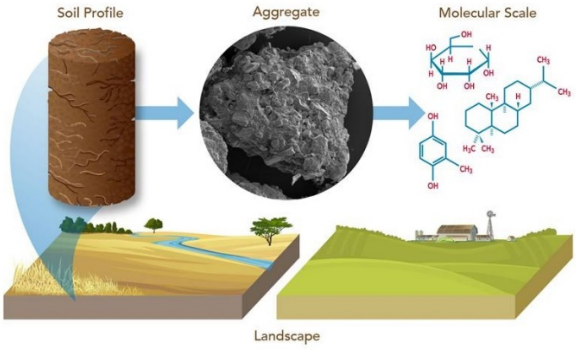
Scientists have long sought to develop synthetic membranes that can match the selectivity and high-speed transport offered by natural membranes. This research by scientists at University of California, Berkeley and Lawrence Berkeley National Laboratory designed a unique polymer-based material that is as effective as natural membrane proteins in transporting protons through membranes.





Using an X-ray-sensitive tag illuminated by a tiny synchrotron X-ray beam, scientists from Brookhaven National Laboratory created an image of a membrane protein on the surface of a single E. coli bacteria. This new X-ray nanovision technology allows scientists to "see" cell membrane proteins and watch how they operate. These new X-ray nano-CT scans will aid in discovery of new membrane protein targets for wide ranging applications.

Researchers from Pacific Northwest National Laboratory coupled microbial characteristics with detailed soil chemistry from two long-term bioenergy research experiments. They found that soil in switchgrass fields had more water-soluble carbon compounds than soil in corn fields. However, the texture of the soil was more important than the crop type on the makeup of the soils' microbial community and the chemistry of the soils' organic matter.



IN THE NEWS

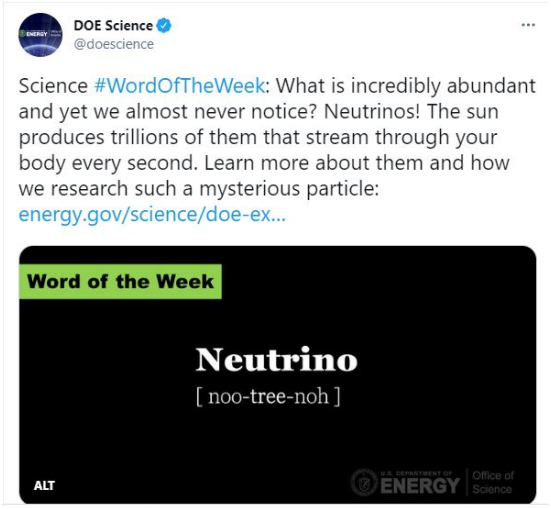
The Guardian: **Is this the end of forests as we've known them?**
This article looking at the issue of forests not recovering from wildfires and droughts due to climate change quotes Nate McDowell, a researcher from DOE's Pacific Northwest National Laboratory.

Fast Company**: The 10 most innovative companies in artificial intelligence**
This list includes Cerebras Systems, which designed a supercomputer specifically to run AI. It mentions that researchers at DOE's Argonne National Laboratory are using it to study nuclear fusion and black holes.

***Seeker*: [This is the largest map of our universe ever created]**
This video describes how scientists created the largest 2D map of the universe in preparation for the Dark Energy Spectroscopic Instrument (DESI), which is supported by DOE.

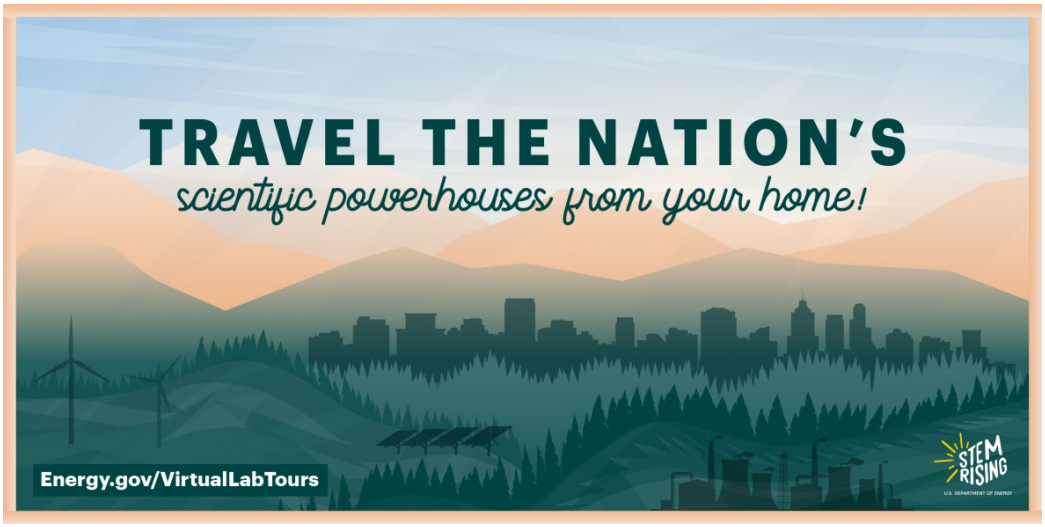
TOP TWEETS

The Office of Science sent out 108 tweets between 3/9/2021 and 3/22/2021. Here are the two most popular:



BY THE NUMBERS

Tour the National Laboratories



You don't have to travel anywhere except your computer to view the world-class science and research facilities at our U.S. Department of Energy National Laboratories. Located all across the country, these Laboratories are offering virtual tours and conversations with their experts on staff to give you access to the work that we do on the behalf of the Nation to break the boundaries of innovation and scientific knowledge. Check out the more than 30 different virtual tours of the labs, as well as numerous other educational opportunities with the national laboratories.

END NOTES

Seeking Submissions for the SciPEP Conference

As part of the DOE Office of Science's collaboration with the Kavli Foundation on the Science Public Engagement Partnership (SciPEP), we are hosting the free, virtual conference Communicating the Future: Engaging the Public in Basic Science from July 27-28. It will explore the unique characteristics of the relationship between the public and basic research, focusing on communications research; training; engagement practice; justice, equity, diversity, and inclusion; and evaluation. We are currently accepting submissions for abstracts based on your work and experiences in basic science communication. Submissions are due April 5.

Please see the Communique archive on Energy.gov for past issues.

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