BREA NEWS

www.bnl.gov/bera/activities/brea/

BREA Meetings

BREA meetings are held on the second Tuesday of every month (except for August), at 1 p.m. in one of the conference rooms in Bldg. 400 (except where noted).

All BREA members are invited to attend and participate.

Meeting Schedule

March 12, 2019

April 9, 2019

May 14, 2019

BREA Officers

President
  Steve Shapiro
  shapiro@bnl.gov

Vice President
  Bob Kinsey
  bobkin@optonline.net

Secretary
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Treasurer
  Lillian Kouchinsky
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* * *

Newsletter Editor
  Mona S. Rowe
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Check out BNL's list of the top 10 discoveries in 2018, starting on page 2.

From the President

by Steve Shapiro, shapiro@bnl.gov

Dear Fellow BREA Members,

March is here and spring is around the corner. Those of you who live on Long Island will appreciate the light snowfall we had this winter (unless you are a skier!) since it saved your backs from shoveling and allowed for more outside outings. It is always nice to look forward to springtime and the big BREA event: our annual luncheon to be held in June; more details to come in our next newsletter.

You will soon be receiving a letter from me and from the Director of Clinical Screening and Outreach of the Worker Health Protection Program (WHPP). WHPP offers free medical exams to all former BNL workers to help identify any illnesses related to any exposures such as radiation, physical or chemical that occurred while working at BNL.

The physical exam is very, very thorough, and you receive a detailed written report with recommendations for follow-up care, if needed.

To date, about 400 former BNL workers have participated. I was one of them and found the medical exam to be extremely thorough – even more thorough than the exam I receive annually from my doctor through Medicare. I encourage all of you to read the correspondence and take advantage of this free screening. It's an offer you can't refuse!!!

– Steve Shapiro, shapiro@bnl.gov

Top 10 Discoveries of 2018

Every year, the U.S. Department of Energy's (DOE) Brookhaven National Laboratory compiles a list of the biggest advances made by the Lab's staff scientists, engineers, and visiting researchers. From uncovering mysteries of the universe to building better batteries, here, in no particular order, are our picks for the top 10 discoveries of 2018.

Small Drops of Perfect Fluid – Nuclear physicists analyzing data from the PHENIX detector at the Relativistic Heavy Ion Collider published additional evidence that collisions of minuscule projectiles with gold nuclei create tiny specks of the perfect fluid that filled the early universe. The ability to create such tiny specks of the primordial soup, known as quark-gluon plasma, could offer insight into the essential properties of this remarkable form of matter and the strong force interactions that hold quarks and gluons together in the visible matter that makes up our world today.

Key Calculation Related to Neutron Lifetime – Brookhaven scientists played a central role in developing simulations that contributed to the highest-precision calculation of a fundamental property of neutrons known as the axial coupling. This quantity can be used to more accurately predict how long neutrons are expected to "live," which is important for understanding how atomic nuclei formed after the "Big Bang" and how the relative abundance of atoms like hydrogen and helium could affect the formation of future stars. The simulations provided input to complex calculations that were run on some of the world's most powerful supercomputers by an international team that included scientists from several DOE national laboratories.

Unexplored Territory in Superconductivity Search – Scientists mapping out the quantum characteristics of superconductors used tools at Brookhaven's new OASIS laboratory to uncover previously inaccessible details of one commonly studied superconductor. This knowledge might give insight into the essential conditions for triggering superconductivity, and how this promising property might be harnessed for energy-saving applications.
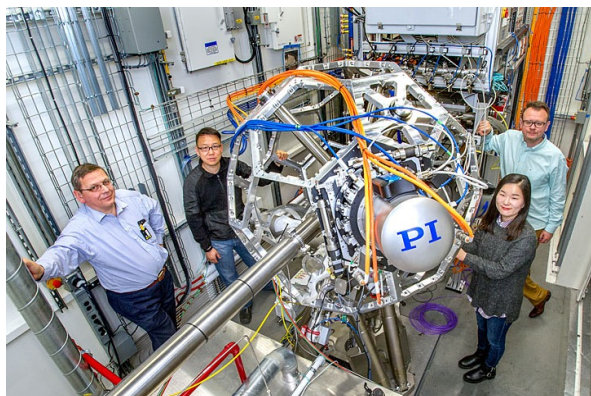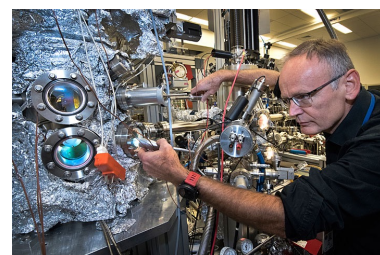

Single-Atom Catalysts for Clean Energy and Environmental Remediation – To optimize the efficiency of catalysts, scientists have started to break them down into single atoms, increasing their surface area and enhancing their reactive properties. Brookhaven scientists discovered several new, single-atom catalysts that break down environmental pollutants and produce clean energy.

From Face Recognition to Phase Recognition – A team including chemists from Brookhaven Lab used an approach analogous to facial-recognition technology to track atomic-scale rearrangements relevant to understanding phase changes, catalytic reactions, and more. The team trained a neural network to recognize features in a material's x-ray absorption spectrum that are sensitive to the arrangement of atoms at a very fine scale. This method helped reveal details of the atomic-scale rearrangements iron undergoes during an important but poorly understood phase change. The technique may help scientists design molecules to speed up or direct the reactions they want to produce useful products.
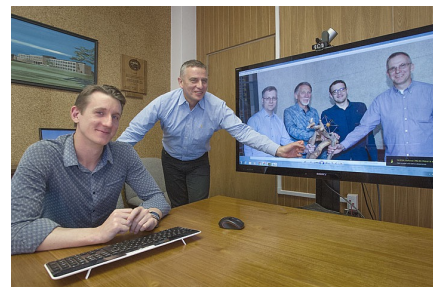
Longer Lasting Batteries – By combining electron and x-ray imaging techniques at multiple Brookhaven facilities, scientists made new breakthroughs in the quest to improve lithium-ion batteries, the most common type of battery found in home electronics and a promising solution for grid-scale energy storage. In one study, scientists witnessed, for the first time, how lithium ions move inside individual nanoparticles in batteries, uncovering a surprising behavior and significantly improving scientists' understanding of how such batteries work. In a second study, scientists developed a new cathode material that could triple the capacity limits of traditional lithium-ion batteries. The results of these studies could help technology companies develop batteries that charge faster and last longer.
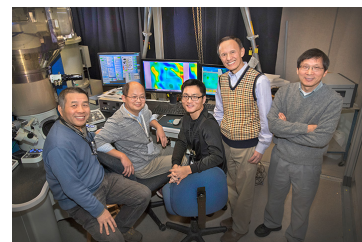
Biochemistry Boosts Plant-Oil Production – Brookhaven biochemists made several discoveries that could help boost plants' production of oil to be used as a biofuel or a feedstock for making other useful chemicals. One study identified signals that normally put the brakes on oil production. Disabling these biomolecular brakes could push oil production into high gear. In a second study, the scientists worked out the details of how certain sugar-sensing molecules help regulate the production of oil in plants. Understanding these molecular details could lead to new ways to get plants to prioritize the production of oil.
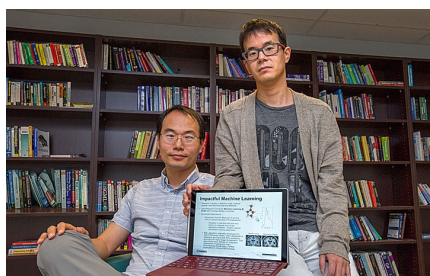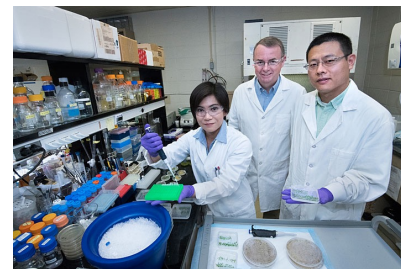
Computational Advances for Medical Applications – Computational scientists at Brookhaven have made new advances in machine learning and software design that will help medical professionals provide better treatments to patients. In one study, researchers used machine learning models to diagnose Alzheimer's disease with 98% accuracy, as well as mild cognitive impairment, a precursor to Alzheimer's, with 84% accuracy. The finding could help medical professionals diagnose Alzheimer's at an earlier stage, and therefore delay the progression of the disease significantly. In a second study, computational scientists developed a new software framework that can rapidly evaluate efficacy of new drugs for a variety of diseases. By calculating how strongly compounds bind to target molecules, the software could improve the speed and accuracy of drug discovery in the pharmaceutical industry, as well as individual patient outcomes in clinical settings.

Precision Prediction of Muon "Wobble" – A team of theoretical physicists released the most precise prediction of how subatomic particles called muons, heavy cousins of electrons, "wobble" off their path in a powerful magnetic field. The calculations take into account how muons interact with all other known particles through three of nature's four fundamental forces while reducing the greatest source of uncertainty in the prediction. The results come just in time for the start of a new experiment measuring the wobble now under way at Fermilab, which should help establish whether a discrepancy between experiment and theory observed at an earlier Brookhaven version of the experiment still stands.
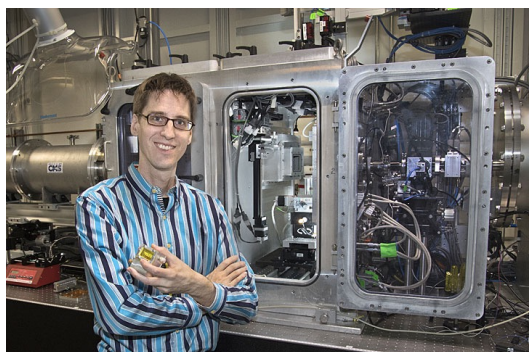
Engineering New Pathways for Self-Assembled Nanostructures – Brookhaven researchers helped investigate how "self-assembly" (when molecules are designed to spontaneously come together to form a desired structure or pattern) can be exploited to engineer a nanostructure in a block copolymer, a well-studied and versatile class of self-assembling materials. The scientists used a new approach developed at Brookhaven, called "pathway engineering," to yield self-assembled patterns with long-range nanoscale order in a block copolymer thin film. New techniques like this one, which bridge between the nanoscale and the macroscale, provide useful tools for synthesis of advanced materials with tailored properties.

– Stephanie Kossman, skossman@bnl.gov

Renew BREA Membership

Membership expires on December 31 of every year no matter when you paid your dues (which are requested by January 31 of the following year). To stay on BREA's mailing list, complete the form below and mail it to me along with your payment. Include your email address so BREA can send you timely information.

If you have questions or if your contact info has changed, email me at hellobylin@yahoo.com.

PLEASE PRINT

Last name: _____ First name: _____ MI: ____

Street: _____ City/State: _____ Zip: _____

Phone: _____ Email: _____

Membership type:
[ ] annual ($10)   [ ] 5 years ($40)   Life [ ] ($95)

Dues cover year(s) _____

Date: _____   Check amount: _____

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    Do not mail it to me via the U.S. Post Office.

Mail form and check (made out to BREA) to:
    Beth Lin, BREA Membership Chair
    81 Westchester Drive
    Rocky Point, NY 11778

                          – Beth Lin, Membership Chair
                              hellobylin@yahoo.com

In Memoriam

We deeply regret to inform you of the passing of the following retirees:

Robert Christian Anderson, 101, January 9, 2019
Len Chimienti, 84, February 2, 2019
Matthew Conforte, 87, April 22, 2018
John C. Heinrichs, 76, January 25, 2019
Vincent Patrick Racaniello, 92, February 19, 2019

More information may be found at BREA's website: www.bnl.gov/bera/activities/brea.

To post an obituary for a deceased BNL employee or retiree, email information to msrowe.hi@gmail.com or mail it to BREA (see panel below for address).

Senior Aqua Fitness

BERA is offering an aerobics-based class for active seniors, perfect for folks with arthritis. *Participants should check with their physician before starting any exercise program.* Advanced registration is necessary and cannot be pro-rated. Contact Christine Carter, 631-344-5090 or ccarter@bnl.gov.

When: Wednesdays, March 6-June 12, 2019, 15 weeks
Fee: $100 for 15 weeks
Time: 9:45 - 10:45 a.m.
Where: Pool, Bldg. 478

Brookhaven Retired Employees Association

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