the Bulletin

BROOKHAVEN NATIONAL LABORATORY

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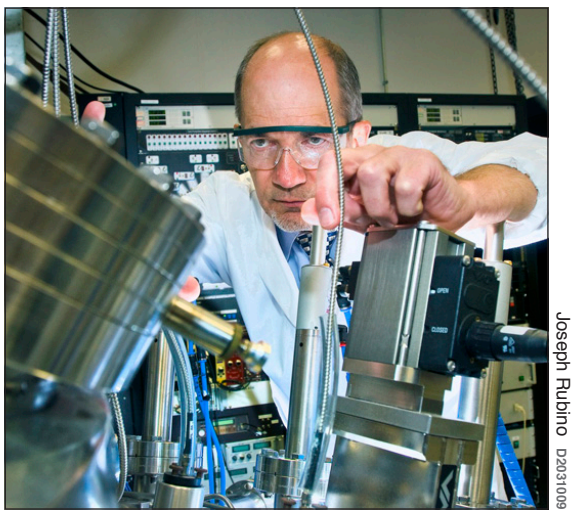


Joseph Rubino D2031009

Fleeting Fluctuations In Superconductivity Disappear Close to Transition Temperature

Measurements may help explain the mechanism of high-temperature superconductivity

As part of an ongoing effort to uncover details of how high-temperature superconductors carry electrical current with no resistance, scientists at The Johns Hopkins University and BNL have measured fluctuations in superconductivity across a wide range of temperatures using terahertz spectroscopy. Their technique allows them to see fluctuations lasting mere millionths of a millionth of a second, and reveals that these fleeting fluctuations disappear 10-15 Kelvin (K) above the transition temperature (Tc) at which superconductivity sets in.

"Our findings suggest that in cuprate superconductors, the transition to the non-superconducting state is driven by a loss of coherence among the electron pairs," said Ivan Bozovic of BNL's Condensed Matter Physics & Materials Science Department (CMPMS), a co-author on a paper describing the results in *Nature Physics* online, February 13, 2011.

Other coauthors are Peter Armitage, Luke Bilbro, and Rolando Valdés Aguilar of Johns Hopkins; and Oshri Pelleg and Gennady Logvenov, previously of BNL. The research was funded by the DOE Office of Science.

Scientists have been searching for an explanation of high-Tc superconductivity in cuprates since these materials were discovered some 25 years ago. Because they can operate at much warmer temperatures than required by conventional superconductors, which must be cooled to near absolute zero (0 K or -273 degrees Celsius), high-Tc superconductors have the potential for real world applications. If scientists can unravel the current-carrying mechanism, they may even be able to discover or design versions that operate at room temperature for applications such as zero-loss power transmission lines. For this reason, many researchers believe that understanding how this transition to superconductivity occurs in cuprates is one of the most important open questions in physics today.

In conventional superconductors, electron pairs form at the transition temperature and condense into a collective, coherent state to carry current with no resistance. In high-Tc varieties, which can operate at temperatures as high as 165 K, there are some indications that electron pairs might form at temperatures 100-200 K higher, but only condense to become coherent when cooled to the transition temperature.

Looking for Evidence

To explore the phase transition, the Johns Hopkins-BNL team sought evidence for superconducting fluctuations above Tc.

"These fluctuations are something like small islands or droplets of superconductivity, within which the electron pairs are coherent, which pop up here and there and live for a while and then evaporate to pop up again elsewhere," Bozovic said. "Such fluctuations occur in every superconductor," he explained, "but in conventional ones only very, very close to Tc — the transition is in fact very sharp."

Some scientists have speculated that in cuprates, on the contrary, superconducting fluctuations…

See ***Superconductors*** *on p. 2*

BNL's New Light Source Is Halfway There

NSLS-II construction passes 50-percent milestone; magnet installation begins

BNL is now halfway toward completing construction of the National Synchrotron Light Source II (NSLS-II), a powerful x-ray microscope nearly half a mile in circumference. Construction started in 2009 on the $912-million facility.

Ready for research in 2015, NSLS-II will be one of the world's most advanced light sources, providing sophisticated new tools for science that will enhance national and energy security and help drive abundant, safe, and clean energy technologies.

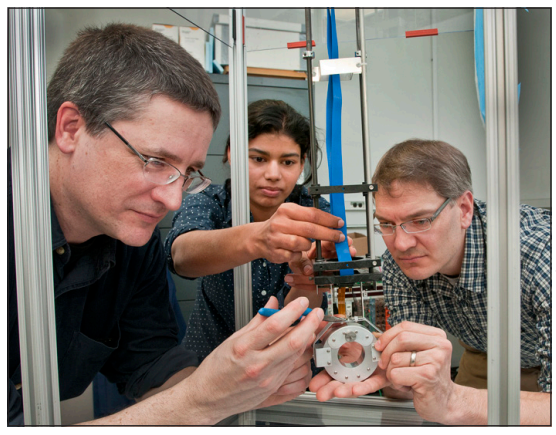
"The 50-percent mark is a major construction milestone," said Steve Dierker, Associate Laboratory Director for Photon Sciences and NSLS-II Project Director. "It means that half of the planned work on the project is finished." With this achievement coming in March 2011, the NSLS-II project is well ahead of schedule.

In 2009, the project received $150 million from the American Recovery and Reinvestment Act — money that came ahead of the baseline schedule and allowed construction to advance more quickly than originally planned.

During its construction and operation, NSLS-II is expected to create more than 1,250 construction jobs and 450 scientific, engineering, and support jobs, plus additional jobs at U.S. material suppliers and service providers. Several dozen contractors, mostly based on Long Island, are currently working on the project.

Conventional construction in the project is divided into two major segments. Torcon serves as the prime contractor for the ring building, which will house the electron…

See ***NSLS-II Update*** *on p. 2*



Joseph Rubino D1130311

From left: Sean Stoll (BNL), Bosky Ravindranath (SBU), and Paul Vaska (BNL).

Miniature 'Wearable' PET Scanner Ready for Use

Scientists from BNL, Stony Brook University (SBU), and collaborators have demonstrated the efficacy of a "wearable," portable PET scanner they have developed for rats. The device will give neuroscientists a new tool for simultaneously studying brain function and behavior in fully awake, moving animals.

The researchers describe the tool and validation studies in the April 2011 issue of *Nature Methods*.

"Positron emission tomography (PET) is a powerful tool for studying the molecular processes that occur in the brain," said Paul Vaska, head of PET physics in BNL's Medical Department with an adjunct appointment at Stony Brook, who led the development of the portable scanner together with BNL colleagues David Schlyer, Medical, and Craig Woody, Physics Department. PET studies in animals at BNL and elsewhere have helped to uncover the molecular underpinnings of conditions such as drug addiction.

But studying animals with PET has required general anesthesia or other methods to immobilize the animals. "Immobilization and anesthesia make it impossible to simultaneously study neurochemistry and the animals' behavior — the actions resulting...

See ***Wearable PET Scanner*** *on p. 2*

Eight BNL Scientists Receive Tenure

Brookhaven Science Associates (BSA) granted tenure to eight BNL scientists, effective December 1, 2010. The scientists are: Elke Aschenauer, Physics Department; Mary Bishai, Physics Department; Vasilis Fthenakis, Sustainable Energy Technologies Department; Peter Petreczky, Physics Department; Vadim Ptitsyn, Collider-Accelerator Department; Jianwei Qiu, Physics Department; Jian Wang, Environmental Sciences Department; and Lin Yang, Photon Sciences Directorate.

Tenure appointments are made after a rigorous selection procedure culminating in a comprehensive review of each tenure case by the Brookhaven Council, an elected body that advises the Director on matters of concern to the scientific staff. The BSA Science & Technology Steering Committee oversees the tenure process and makes final recommendations to the BSA board. The newly tenured scientists are featured in alphabetical order, starting with Aschenauer in The Bulletin of March 18, 2011. The contributions of Bishai and Fthenakis are summarized below.

Roger Stoutenburgh D1520211

Mary Bishai

Physicist Mary Bishai, Physics Department, was granted tenure for outstanding scientific contributions and leadership in experimental neutrino physics. She is particularly noted for her critical role in the measurement of the neutrino beam flux for the Main Injector Neutrino Oscillation Search (MINOS) experiment, which led to the most precise measurements to date of the neutrino atmospheric mass splitting.

As a graduate student at Purdue University, Bishai analyzed data from the CLEO-II detector at Cornell University to produce the first evidence for parity violation in a charm strange baryon. She then became a research associate at Fermi National Laboratory in 1998, receiving her Ph.D. from Purdue in experimental high energy physics in 1999. At Fermilab, she joined the Tevatron CDF (Collider Detector at Fermilab) experiment, and was the principle author of a widely cited study measuring quarkonium and B-meson cross sections, recognized as having significantly increased knowledge of heavy quark production.

See ***Mary Bishai*** *on p. 2*

Roger Stoutenburgh D3130506

Vasilis Fthenakis

Senior Scientist Vasilis Fthenakis, Sustainable Energy Technologies Department (SETD), was granted tenure as an internationally recognized expert for his leading work on the interface of energy and the environment. Since 2002, Fthenakis has headed the National Photovoltaics Environmental Research Center (NPERC), operated at BNL under the auspices of DOE. The center fosters safe and environmentally friendly processes and products for converting solar energy to electricity.

SETD Chair J. Patrick Looney said, "Vasilis has made unique intellectual contributions to science, literally creating a new sub-field with its own community of practice that is devoted to understanding, quantifying, and minimizing the environmental impacts of photovoltaic systems and making comparisons with other energy generation life-cycles. His work includes the invention of processes for recycling photovoltaic panels, which has helped to enable the widespread adoption of thin-film photovoltaics in the European Union."

See ***Vasilis Fthenakis*** *on p. 2*

Service Anniversaries

The following employees celebrated a service anniversary during January 2011:

— 40 years —
Shelby Williams ..... PPM

— 35 Years —
Joan Barrow .....ITD
Juanita McKinney.....ITD
Patricia Giacalone ..... Budget
Peter Eterno, Jr.....Facil. Ops
Thomas Walters..... Maint. & Fab
Vinod Mubayi.....NS&T
Michele Rabatin.....NNS
Charles Whiting ..... PPM

— 30 Years —
Andreas Warkentien ..... C-AD
Rolf Beuttenmuller.....Instrum
Kevin Tisch ..... Maint. & Fab
Abass Wessen ..... Mod. Proj

— 25 Years —
William Schmidt..... Maint. & Fab
Gregg Tomasello.....Site Servs

— 20 Years —
Michael Blaskiewicz ..... C-AD
Mildred Wiener ..... C-AD
Andrew Marone .....Magnet
Gary Schroeder .....ITD
Subhash Sengupta..... Rad. Contr

— 10 Years —
John Donnellan.....ITD
Dax Fu.....Biology
Sachin Junnarkar.....Instrum
Kathleen Ratto..... Photon Scis
Wayne Boyd.....Site Servs

The following employees celebrated a service anniversary during February 2011:

— 35 Years —
Susan Duffin ..... Physics
Jerome Quigley..... PPM

— 30 Years —
Leonard Mausner ..... C-AD
Richard Jackimowicz .....Biology
Pooran Singh ..... Photon Scis

— 20 Years —
Linda Bowerman .....Global/Reg.
Alan Raphael..... Mod. Proj
Kenneth Krasner..... Photon Scis
Jennifer O'Connor .... Photon Scis

— 10 Years —
John Smedley.....Instrum
Thomas Carroll ..... Maint. & Fab
Genda Gu..... CMP/MS
Edwin Haas..... Photon Scis
Joseph Minter.....Site Servs

Wearable PET Scanner *from p. 1*
…from what goes on in the brain," Schlyer said. "Our approach was to eliminate the need for restraint by developing a PET scanner that would move with the animal, thus opening up the possibility of directly correlating the imaging data with behavioral data acquired at the same time."

After several years of development, the scientists have arrived at a design for a miniature, portable, donut-shaped PET scanner that can be "worn" like a collar on a rat's head for simultaneous studies of brain function and behavior. Weighing only 250 grams, the device — dubbed RatCAP, for Rat Conscious Animal PET — is counterbalanced by a system of springs and motion stabilizers to allow the animal significant freedom of movement. Measurements of the rats' stress hormones indicated only moderate and temporary increases.

"Rats wearing the device appear to adapt well and move freely about their environment," Woody said.

To validate the use of the wearable scanner for simultaneous studies of brain function and behavior, the scientists conducted tests with 11C-raclopride, a commonly used PET radiotracer, which incorporates a radioactive, positron-emitting isotope of the element carbon. When the positrons interact with electrons in ordinary matter, they immediately annihilate one another, emitting back-to-back gamma rays. Detectors in the circular PET scanner pick up the signals from these back-to-back gamma rays to identify the location and concentration of the tracer in the body.

Roger Stoutenburgh D1660311

The RatCAP research team includes: Daniela Schulz, Paul Vaska, Srilalan Krishnamoorthy, Craig Woody, Sean Stoll, Fritz Henn, Paul O'Connor, Bosky Ravindranath, Sri Harsha Maramraju, Martin Purschke, and David J. Schlyer.

The tracer 11C-raclopride binds to receptors for dopamine, a brain chemical involved in movement, reward, and memory formation. A higher signal from the tracer means that less natural dopamine is in that particular part of the brain; a low signal indicates that that particular part of the brain has released dopamine (which binds to its receptors, thus blocking the tracer from binding).

The main test was to see if the wearable scanner could be used to correlate dopamine levels with behavior — in this case, the rats' activity (i.e., movement) within their chambers. Surprisingly the level of activity was inversely related to dopamine levels — that is, the more active the animals were, the lower the level of dopamine (as indicated by a stronger tracer signal).

"This is perhaps a counterintuitive result because behavioral activation is typically associated with an increase in dopamine release," said Daniela Schulz, a BNL behavioral neuroscientist in Medical and lead author of the paper. "So our method provides data which may challenge traditional paradigms and ultimately improve our understanding of the dopamine system.

"But, regardless of the direction, the results clearly demonstrate that RatCAP can correlate brain function measurements with behavioral measures in a useful way," she said.

The scientists also present results comparing RatCAP-wearing rats moving freely about their cages with animals that had been anesthetized, as well as comparisons of two methods of administering the tracer — injecting it all at once and in a steady infusion to maintain a constant concentration in the blood.

"These measurements will help us further refine the technique and aid in our assessment of results obtained with RatCAP in comparison with other study techniques," Schulz said.

The researchers' next step will be to use RatCAP to explore distinct behavioral expressions that can be correlated with simultaneously acquired PET data.

The research was funded by the DOE Office of Science. Development of RatCAP was a joint effort between BNL's Medical, Chemistry and Physics Departments, Instrumentation Division and the Biomedical Engineering Department at Stony Brook University (SBU). Co-authors on the paper include: Daniela Schulz, BNL; Sudeepti Southekal, Brigham & Women's Hospital, Boston; Sachin S. Junnarkar, BNL; Jean-François Pratte, Université de Sherbrooke, Canada; Martin L. Purschke, BNL; Paul O'Connor, BNL; Sean P. Stoll, BNL; Bosky Ravindranath, SBU; Sri Harsha Maramraju, SBU; Srilalan Krishnamoorthy, SBU; Fritz A. Henn, BNL and Cold Spring Harbor Laboratory; Craig L. Woody, BNL; and David J. Schlyer and Paul Vaska, BNL and SBU.

— Karen McNulty Walsh

Vasilis Fthenakis *from p. 1*
Through his work, Fthenakis also resolved key regulatory barriers related to solar energy both in the U.S. and in Europe. He is leading the International Energy Agency Task on photovoltaic EH&S, and he gives keynote talks promoting a proactive, long-term environmental strategy for the global photovoltaic industry.

Fthenakis, who joined BNL in 1980, earned his Ph.D. in fluid dynamics and atmospheric science from New York University. In 2006, he established and became the Director of the Center for Life Cycle Analysis at Columbia University.

Fthenakis coauthored the book *Prevention and Control of Accidental Releases of Gases* and about 240 scientific publications, among them leading articles in *Scientific American* and *Energy Policy* that show the feasibility of renewable energy to supply most of the energy needs of the U.S. He is a Fellow of both the American Institute of Chemical Engineers and the International Energy Foundation, and has received distinctions for exemplary work by DOE, BNL and the National Renewable Energy Laboratory.

— Diane Greenberg

Mary Bishai *from p. 1*
In 2004, Bishai came to BNL's Electronic Detector Group, working on neutrino flavor physics. She joined the MINOS experiment, a long baseline experiment sending neutrinos from Fermilab to Soudan, Minnesota, and led the beam design study that was the basis for determining the sensitivity of such an experiment. Along the way, she has made decisive contributions to the design and optimization of the proposed Long Baseline Neutrino Experiment.

Said Physics Chair Tom Ludlam, "Mary has earned wide respect within the high energy physics community. Throughout her career, whether engaged in collider experiments or neutrino physics, her work has been innovative and at the leading edge of both science and technology. Her accomplishments and promise for future achievement fully warrant her promotion to tenure."

— Liz Seubert

Attn.: Former EBS-RMSCO Dental Participants

Anyone who was enrolled in the EBS-RMSCO Dental program in 2010 must submit any claims not previously submitted for processing to EBS-RMSCO by no later than June 30, 2011. Claims submitted after June 30, 2011 will not be processed by EBS-RMSCO nor will they be processed or reimbursed by the new Delta Dental plans.For instructions on filing claims, see *http://www.bnl.gov/hr/Benefits/dental/linkablefiles/EBS_ClmIns.pdf*.

Superconductors *from p. 1*
…might exist in an extremely broad region, all the way up to the temperature at which the electron pairs form. In the present study, the scientists tackle this question head-on, by measuring the conductivity as a function of temperature and frequency up to the terahertz range.

"With this technique, one can see superconducting fluctuations as short-lived as one millionths of a millionth of a second — the shortest possible — and over the entire phase diagram," Bozovic said.

The scientists studied a superconductor containing variable amounts of lanthanum and strontium layered with copper oxide. The samples were fabricated at BNL, using a unique atomic-layer molecular beam epitaxy system that allows for digital synthesis of atomically smooth and perfect thin films. Terahertz spectroscopy measurements were performed at Johns Hopkins.

Surprising Central Finding

The central finding was somewhat surprising: The scientists clearly observed superconducting fluctuations, but these fluctuations faded out relatively quickly, within about 10-15 K above Tc, regardless of the lanthanum/strontium ratio.

This implies that in cuprates at the transition temperature, electron pairs lose their coherence. This is in contrast to what happens in conventional superconductors, where the electron pairs break apart at the transition temperature.

"So, unlike what happens in conventional superconductors, the transition in cuprates is not driven by electron (de)pairing but rather by loss of coherence between pairs — that is, by phase fluctuations," Bozovic said. "The hope is that understanding this process in full detail may bring us one step closer towards cracking the enigma of high-temperature superconductivity."

— Kendra Snyder

NSLS-II Update *from p. 1*
…accelerator and beamlines that are the heart of NSLS-II. Laboratory-office buildings, which E.W. Howell is constructing, will be attached around the exterior of the ring building.

Beneficial Occupancy

The circular ring building, encompassing 400,000 square feet, consists of seven sections. Construction is now substantially complete on the first ring section of 70,000 square feet, enabling the Lab to take beneficial occupancy of the first fifth of the ring. Beneficial occupancy allows the NSLS-II project team to begin installing accelerator components and beamlines for experiments.

Taking beneficial occupancy of a portion of the ring building is a second major milestone, according to Dierker. Up until now, all activity in the ring building has involved conventional construction, including site preparation; concrete work; structural steel; mechanical, electrical and plumbing systems; and the building enclosure — roof and walls.

"Beneficial occupancy enables us to begin installing the first of 826 high-precision magnets destined for the main accelerator ring," said Dierker. The first, fully equipped magnet girder, 14 feet long and holding multiple magnets, will be placed in the ring building in March. This is a third significant milestone for the NSLS-II project.

In brief, NSLS-II will work by shooting electrons through the center of each magnet, where powerful magnetic fields will contain and steer the particles in a nearly circular path. Light emitted by electrons traveling around the ring will be shunted to beamlines, a collection of scientific instruments used to do experiments.

NSLS-II will enable scientists to focus on some of the nation's most important scientific challenges at the nanoscale level, including clean, affordable energy; molecular electronics; and high-temperature superconductors. NSLS-II will also be used to study the smallest crystals in structural biology.

Funded by the DOE Office of Science, the NSLS-II construction project is scheduled to be completed by June 2015.

— Mona S. Rowe

Arrivals & Departures

— Arrivals —
Matthew Donley..... PPM
Rocio Cortes Rodriquez..... CFN

— Departures —
Matthew Cuttler.....ITD
Jun-Sik Lee..... Photon Scis
Pavel Oblozinsky.....NS&T

2010 Reimbursement Accounts Claims — Deadline, 3/31

March 31 is the deadline for submitting any 2010 reimbursement account claims. Claims incurred in 2010 should be sent to PayFlex. Instructions and forms are available from the Benefits Office website: *www.bnl.gov/hr/Benefits/ReimbursementAccounts.asp*.

Finance and Business Operations Reshaped

Written for Monday Memo by Suzanne Davidson, Chief Financial Officer and Assistant Laboratory Director for Business Operations


Suzanne Davidson J.R. D0740211

The business and finance functions across BNL are taking a new yet familiar approach to build upon their excellence, strengthen service, and ensure appropriate levels of oversight and consistency, while being tailored to directorate and department needs.

The previously separate business and finance functions across the Lab have come together to create the new Business Operations Directorate, formerly known as the Finance Directorate, as part of the Blueprint. In the new organization, the Business Operations Managers in each of the directorates will now report directly to the Chief Financial Officer (CFO) with a dotted-line to their respective Associate or Assistant Laboratory Directors (ALDs).

This new structure is designed to bring focus and continuous improvement to:

- Drive quality and consistency of financial support across the Lab;
- Improve the ability to recruit and provide current staff with career advancement and growth opportunities as part of a broader business operations and finance organization;
- Reduce audit risk with a more standardized approach;
- Promote a Lab-wide view as decision-making becomes more balanced between directorate and Lab needs; and
- Encourage the sharing, development, and implementation of best practices.

The Business Operations Managers and their respective teams will continue to serve as strategic partners in the science and operations directorates. Together, they will promote sound financial stewardship and effective decision making to support the Lab's mission, values, and operations.

The Business Operations Directorate will have both a centralized services and deployed services approach.

The centralized services consist of the centers of excellence (COEs) with which we're already familiar. The COEs are Travel, Payroll, General Accounting, Accounts Payable, Accounts Receivable, Budget Office, Prime Contracts Management including the recently added requirements management function, Procurement, and Property. Each COE develops procedures that support Lab-wide requirements, provide consistency across the directorates, and address changing needs.

The deployed services, led by the Business Operations Managers and their teams, include ALD and line management support, budgeting, forecasting, project reporting and administration, business reporting and administration, proposal support, and purchasing support. The procurement organization has already established the deployed services model, paving the way for this model for the balance of the organization.

Please join me in supporting the Business Operations Managers, their teams, and the directorate as we all strive for greater operational excellence.

Brookhaven Veterans Association Update

The **AdoptaPlatoon** team in the Brookhaven Veterans Association (BVA) is collecting lip balm, baby powder, and instant drink mix in individual stick packages for the Lab's adopted platoon. Drop off gifts in boxes located at Bldg. 490, clinic; Bldg. 400, lobby; Bldg. 488, lobby; and Bldg. 510, library.


Joseph Rubino D3380509

Book & Bake Sale, 3/31: The AdoptaPlatoon team will host a book and bake sale in Bldg. 400 on Thursday, March 31, 11 a.m.-3 p.m. Bakers are needed. To volunteer, call Janet Sikora, Ext. 3670.

BVA Quarterly Meeting, 4/5: The meeting will be held at noon on Tuesday, April 5, in the Snyder Conference Room, Chemistry Department, Bldg. 555. All BNLers who have served in the military are encouraged to attend.

BREA Luncheon — Join in the Fun!

A big event of the year for BNL retirees will be held on Wednesday, June 15, when the Brookhaven Retired Employees Association (BREA) will celebrate a long-awaited summer at the BREA annual get-together luncheon. Once again the Bellport Country Club will host BREA for an afternoon of good food, good company and good fun — a perfect occasion to get together with old friends and former colleagues.

The menu will feature appetizers, followed by a four-course meal with starter, salad, choice of entrées, dessert, coffee or tea, and unlimited wine, beer or soda, all for $37. The luncheon is open to BREA members and their spouse or a guest. Non-member retirees who would like to attend will be able to join BREA at the door for the normal membership fee of $10 when they arrive. If you no longer live on Long Island, here is a great excuse to come back for a visit and join in.

To make an early reservation, send a note to BREA, BNL, Bldg 421, Upton, NY 11973-5000, together with a check for $37 per person (made out to BREA). Include your name (and spouse/guest names), address, phone no. and e-mail (if applicable), and note any special requests, such as help needed with transportation. For more information, contact Martine O'Connor, 631-286-9725, or *mocfrog@aol.com*.

BNL Supports Japan Disaster Relief

This message was written by Laboratory Director Sam Aronson.

On behalf of the BNL community, let me express our heartfelt condolences to those among us who may have lost family, friends, colleagues, or collaborators in Japan following the March 11 earthquake and tsunami. We were all shocked and saddened by the news that thousands of people had lost their lives or were injured, and that many remain missing or separated from their loved ones. Several BNL employees were in Japan on work-related travel at the time of the disaster and, fortunately, all are safe. Two employees remain in Japan and they are also safe.

The Lab has long had close ties with scientists and scientific institutions in Japan, including major collaborative programs that started decades ago and have led to new programs today. In addition, BNL has been visited by many hundreds of Japanese scientists over the years, some on a long-term basis, and in turn BNL scientists also have visited Japan regularly, collaborating with colleagues there at many universities and research institutions.

These strong collaborations bring the disaster closer to home for us. The earthquake, tsunami, and mass evacuations have created tremendous need for the Japanese people. The basics — such as food, water, shelter, and medical care — are in critically short supply. The need will likely increase as this tragedy continues to unfold.

As always, many members of the BNL community want to help relief efforts in times of disaster. The Lab is providing several ways to assist.

BSA Matching Donation Up to $25,000

To maximize the impact of financial donations, Brookhaven Science Associates will match dollar-for-dollar all donations up to $25,000 total Labwide to the Japan Society, an American nonprofit organization that aims to bring the people of Japan and the United States closer together "through mutual understanding, appreciation, and cooperation." BSA and BNL's Asian Pacific American Association have elected Japan Society because of its partnership with several Japanese and American not-for-profits working on the front lines of disaster relief and recovery. Japan Society will forward 100 percent of the donations received to organizations that will have the maximum impact, both in terms of immediate relief needs as well as the long-term recovery process.

You may make a tax-deductible donation online at *www.japansociety.org/earthquake* (do not select the "matching gift program" box since BSA will handle the match separately). If you prefer, you may write a check payable to 'Japan Society,' indicate 'Japan Earthquake Relief Fund' on the memo line, and mail it to: Japan Society, 333 East 47th Street, New York, New York 10017, Attn: Japan Earthquake Relief Fund. Following your donation, you will receive an acknowledgment for your 100 percent tax-deductible donation with additional receipt information through the mail.

For the BSA matching donation, send a copy of your receipt or check by April 15 to Jeanne D'Ascoli, Community Relations Manager, Bldg. 400C, Attn: Japan Donation. For questions about the BSA match, contact Jeanne at *dascoli@bnl.gov* or Ext. 2277.

Japan Relief Fundraising Benefit, 3/30

The Asian Pacific American Association will host a Japan Relief Fundraising Benefit Talk and Reception for the Lab community on Wednesday, March 30, 4-6 p.m. in Berkner Hall. The event will feature presentations by BNL Nuclear Science and Technology Chair Bill Horak on containment and release management strategies for reactors, and Stony Brook University Geosciences Professor Teng-fong Wong on earthquakes and tsunamis. A reception will be held in Berkner Hall lobby immediately following the presentations. Tables will be set up to collect check and cash donations for the Japan Society's Japan Earthquake Relief Fund. Please make checks payable to 'Japan Society' and indicate 'Japan Earthquake Relief Fund' on the memo line. In addition, computers will be available to donate online. All donations are eligible for the BSA match. For additional information about the event, contact Susan Wong at *sge@bnl.gov* or Ext. 7988.

Lunchtime Collections

The Asian Pacific American Association will staff a table in Berkner Hall near the cafeteria entrance from 11:30 a.m. to 1:30 p.m., now through April 15. Cash and checks will be accepted. Please make checks payable to 'Japan Society' and indicate 'Japan Earthquake Relief Fund' on the memo line. All donations are eligible for the BSA match. For questions about the lunchtime collections, contact Susan Wong at *sge@bnl.gov* or Ext. 7988.

Other Activities Supporting Japan

Groups across the Lab are developing fundraising activities involving the Lab community. Those details will be announced as they are finalized.

These are extremely challenging times for the people of Japan and I encourage you to join me in providing support.

— Sam Aronson
Laboratory Director

Calendar

— WEEK OF 3/28 —

Monday, 3/28

IBEW Meeting
6 p.m. Centereach Knights of Columbus Hall, 41 Horseblock Rd., Centereach. A meeting for shift workers will be held at 3 p.m. in the union office. The agenda includes regular business, committee reports, and the president's report.

Wednesday, 3/30

***Japan Relief Fundraising Benefit**
4-6 p.m. Berkner Hall. The Asian Pacific American Association will host a Japan Relief Fundraising Benefit Talk and Reception. Featuring presentations by BNL Nuclear Science & Technology Chair Bill Horak on containment and release management strategies for reactors, and Stony Brook University Geosciences Professor Teng-fong Wong on earthquakes and tsunamis. See notice, left.

Thursday, 3/31

***Book and Bake Sale**
11 a.m.-3 p.m. Bldg. 400 lobby. The AdoptaPlatoon team will host a book and bake sale to support the Lab's adopted platoon. Volunteers are welcome, books and baked goods are needed, please contact Janet Sikora, Ext. 3670.

Friday, 4/1

Sam's Club Membership Drive
11 a.m.-2 p.m. Berkner Hall lobby. A Business Membership is $35 with a $10 gift card. A Business Plus Membership is $100, with a $10 gift card, extended hours, and more savings on services and eValues program.

— WEEK OF 4/4 —

Tuesday, 4/5

***Brookhaven Veterans Association**
Noon. Snyder Conference Room, Chemistry, Bldg. 555. The BVA will hold its quarterly meeting. All BNLers who have served in the military are encouraged to attend.

Talk: 'Dying to Get Some Sleep'
Noon. Berkner Hall. Marta Maczaj, M.D., Co-Director of St. Charles Hospital Sleep Center, will talk on sleep deprivation and its consequences; memory, mood, stress and your sleep, tips on improving sleep. All are welcome. If you pre-register at *nlosinno@bnl.gov*, you will get an email reminder.

— WEEK OF 4/11 —

Wednesday, 4/13

BSA Noon Recital
Noon. Berkner Hall. The Prima Trio, winners of the 2007 Fischoff National Chamber Music Competition's Grand Prize and Gold Medal, will perform arrangements by their clarinetist Boris Allakhverdyan. Sponsored by Brookhaven Science Associates, the company that manages BNL, the concertis free and open to the public. Visitors to the Lab of 16 and older must carry a photo I.D.

— WEEK OF 4/18 —

Wednesday, 4/20

468th Brookhaven Lecture
4 p.m. Berkner Hall. Robert Bari, Energy Sciences & Techlology Department, will talk on "Small Modular Reactors." All are welcome to this free lecture, open to the public. Visitors to the Lab of 16 and older must carry a photo I.D.

Fore! Golf Season Starts Soon

The BERA Golf Association is now accepting applications for the 2011 Golf League. New members are welcome. For more information about the league visit the website at *www.bnl.gov/bera/activities/golf/* or contact Jeff Williams at Ext. 5587 or *jwilliams@bnl.gov*.

Classified Advertisements

Current job openings and a statement of job placement policy at Brookhaven National Laboratory are available on the homepage at *www.bnl.gov/HR/careers/*. To apply for a position, go to *www.bnl.gov* and select "Search Job List." For more information, call Ext. 2882.

Motor Vehicles

07 HONDA ODYSSEY – 47K mi. EX-L/RES/NAV, 47K mi, silver, excel cond, orig owner, 100k warr. $19,800 neg. 889-5302.

06 CADILLAC BLACK CTS – 49K mi. excel cond. $12,500 neg. John, 345-0731.

04 DODGE NEON SXT – 122K mi. 4dr, 4cyl, a/t, a/c, p/w, p/l, p/s, c/c, cd, new batt/tires/tmg blt, 32 mpg. $4,300 neg. Jinying, Ext. 4269.

00 DODGE NEON HGH/ES – 125K mi. 4 dr, a/t, a/c, white, new: plugs, wires, air filter, PCV, cam position sensor. $1,000 neg. 775-0476.

Marine Supplies

SUZUKI OUTBOARD MOTOR – DF2.5, Model '09, short shaft 15", 2.5 HP, like new, ideal for sm dinghies, etc, $600/obo. Ext. 7179.

Furnishings & Appliances

FREEZER CHEST – lg, Kenmore/$125; Glider Rocker maple chair/$200; 516-740-8418 or lcade@uspsports.com.

FUTON – in gd cond, pics avail upon request, u-pic-up, $150. rnash@bnl.gov.

KITCHEN SET – 5pc, tile table, 4 chairs/$100; custom coffee table 6'L, boomerang shape, items in gd cond. 744-4077.

SOFA – dk espresso brown 84" Ashley, end units recline, <1yr old, dismantled for easy transp., $400/obo. Ext. 2824, takacs@bnl.gov.

SOFA SLEEPER COUCH – pullout, excel cond, $100. Lowenstein, Ext. 4611, 286-2788 or lowenstein@bnl.gov.

TV CABINET – 52"h, 21"d, 36"w, natural oak finish comp shelf, drawer, excel cond, $75. Hank, 744-9812.

Audio, Video & Computers

2010 TURBOTAX SOFTWARE – CD for Windows & Mac, Fed & State, Home & Business, new/$60, sell/$25. Tony, Ext. 8450.

Sports, Hobbies & Pets

180 GAL AQUARIUM – Oceanic: blt-in overflows, stnd, lights, sump, protein skimr, pump, pwrheads, sm SW fish, $2000. Ext. 7049.

GOLF CLUBS - 2 sets, one bag, Wilson BossII, A.Palmer Irons #3,4,5,6,7,8,9; &Titlist DCI #3,4,5,6,8,9, $50/set 929-8741.

AB CIRCLE PRO – excel cond, used twice, pd $199+, $150 neg. 433-7050.

BOW FLEX ULTIMATE – up to 410/lbs resistnce, 90 exercises avail, all attchmts incl, like new, ask/$400. 264-5473.

BOWFLEX – Motivator w/lat pulldown & leg extension, excel cond, $450/obo. Ext. 5873.

ELECTRIC GUITAR – Epiphone Special II (Ebony), new in box, autographed by Joe Bonamassa. $250. 878-1303.

FOOSBALL /SOCCER TABLE – Harvard, v/nice quality w/drink holders & elect scoring, ask/$100. Toby, Ext. 2012, 838-5879.

KAYAK – Perception Aquaterra Jocassee tamdem v/stable, easy to row, gd cond, ask/400. Robert, Ext. 4548, or hoogsteden@bnl.gov.

TERRY CAMPER – 29', master bdrm, full kitch, shower, 2 fold-down bunk beds, v/gd con, photos, $3000/neg. 775-8160.

WETSUIT – Youth size 12. Excel. condition. Pd. $110. Ask $55. Lynda, Ext. 7235 or fitz@bnl.gov.

Tools, House & Garden

CHINA FIR – unusual specimen tree (Cunninghamia), 2' seedling, $25/you dig. 878-0898.

REAR TILLER – Agri-Fab 36" tow behind, used w/atv, garden tractor, 6.5hp Briggs & Stratton eng, runs well, $700. Carol, Ext. 2587.

Miscellaneous

CRUISE TICKET AVAILABLE – 7 Day Caribbean Carnival Cruise on April 10 to Cayman Isl, Cozumel, Isla Roatan & Belize w/2 fun days at sea. $575/neg. Call for details. Kim, Ext. 2896, 399-3098.

STROLLER – MacLaren Techno XLR, 4 yrs, old, v/gd cond, photo avail/$50. Ext. 7918 or difilip@bnl.gov.

WATERFRONT HOME – live in 3bdrm beach dock in Massapequa in exchange for taking care of elderly gentleman. Rick, Ext. 3005.

XBOX 360 HOMEFRONT – Video game mint cond/$35. Robert, 708-6238 or magnum2@optonline.net.

Happenings

FUNDRAISER FOR PETER GANNON – Mercy HS Alumni Peter Gannon 1985 was diagnosed with a brain tumor. A fundraiser will be held at the Rock Hill Country Club on May 5th from 6-9pm. friendsofpetergannon.com. 428-9191.

THEME BASKET AUCTION – St Andrew's Episcopal Church 10th Annual Theme Basket Auction: East Main Street, Yaphank, Sat, April 30, doors open @ 12:00, $5 admission. judywms@bnl.gov.

Free

BEDROOM FURNITURE – Men & women dressers w/mirror/headbd/drawers & shelves, old but solid, contact for dims and photos. Bill, Ext. 2378, 793-9111.

CARTRIDGES – HP inkjet, #32/black, #33/color, used but not empty. 744-3902.

KITTEN – 18 weeks. Grey with white "boots", playful. Loves people. Foster owner allergic. Pictures on craigslist. 525-6648.

Wanted

BASKETS – Need baskets for a fundraiser auction in May. 258-4607.

BOXTOPS & CAMPBELL'S UPCS – Needed for Kindergarten and 4th Grade class. Thanks! Bldg. 911A. Nina, Ext. 5894.

DONATIONS OF DOG/CAT FOOD – For pets of struggling families/elderly and or Kent Animal Shelter. Collection bins are in Bldgs: 134, 400, 510, x5864, 725, 901, 902. Kathleen, Ext. 3161 or kratto@bnl.gov.

FILEMAKER PRO DEVELOPER – We are looking to hire or contract someone who is excellent at FileMakerPro and who can develop a database for our agency. Please call for interview. Lillian Sanabria-Hernandez, 516-352-6088.

FIREARMS – will pay fair dollars for old or new. joe, 487-1479.

FIREWOOD – cut downed hardwd logs oak, maple, etc 14"-20", split or non split pcs, will remove free nr Rocky Point vicinity. Michael, Ext. 7861.

LIVE-IN-NANNY – A family at Melville, LIE exit 49 is looking for a someone to take care of 2 school-aged kids, simple house work. Anyone interested please contact. YingXia Wang/ChengPu Wang, 974-1256 or yingxiaw@hotmail.com.

OLD US COINS / PAPER CURRENCY – want to purchase old US loose coins or collections. Will pay fair price. 678-2334.

For Rent

WEEKI WACHEE, FL – Gulf Coast Ranch, 70m Orlando, 45m Tampa, fly Islip direct, screen/igp, fruit trees, 3bdrm, 2bath, d/r, f/p, 2x gar, shed, photos. $950/mo neg. 344-5537.

CENTER MORICHES – Waterview, 1 bdrm apt, single occup., non smkr, no pets, all new carpeting/kitch/appli/bath, util incl, can be furnished. $1,050/mo. 834-0047.

EAST PATCHOGUE – 4BR, 2B Cape. LR, EIK, DR, Enc sun porch, overszd 2 car gar, lg yard. $1600./mo + utils. 1 mo sec + ref. N/S. $1,600/mo. Hank, 516-551-1901.

FARMINGVILLE – furn lg 2nd flr bdrm w/wic, share bath, kitch, d/r, l/r, incl elec, phone, wifi, cable. $575/mo. Ben, 513-8275 or benonium@gmail.com.

MEDFORD – cozy bi-level 2 bdrm, 1.5 bath condo, new kit/bth/htg/win, w/igp, golf & gym, 7 mi from lab. $1,575/mo. GS, 880-7584 or gsrentit@gmail.com.

MIDDLE ISLAND – 1 bdrm lg bsmt apt, pvt ent, phone, cable, int, strictly no smkg/pets, quiet, all incl, nr Lab, BNL employee only, 1 mo sec. $800/mo. 672-2451.

PORT JEFF – 3 bdrm hse, 2 ba, l/r w/f/, d/r, all new kitch, hardwd flr, windows & siding; 1 car gar, nr shops, beach privils, non smkr $1,700/mo + utils. 928-8993.

RIDGE – 3 bdrm, 1 ba cozy hse, quiet n'borhd, only 3.5 mi to BNL, hardwd flrs/part, bsmt, w/d, updated appli, you pay util, no smkg/pets, please. $1,500/mo. 806-2176.

RIDGE – 1 bdrm, 1 bath w/jacuzzi tub, bsmt apt w/grd level ent and lg windows, priv drway, use of yd, incl utils/cable/int, 1 mo sec req. $1,000/mo. 965-2039.

ROCKY POINT – 2 bdrm, eik, lg l/r, deck onto lg encl yd, 1 mi to beach, Rocky Pt SD, upgraded elec, oil heat, move-in cond $1,350/mo + util & sec. 516-369-7732.

S. SETAUKET – 1 master bdrm w/full bath avail in 3bdrm hse; share l/r, eik, f/r, 2bath, laundry, 6 min to SUNY, 1 mo depst, $650/mo + util, Mrs. Sun, 588-9508.

SHIRLEY – 1st flr 1 bdrm, full eik, l/r, bath cac, $1175 1person, $1325 2 people, no smkg/pets, 1/mo rent & sec, verifiable income a must. $1,175/mo. 682-5338.

SHIRLEY – lg 1 bdrm bsmt apt, suitable for one, close to beaches/parks/freeways/lirr, lab, all incl, 1 mo + sec. $750/mo. Ext. 3846.

SHOREHAM – share a hse w/professional, lg/ furn bdrm, cable TV, int, no smkg/pets, 8 mi to BNL, avail now. $675/mo. 516-380-2650 or gg19582003@gmail.com.

SHOREHAM – Spacious basement level apt located ten mins from BNL. Two large rooms, EIK, bath, sep. entrance. Includes all utilities. $900/mo. Vinny, 744-4049.

YAPHANK – beautiful lower level apt, ideal for 1, suitbl for 2 people, 1 bdrm, livg area, eik, f/bath, sep ent, util incl except cable/phone, 5 min to Lab. $1,000/mo. 816-6424.

For Sale

WEEKI WACHEE, FL – Gulf Coast Ranch, 70m Orlando, 45m Tampa, screen/igp and lanai, fruit trees, SW architecture, 3bdrm, 2bath, lg dr, f/p, 2x gar, shed, see photos. $129,900 neg. 344-5537.

S.BLUE POINT – 4bdrm 2ba Cape, fresh paint, new roof, high effic heatr, cac, eik, Ovr sz gar full bsmt, walk to water, pics on youtube. 64 Paumanake Rd, motivated seller. $415,000 neg. 516-885-5174.

SHOREHAM – North, 5 bdrm, 3 bath, Ranch, wd flrs; bsmt w/2 bdrm, l bath apt, full windows, pos M/D, pool, priv beach. $350,000. 769-6162, li08house@gmail.com.

Lost & Found

GLASSES – in black case, prescription metal frame glasses w/plastic side shields on them. Ext. 7192.

On-Site Service Station

In addition to selling gas, we provide oil or battery changes, checkups. all sorts of vehicle maintenance and repairs, New York State inspections, done conveniently while you are at work. Ext. 4034.

Fun Science Contests Held at BNL

Science Bowl, Hydrogen Fuel Cell Car Challenge

Science Bowl

For the third year in a row, students from R.C. Murphy Junior High School took first place in the regional Middle School Science Bowl held at BNL. On March 19, 100 students were challenged in the fast-paced question-and-answer tournament designed to test students' knowledge of life sciences, energy, earth and space sciences, mathematics, and general science.

Locust Valley Middle School was the second-place winner, William Floyd Middle School took third place, and Longwood Junior High School took fourth place.

The Regional Science Bowl at BNL is part of the National Science Bowl® coordinated by the DOE Office of Science. All winning teams received medals and a trophy. The first-place team in the academic competition will represent the Long Island region at the National Science Bowl®, which will be held in Washington, D.C., from April 28 to May 3, 2011. DOE will fund the team's trip.

Hydrogen Fuel Cell Car Challenge

Lawrence Middle School won first place in the Hydrogen Fuel Cell Car Challenge in which students design, build, and race model cars. Two teams from William Floyd Middle School won second and third place. The first-place team's car raced down the ten-meter track in 4.47 seconds, the second-place winners sent their car down the track in 6.34 seconds, and third place also came in at 6.34 seconds.

— Diane Greenberg

Photo courtesy of Frank Frego

With their coach, Patrick McManus, are first-place regional Science Bowl winners from R.C. Murphy Middle School: (from left) John Welde, Rajiv Moturu, Daniel Redlinger, Matthew Cornell and Felix Wang.

Roger Stoutenburgh D3420311

With coaches Kristine Suapengco (left) and Kobir Gupta (right) are Lawrence Middle School students who won the hydrogen fuel-cell car competition (from left): Louis Jan, Jennifer Kendal, Brandon Berkowitz, and Maxine Kastriner.

Super Moon

Written for The Bulletin by Phil Harrington, Training & Qualifications Division, who took this photo from Smith Point Park, using a Canon T2i camera and Celestron C6 telescope. (f/6.3, exposure: 1/15th of a second, at ISO 400).

On Saturday, March 19, the full Moon may have looked just a little bit larger than usual. That's because this is the first time in 18 years that the full phase coincided with perigee — the point in the Moon's elliptical orbit that brings it closest to Earth. Perigee moons appear about 14 percent bigger and 30 percent brighter than the same phase when the Moon is farthest from Earth, at apogee.

As the National Oceanographic and Atmospheric Administration points out, a perigee full Moon brings with it higher-than-usual "perigean tides," but these are nothing to worry about. Tides are always higher at the full phase because of the combined gravitational pull of the Moon and Sun. These so-called "spring tides" result from the Moon and Sun being on opposite sides of Earth at the time, which causes the tides to "spring up." But even at a perigee Full Moon, lunar gravity usually pulls tide waters only a few centimeters (an inch or so) higher than typical spring tides. Local geography can amplify the effect to about 15 centimeters (six inches).

Contrary to some reports circulating the Internet, Saturday's "Super Moon," as it was dubbed by the media, did not cause or contribute to the earthquake and tsunami that destroyed portions of Japan. In fact, when the earthquake occurred on March 11, the Moon was near First Quarter phase, when it and the Sun are perpendicular to one another relative to Earth. At the Moon's quarter phases, high tides are actually lower than usual — referred to as "neap tides." So, if anything, the Moon/Sun configuration worked against the tsunami.

Next month, perigee occurs on April 17, while full Moon comes a day later. That's close, but not close enough for purists. The next truly Super Moon will be on November 14, 2016.

Editor's Note. Harrington's latest book on astronomy, Cosmic Challenge, was published by Cambridge University Press in December 2010. See www.philharrington.net/cc01.htm for more information.

the Bulletin

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On the Web, the Bulletin is located at *www.bnl.gov/bnlweb/pubaf/bulletin.asp*. A calendar listing scientific and technical seminars and lectures is found at *www.bnl.gov/bnlweb/pubaf/calendar.asp*.

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