

The Glue That Binds Us All

How an electron-ion collider could help unravel what makes matter stick together and what puts the spin on protons

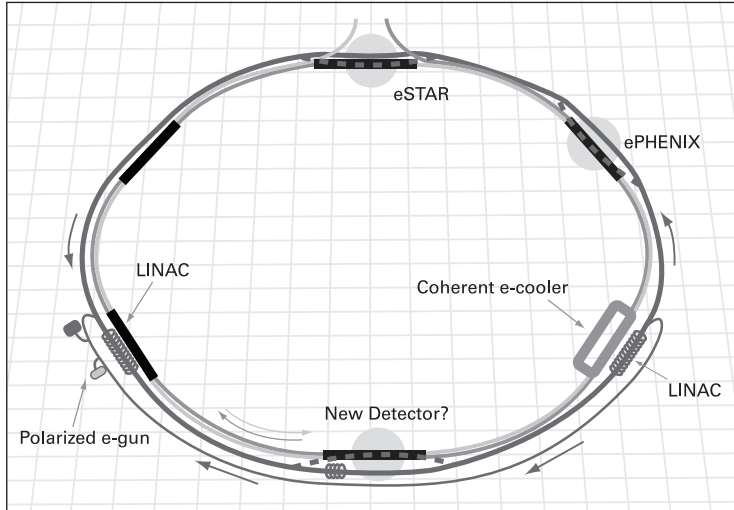
RHIC, the Relativistic Heavy Ion Collider at Brookhaven Lab, found it first: a “perfect” liquid of strongly interacting quarks and gluons — a quark-gluon plasma (QGP) — produced by slamming heavy ions together at close to the speed of light. The fact that the QGP produced in these particle smashups was a liquid and not the expected gas, and that it flowed like a nearly frictionless fluid, took the physics world by surprise.

These findings, now confirmed by heavy-ion experiments at the Large Hadron Collider (LHC) in Europe, have raised compelling new questions about the nature of matter and the strong force that holds the visible universe together.

Similarly, searches for the source of “missing” proton spin at RHIC have opened a deeper mystery: So far, it’s nowhere to be found.

To probe these and other puzzles, nuclear physicists would like to build a new machine: an electron-ion collider designed to shine a very bright “light” on both protons and heavy ions to reveal their inner secrets.

“An electron-ion collider would be the brightest, highest-intensity ‘femtoscope’ to shine on the structure of matter,” said Brookhaven theoretical physicist Raju Venugopalan, referring to its ability to discern structures at the scale of femtometers — that’s 10^{-15} meters, a millionth of a nanometer, or a millionth of a billionth of a meter!



eRHIC: Colliding Electrons with Ions at RHIC

There are compelling reasons to build an electron-ion collider (EIC) at Brookhaven National Laboratory, not the least of which are the Lab’s rich physics history, accelerator expertise, and the existence of a fully functional and productive proton/heavy-ion accelerator/collider — that is the Relativistic Heavy Ion Collider (RHIC) — and its international collaborations of physicists eager to continue their explorations of matter. Adding an electron ring and other accelerator components to the existing accelerator complex would be a cost-effective, practical strategy for achieving the scientific goals of an electron-ion collider. More info: <http://www.bnl.gov/rhic/news2/news.asp?a=3145&t=today>.

“Snapshots” of matter at that scale over a wide range of energies would offer deeper insight into the substructure of the nucleus, its constituents, and particularly its smallest components, the quarks and gluons and how they interact.

“Increasingly, it’s looking as if gluons and their interactions may hold the keys to many of our puzzles,” Venugopalan said. An electron-ion collider would be the ideal tool for gazing at the “glue” under conditions where scientists believe that it completely dominates the structure of neutrons, protons, and nuclei.

Glue Holds the Key

The simplest view of a proton or neutron (the most common hadrons, or particles composed of quarks and gluons) reveals three quarks interacting via the exchange of gluons. These gluons are carriers of the strong force, which “glues” the quarks together, similar to the way photons, particles of electromagnetic energy (or light), carry the electromagnetic force that governs interactions among charged particles.

But the analogy is not quite perfect because, while photons do not interact with one another, gluons do. And experiments



Abhay Deshpande (left) and Raju Venugopalan, two physicists with a strong interest in the physics case for an electron-ion collider, talked about the project recently via Skype.

probing proton structure at the HERA collider at Germany’s DESY laboratory, along with the increasing body of evidence from RHIC and LHC, suggest that those interactions make all the difference. They result in a much more complex picture of proton structure, with countless gluons (and a sea of quarks and antiquarks) flitting into and out of existence from the vacuum within each hadron.

“Think of the proton as a black night with the gluons like fireflies blinking on and off,” Venugopalan said. “A snapshot with the proton at rest will reveal an ephemeral and diffuse glow from the fireflies whose flicker is barely visible in the darkness. With finer resolution snapshots, one may be able to determine the density of fireflies, localize them better spatially, and even extract de-

tails about their motion as they whirl about.”

The experiments at HERA made it clear that getting more details about the gluons is essential because, at high energy, the fleeting gluons become vastly more numerous than the quarks.

“People found this very intriguing, that there were so many gluons, suggesting they play a much bigger role in nuclear structure and interactions than had been previously thought,” he said.

A Different Spin

Around the same time, physicists looking for the missing source of proton spin — which was clearly shown in fixed-target experiments at CERN, SLAC, and DESY not to be accounted for by the net spin of...

See *Quarks and Gluons* on p. 2

Sambamurti Memorial Lecture, 6/26

‘The Trouble With Neutrinos’

On Tuesday, June 26, join Dan Dwyer of Lawrence Berkeley National Laboratory (LBNL), who will give the 2012 Sambamurti Memorial Lecture, titled “The Trouble With Neutrinos,” in Berkner Hall. Refreshments will be served at 3 p.m. and the lecture will start at 3:30 p.m. This free talk is open to the public. Visitors to the Lab ages 16 and older must carry a photo ID.



Dan Dwyer

In the abstract for his talk, Dwyer explains that neutrinos are considered the ‘ghosts’ of the particle world, present everywhere but rarely seen. This elusive nature has been very troublesome for neutrino physicists, leading them to blame neutrinos for a whole host of problems in experimental physics, Dwyer continues. He will describe how these challenges have provided some great — and some not so great — results from neutrino experiments.

Dwyer’s recent work with the Daya Bay Reactor Anti-Neutrino Oscillation Experiment in China, which has recently made the first clear measurement of short-distance neutrino disappearance, will be included in the talk.

“These troublesome neutrinos can tell us about the inner working of stars and the evolution of the universe since the Big Bang, and may give us clues about

the nature of dark matter, if only we can coax them to reveal their secrets,” Dwyer said.

Dwyer joined LBNL as a physicist project scientist in May 2012. From July 2007 to 2010, he held postdoctoral and senior postdoctoral scholar positions at the California Institute of Technology, also serving on the Daya Bay Analysis Committee and Coordinator for Daya Bay Antineutrino Detector commissioning. He earned his Ph.D. in physics from the University of California, Berkeley, in 2007, supported by a National Science Foundation Graduate Research Fellowship 2002–2005. Dwyer’s BS in physics was from the Massachusetts Institute of Technology in 2000, when he was also honored with the Orloff Award for Excellence in Physics Research. Before attending MIT, he held a United World College scholarship for two years of study in Italy, 1994–1996. He is a member of the American Physical Society.

The Sambamurti Memorial Lecture was established in 1992 to commemorate the work of Aditya Sambamurti, a young BNL physicist who died of cancer in 1992 at age 31. Each year, an outstanding young physicist whose professional interests overlap those of Sambamurti is selected to deliver the lecture.

— Liz Seubert

479th Brookhaven Lecture, 6/20

‘Charting Plant Metabolism: Quantification of Metabolic Fluxes and Predictive Mathematical Models’

Every living thing requires energy to stay alive, right? When you idly watch grass grow, your body relies on a metabolic network of chemical reactions to produce the energy it needs from the food you have eaten. When your body needs more energy to pull weeds or split firewood, it relies on that same metabolic network to produce more energy so you can complete the task at hand.

Just as humans have metabolic networks that produce energy from the food they consume, plants have metabolic networks that produce energy from the light, nutrients, and carbon dioxide that they absorb. Scientific researchers at Brookhaven Lab are exploring these metabolic networks in plants and are working with advanced computational modeling to determine how the networks could be used to produce oils and biomass for renewable biofuels, materials, lubricants, and more.

On Wednesday, June 20, join Jörg Schwender of the Biology Department for the 479th Brookhaven Lecture, titled “Charting Plant Metabolism: Quantification of Metabolic Fluxes and Predictive Mathematical Models.” All are invited to attend this free talk, which is open to the public and will be held in Berkner Hall at 4 p.m. Refreshments will



Jörg Schwender

Joseph Rubino DT380612

be offered before and after the lecture. Visitors to the Lab ages 16 and older must carry a photo ID while on site.

To join Schwender for dinner at a restaurant off-site following the talk, contact Kathy Folkers at Ext. 3415 or folkers@bnl.gov.

During his talk, Schwender will describe some of the modeling efforts that he and his collaborators use to explore the biochemical reactions of plant metabolism and predict the characteristics of high-oil plant varieties.

Schwender earned a Ph.D. in biology from the University of Karlsruhe in Germany in 1999. He worked in Michigan State University’s Department of Plant Biology as a research associate, 2000 to 2003, and a visiting assistant...

See *Schwender Lecture* on p. 2

CALENDAR OF LABORATORY EVENTS

• The BERA Store in Berkner Hall is open weekdays from 9 a.m. to 3 p.m. For more information on BERA events, contact Andrea Dehler, Ext. 3347, or Christine Carter, Ext. 2873.

— REGULARLY —

Weekdays: Free English for Speakers Of Other Languages Classes
Beginner, Intermed., Adv. classes, various times. All welcome. Learn English, make friends. See <http://www.bnl.gov/esol/schedule.asp> for schedule. Jen Lynch, Ext. 4894.

Mondays: Yogalates
Noon–1 p.m. at the Rec Hall (Bldg. 317). Registration required, Ext. 2873.

Mon. & Thurs.: Kardio Kickboxing
\$5 per class. 12:15–1:15 p.m. in the gym (Bldg. 461). \$5 per class. Ext. 2873.

Mon., Tues., Thurs., & Fri.: Tai Chi
Noon–1 p.m., B’haven Cntr (Bldg. 30), N. Rm. Adam Rusek, Ext. 5830, rusek@bnl.gov.

Tuesdays: Hospitality Welcome Coffee
10:30 a.m.–noon. Rec Hall (Bldg. 317). Meet over coffee. Children welcome.

Tuesdays: Pilates
Noon–1 p.m. at the Rec Hall (Bldg. 317). Registration required, Ext. 2873.

Tuesdays & Wednesdays: Zumba
Tuesdays: Noon–1 p.m., in gym (Bldg. 461). Wednesdays: 5:15–6:15 p.m., at the Rec Hall (Bldg. 317). Registration required, Ext. 2873.

Tuesdays: Toastmasters
Two monthly meetings: 1st & 3rd Tuesdays, 5:30 p.m., Bldg. 463, Room 160. Guests and visitors welcome. www.bnl.gov/bera/activities/toastmasters/.

Tuesdays & Thursdays: Aerobic Fitness
5:15–6:30 p.m. in the Rec. Hall (Bldg. 317). \$5 per class, or 10 classes for \$40. Kathy Schoenig, Ext. 2818.

Tuesday & Thursday: Aqua Aerobics
5:30–6:30 p.m., Pool (Bldg. 478). Registration required, Ext. 2873.

Wednesdays: Ballroom Dance
5:30, 6:30, 7:30 p.m., Brookhaven Center (Bldg. 30). Vinita Ghosh, Ext. 6226.

Wednesdays: Play Group
10 a.m.–noon at Rec Hall (Bldg. 317). Parents meet while infants/toddlers play. For events, see <http://www.meetup.com/BNL-Playgroup>, or call Ext. 2873.

Wednesdays: Yoga
Noon–1 p.m., B’haven Center (Bldg. 30). Free. Ila Campbell, Ext. 2206, ila@bnl.gov.

1st Wednesday of month: LabVIEW
1:30–3 p.m., Bldg. 515, 2nd fl. Seminar Rm. Free technical assistance from LabVIEW consultants. Ext. 5304, or Terry Stratoudakis, (347) 228-7379.

Thursdays: BNL Cycletrons Club
5 p.m., Brookhaven Center. First Thurs. of month. Andy Mingio, Ext. 5786.

Thursdays: Reiki Healing Class
Noon–1 p.m., Call for location. Nicole Bernholz, Ext. 2027.

Thursdays: Postdoc Social Night
6:30 p.m. ASAP Lounge (Bldg. 462). www.bnl.gov/asap.

Thursday: Judo Class
7:30 p.m. Gym (Bldg. 461). Tom Baldwin, Ext. 4556.

Fridays: Family Swim Night
5–8 p.m. Pool (Bldg. 478). \$5/family. Ext. 2873.

Schwender Lecture from p. 1
...professor, 2003 to 2005. In 2005, Schwender joined the Biology Department at Brookhaven Lab. He was named assistant biochemist in 2005, associate biochemist in 2007, and biochemist in 2010.

— Joe Gettler

Arrivals & Departures

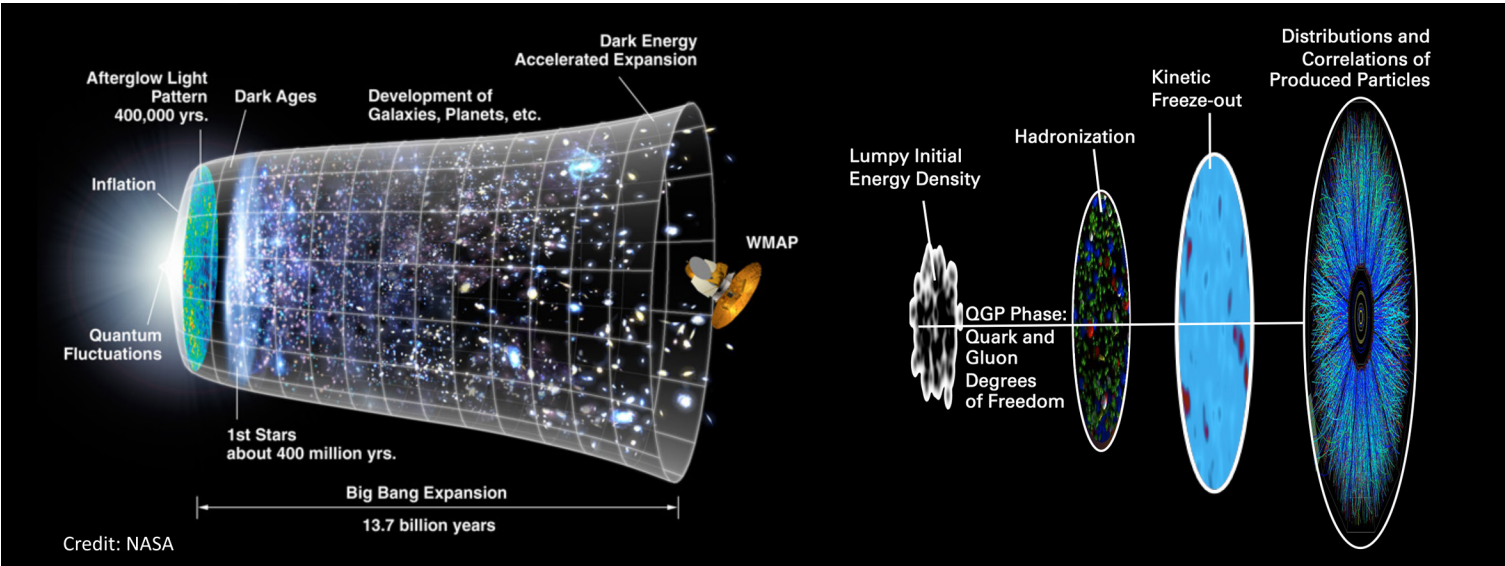
— Arrivals —

Alexey Akimov	Chemistry
James Dickerson	CFN
An He	Photon Sciences
Ariel Nunez	Facils & Ops

— Departures —

Sirajj Khandkar	ITD
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Cycletrons Annual
Noontime Gathering, 6/18
Celebrate ‘National Ride To Work Day’
The BERA Cycletrons Club is planning a noontime gathering on Monday, June 18, to attract new members and support motorcycle safety and commuting to work. Join in for pizza lunch at noon at the Gazebo, \$5 per person. All welcome. Rain or shine. Contact Frank Dusek, Ext. 2022, dusek@bnl.gov.



Quarks and Gluons from p. 1
...all the quarks and antiquarks inside — became interested in gluons, too. Could the gluons carry the missing spin? Physicists have been measuring some aspects of gluon spin in collisions between beams of polarized protons at RHIC. But so far, in the energy ranges they’ve explored, the gluon contribution to overall proton spin appears to be near zero. They’ve only looked in regions where the gluons do not yet completely dominate proton structure, however.

“One thing we have not done in spin is explore the contribution of gluons where they exist in large numbers,” said Stony Brook University physicist Abhay Deshpande. To do that, scientists have to ramp up the energy to look deeper into the proton.

Light Speed “Magic”
The closer the particles get to the speed of light, the longer the gluons that arise from the vacuum’s quantum fluctuations last.

“It’s a direct effect of time dilation, part of Einstein’s theory of relativity,” Venugopalan explained. That is, when something is accelerated close to the speed of light, time and the processes that take place inside the particles appear to slow down. “An outside ‘observer’ viewing a fast moving proton would see the glow of the firefly-like gluons last longer and longer the closer the proton got to the speed of light,” he said.

So, in effect, by speeding the particles up, scientists can slow down the gluon fluctuations popping in and out of the vacuum to “take pictures” of them with their particle detectors.

Physicists like Deshpande and others interested in proton spin would like to look at the long-lasting gluons to tease apart their contributions to spin — including how their own orbital motion affects this intrinsic property.

“All the experiments that have looked at proton spin so far have smashed the whole system,” Deshpande noted. “But if you break the proton, at that instant you destroy the orbital motion of the gluons, so you can’t study it. Instead we want to probe the process more delicately without destroying the proton.” An electron from an electron-ion collider with high enough luminosity, or collision rates, would be just the kind of precise probe scientists need to tease out these subtle contributions to proton spin.

Gluon Saturation
A high-luminosity electron beam would also help physicists probe another interesting phenomenon they think occurs in particles moving ever closer to the speed of light. According to

the theory that describes the interactions of quarks and gluons, known as quantum chromodynamics (QCD), as the firefly-like gluons “glow” longer, they should start to overlap, interact, and merge with one another, while new ones continue to pop out of the vacuum. Eventually, a balance is reached between gluons emerging from the vacuum and those recombining. The physicists call this steady state of maximal gluon concentration gluon saturation, or color glass condensate (*see box below*).

Such a state of gluon saturation may have already been reached at RHIC — in the heavy ions before they collide.

“Those particles, gold ions, are moving at nearly the speed of light, and at light speed it is mostly gluons,” Venugopalan explained. “So really, what you have is two ‘walls’ of gluons colliding.” The quarks, which carry about half of the ions’ momentum, essentially move through one another, he said, while the dense fields of gluons are what stop and interact to begin the formation of the quark-gluon plasma.

The properties of those interacting gluon fields are therefore very likely linked to what’s observed in RHIC’s detectors.

Fingerprints In Time
Scientists have learned a lot about the dense gluon fields by tracing RHIC’s particle paths back.

“If you look closely at the particles coming out of a gold-gold collision at RHIC, you find these correlations — a particle at one end of the collision seems to ‘know’ about another at the opposite end, and there’s a collective kind of flow to the particles,” Venugopalan said. “If you trace back the paths of these correlated particles, it’s telling you stuff that happened very early in the collision — how the flow was formed, and the details of the flow.”

In some ways, he suggested, it’s analogous to the way cosmologists learn about the very early universe by looking at the cosmic microwave background radiation. Those measurements of tiny fluctuations in the universe’s temperature 300,000 years after the Big Bang contain clues about what the universe looked like the instant after its birth, because certain aspects

Color Glass Condensate: **Color** is a type of charge that quarks and gluons carry as a result of their strong force interactions — which accounts for the term “chromo” in quantum chromodynamics (QCD). The word **glass** is borrowed from the term for silica and other materials that are disordered and act like solids on short time scales but liquids on long time scales. In the “gluon walls,” the gluons themselves are disordered and do not change their positions rapidly because of time dilation. **Condensate** means that the gluons have a very high density.

Above: The particle tracks observed in RHIC’s detectors (extreme right) contain fingerprints or clues that reflect the conditions very early in heavy ion collisions, when gluons in the colliding ions were just starting to interact. This is somewhat analogous to the way the structure we see in the universe today is a reflection of structural aspects “frozen out” very early in the history of the universe (left). In each frame, time runs from left to right, but it runs over a span of 13.7 billion years in the left frame and only over billionths of a second in the right frame. Scientists can learn a lot about these early conditions by looking back, but they’d also like to probe the earliest stage of ion collisions directly. An electron-ion collider would make that possible.

of its structure were “frozen out” at that instant leaving an imprint on the future measurements — and even on the large-scale structure we observe in the universe today, nearly 14 billion years after the Big Bang.

“Likewise, at RHIC, we are looking at the spatial structure of the collision in ways that are very sensitive to the earliest moments of the collisions, when the gluons first interact and tiny fluctuations are in a similar manner frozen out and left as fingerprints,” Venugopalan said.

But with so much still unknown about the gluon fields — and so many of the unexpected characteristics of RHIC’s quark-gluon plasma dependent on them — scientists are eager to take a closer look.

The super bright electron beam of an electron-ion collider would allow them to do just that — send electron probes into light-speed ions to study the saturated gluon state directly.

“Before we built RHIC, we just wondered about the QGP — whether we could create it in a laboratory,” Deshpande said. “Now that we have created a QGP and we find it so much more interesting than we expected, we want to explore it more, to understand how its properties emerge. To get a complete picture, we need to explore in both directions — by looking back with heavy ion collisions, and by probing the structure and properties of the saturated gluon fields directly with an electron-ion collider.”

Collective Behavior
The experiments would help reveal not just the femtoscale structure of individual particles, but also conglomerate structures and interactions among the constituent particles and fields.

“We are trying to go from a phase where we are studying the fundamental elements of the system — the particles — to understanding their collective behavior,” Venugopalan said. “It’s analogous to how this process led to the discovery of collective

behavior like superconductivity in condensed matter physics. We are now trying to do condensed matter physics with quantum chromodynamics (QCD) — the theory that describes the strong force — the way physicists have been doing for many years with quantum electrodynamics — the theory of electromagnetism.”

If physicists can figure out how the gluon fields interact, how the quark and gluon spins and orbital motions coordinate with one another, how the hot quark soup thermalizes — reaches an equilibrium temperature of more than 4 trillion degrees Celsius — in a few trillionths of a trillionth of a second, who knows where it will lead?

“This kind of curiosity and fundamental questions about electrons and protons and their interactions when present in large numbers are what drove us beyond the known electromagnetic interactions, and laid the foundation of condensed matter physics that is crucial for all the electronic gadgets we now use every day,” Deshpande said. “With an electron-ion collider, we could go from QCD as we know it today to a theory of condensed strongly interacting matter — and see where that takes us.

“But to do this, we have to go beyond the capabilities that the HERA collider had. It collided electrons with protons, but it didn’t have the heavy-ion beams, its proton beams were not polarized, and it did not have the brightness (luminosity) needed to explore all these pressing science questions that have only recently come to the fore.”

One thing is certain: If an electron-ion collider becomes a reality, what the physicists learn will offer deeper insight into what holds 99 percent of the matter in the visible universe together. That’s the percentage of everything we see around us — from stars to planets to our own physical forms — that gets its mass from protons and neutrons, and thus ultimately from the quarks and gluons governed by the strong force.

“At the most fundamental level,” Venugopalan concluded, “we are driven by our curiosity to learn more about what we are made up of.”

— Karen McNulty Walsh
See also: www.bnl.gov/rhic/news/2/news.asp?a=3145&t=today.

Groundbreaking for Expansion, Renovation of Editorial Office Of the American Physical Society

On May 8, Brookhaven Lab Director Sam Aronson joined American Physical Society (APS) President Barry Barish, APS Editor-in-Chief Gene Sprouse, Brookhaven Town Supervisor Mark Lesko, and other dignitaries at the APS Offices in Ridge, NY, for a ceremonial “shovel-in-the-ground” marking the expansion and renovation of the organization’s editorial office building. Additional office space is needed as the APS journals’ operations continue to grow, attracting the best work of physics researchers worldwide.

The APS is a non-profit membership organization working to advance and diffuse the knowledge of physics through its outstanding research journals, scientific meetings, and education, outreach, advocacy, and international activities. The APS represents 50,000 members, including physicists in academia, national laboratories, and industry in the United States and throughout the world. APS offices are located in Ridge and Washington, D.C., with headquarters in College Park, M.D.

— Jane Koropsak



BNL Director Sam Aronson (left) shakes hands with APS Editor-in-Chief Gene Sprouse as Brookhaven Town Supervisor Mark Lesko looks on.



Calling All Donors, Calling All Donors: Give Blood, Save A Life, Maybe Win Two Tickets for NY Jets vs. NY Giants

As we go through our daily routines we typically don’t stop to think about the importance of being a blood donor. But emergency responders know firsthand how blood donors save lives.

“We work hard every day to protect employees, visitors, and the Lab site, but for many BNLers, being an emergency responder doesn’t stop when their shift ends. They head home to volunteer in fire departments and ambulance companies in their home communities,” said BNL Fire Chief Charles LaSalla. “In many instances, upon arrival at a vehicle accident or other trauma situation, they quickly realize that a blood transfusion may save a life.”

“It’s a pretty simple equation,” added Security Police Officer John “Cuz” Pagano. “Give a pint, you may save a life.”

In 2009, Pagano’s wife underwent a double lung transplant, requiring her to receive blood, so they are both grateful for blood donors. As a small token of his appreciation and an extra incentive for BNLers to become donors, Pagano, a big fan of the New York Jets football team, is offering two tickets to a Jets game as a prize

Above: Some of the employees from the Laboratory Protection Division. These workers, many of whom volunteer as emergency responders in their local communities, truly recognize the importance of being a blood donor.

Next Blood Drive: 6/19, 20

Consider rolling up your sleeve for the next BNL blood drive on June 19 and 20 (see accompanying story at left).

To be a blood donor you must: bring a valid photo ID, weigh a minimum of 110 pounds, be between the ages of 16 (with parental permission) and 75 years old (76+ accepted with a doctor’s note), eat well (low fat) and drink fluids, and not have donated blood in the past 56 days. Restrictions may apply to individuals from the United Kingdom and Europe.

Schedule an appointment online: <http://intranet.bnl.gov/hr/blood-drive>, or, call Liz Gilbert, at Ext. 2315.

Can you please spare a pint?

Laboratory Protection Division Reminder Be A Good Host to Your Guest: Submit a Visitor Notification Form

With summer almost here, many people are making plans to visit Brookhaven Lab. At any time of the year, if you would like to host guests on site — whether they are collaborators, funders, family members, or friends — before they drive up to the Lab’s Main Gate, be sure to register them by completing a visitor notification form: <https://www.bnl.gov/gateaccess>.

The Laboratory Protection Division (LPD) has noticed an increase in the number of visitors who arrive at the Main Gate to find that hosts have not submitted the proper notification form. There has also been an increase in the number of events hosted on site without notifying LPD staff at the Main Gate. These omissions cause unnecessary delays for all guests arriving at the Lab and additional work for LPD.

Once you have made plans for your guest to arrive at the Laboratory, or your event has received final approvals, tell the BNLers working at the Main Gate by submitting a visitor notification form or event notification form here: <https://www.bnl.gov/gateaccess>. You can also access these forms from the “Main Gate Access Forms” link located along the left side of the Lab homepage.

On-site Service Station Closed for One Day, 7/6

The on-site vehicle repair shop/gas station will be closed for a vacation day on Friday, July 6.

Drivers, Walkers, Riders Protect Yourself and Each Other

Drivers, pedestrians, and bicyclists must remain alert and comply with New York State traffic laws while traveling on site. As a motorist, slow down when approaching and passing bicyclists. Allow enough room so that, if the cyclist swerves into the road because of an unseen road hazard, your vehicle may still pass safely. Also, pay attention to pedestrians and yield them the right of way at crosswalks.

For All Bicyclists

Cyclists are required to obey the same rules as drivers. Failure to obey these rules is a major contributing factor to accidents. In particular, riding the wrong way, ignoring stop signs, running red lights, and failing to observe right-of-way rules for lane changes are major contributing factors in accidents in which cyclists are injured.

Remember: Bicycle riders always come out second best in any conflict with a motor vehicle, even if they have the right of way.

Wear the proper protective gear both on your person and your bicycle. These items include bike helmet, highly visible or reflective outerwear, and proper reflectors on the bike.

Whether cycling around the site for business or pleasure, all riders are required to follow the BNL bicycle-safety policy which states a bicycle helmet must be worn when cycling at BNL.

See more helpful advice on p.5, this week’s special supplement.

CALENDAR

Friday, 6/15

- *2012 RHIC/AGS Users’ Meeting
www.bnl.gov/aum.
- *Employee Lunchtime Tour
Noon. Berkner Hall lobby. See notice below.

— WEEK OF 6/18 —

Monday, 6/18

- *Defensive Driving Class, Part 1.
6-9 p.m. Berkner Hall, Room B. Part 2, 6/20. See notice below.

Tuesday, 6/19

- *Blood Drive
9 a.m.-3 p.m. Brookhaven Center. See story, left.

Wednesday, 6/20

- *Blood Drive
9 a.m.-3 p.m. Brookhaven Center. See story, left.
- *Talk: Emotional Intelligence
Noon. Berkner Hall, Room B. An Employee Assistance Program-sponsored talk by Jude Tredler Wolff, Magellan Health Services, on “Applying Emotional Intelligence to Your Life.” All Lab community welcome. See p. 6 (in special supplement).
- *479th Brookhaven Lecture
4 p.m. Berkner Hall. Jörg Schwender, Biology Department, will talk on “Charting Plant Metabolism: Quantification of Metabolic Fluxes and Predictive Mathematical Models.” All are welcome to this free lecture, open to the public. Visitors to the Lab of 16 and older must carry a photo ID. See p.1.

— WEEK OF 6/25 —

Monday, 6/25

- *Defensive Driving Class, Part 2.
6-9 p.m. Brookhaven Center South Room. See notice below.

Tuesday, 6/26

- *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. See below.
- *Sambamurti Memorial Lecture
3:30 p.m. Berkner Hall. Dan Dwyer, Lawrence Berkeley National Laboratory, will talk on “The Trouble With Neutrinos.” All are welcome to this free event. Visitors to the Lab of 16 and older must carry a photo ID. See p.1.

Employee Lunchtime Tour: BNL Water Treatment Plant

On Friday, June 15, join a visit to BNL’s Water Treatment Plant. Meet at noon in the lobby of Berkner Hall to start the tour. You will return to Berkner by 1 p.m. No reservations are needed.

IBEW Meets Tuesdays

The monthly IBEW meetings held at Knights of Columbus Hall in Centereach will now be held on Tuesdays, not Mondays, until further notice. The next meeting will be on Tuesday, June 26 (see calendar above).

Defensive Driving: Two Parts, 6/18 & 25

The next six-hour Defensive Driving (point & insurance reduction) course will be held in two parts on consecutive Mondays, June 18 in Berkner Hall, Room B, and June 25 in the Brookhaven Center South Room, 6 to 9 p.m. The course is open to BNL, BSA and DOE employees, BNL facility-users, contractors, guests, family members, and friends, at \$33 per person. Preregistration is required. To register, call Ed Sierra, 821-1013, and leave a message. Or complete a New York DMV Approved Course Online for \$39.95 with discount (Use code: “SAVE10” for \$10 discount): www.lidrivesafe.com.

The Owl Shift at STAR and PHENIX

Keeping tabs on the Relativistic Heavy Ion Collider through the wee hours

By Natalie Cmosija, a Stony Brook University journalism graduate who spent four months in early 2012 as a science writing intern with the Media & Communications Office.

In the dead of night, while many experimental facilities at BNL are quiet, the Relativistic Heavy Ion Collider (RHIC) runs. When RHIC is operating, it runs every day, all day and all night. Until mid-April, the physicists used RHIC to collide polarized proton beams, which give a baseline for comparing results from heavy ion collisions at RHIC, and also are used to study the origin of what's known as proton spin.

To conduct this basic research, shift crews of scientists operate and collect data from the collisions at two detectors, STAR and PHENIX. Each shift crew consists of a shift leader and three others who take responsibility for operating and monitoring various aspects of the detectors' operation, even as the machine continues to run throughout each night.

"It's the only way we could do it," said Edward O'Brien, senior physicist and director of operations at the PHENIX experiment. "It's so complex. You have to essentially get thousands of pieces of electronics and equipment working simultaneously. You spend weeks getting everything running just so and you do your best to not disturb it, so you have to leave it running."

Evening and overnight hours, explained O'Brien, actually permit the best data to be taken because there is little interference with the beam.

PHENIX Owl Crew

From 12:30 a.m. to 8:30 a.m. on April 21, the night "owl" crew for that week ran the PHENIX detector from their counting house and I kept watch with them. A large screen, showing the beams destined to collide and the level of the system's voltage, commanded the room. Under it, a bank of computers were busy, each devoted to an aspect of the PHENIX detector's function. Early in the shift, the team awaited the beam. Alex Mwai, a Stony Brook University (SBU) graduate student, said that the nightshift could sometimes be difficult, especially after 3 a.m.

"Other than that, the rest of it is actually a lot of fun, especially when you have beam and have stuff to do," explained Mwai. In charge of voltage control, Mwai monitors the state of the high and low voltage for different systems, and ramps up



Alex Mwai (left) and Damien Reynolds, both of SBU, and Ed O'Brien, BNL in the PHENIX Counting House

high voltage when the team has a beam and is doing a run.

"The 2012 RHIC Run has been very successful, with both RHIC and PHENIX performing well," said O'Brien. Success can be defined as recording the greatest number of proton collisions or, as the scientists call them, "events."

"Every time there's a collision, we make a determination as to whether we want to record the event or not," said O'Brien. "We have the ability to take 6,000 to 7,000 events per second out of a total of a few million proton collisions every second."

PHENIX Science

PHENIX's 18 detector subsystems are used to measure the extent of various nuclear phenomena such as the production of the W-boson, which decays into high-energy muons, among the collision products. The W-boson could play a role in determining how a proton gets its overall spin. A proton is composed of quarks and gluons, subatomic particles that have spins of their own that contribute to the cumulative spin of the proton. These spins, however, do not add up to the proton's one-half spin, leading scientists to look at the W-boson, among other clues to the origin of the missing spin.

"There's a way to look for Ws by colliding protons and examining the various particles that are produced. It's hard to produce the W-boson, so we are looking for something that is rare," said O'Brien. "When protons collide at RHIC, the quarks inside the protons also collide and sometimes form a W. We can get some insight into the quark spin by looking into the W spin."

Another aspect of the collisions that interests Mwai is the nuclear phase diagram as it relates to quark-gluon plasma,

the "perfect liquid" that existed after the Big Bang and is produced for a fraction of a second when heavy ions collide at RHIC. RHIC made a switch from colliding protons to colliding heavy ions around mid-April.

"The region of the nuclear phase that we are especially interested in is quark-gluon plasma," said Mwai. "The questions are very interesting and most of these questions are really fundamental like, how do you form quark-gluon plasma, what are its characteristics and, of course, the transition to quark-gluon plasma," which offers clues to how the universe evolved.

Factory for Students

"It's a new state of matter, that's what drew me in," said Damian Reynolds, an SBU chemistry graduate student and fellow PHENIX crewmember.

Based on the number of graduate students on shift, the experiment is like a "factory" for students, said Vlad Pantuev, a PHENIX collaborator from the Institute of Nuclear Research in Russia.

"It is experience first and, secondly, the wide range of tasks we have to do. You get to know the experiment," said Pantuev. "You have to know programming, math, and physics."

Complementary Detectors

"What differentiates PHENIX from STAR, apart from PHENIX's focus on muons, is how the detector examines collisions," said Bill Christie, senior physicist and operations coordinator for the STAR detector.

"What happens in the collisions at STAR and PHENIX is the same, the difference is what we measure of what comes out of the collisions," explained Christie. "There are many ways to look at the same collision and, depending on what you want



Bill Christie, BNL, in the STAR Control Room

to measure, you can have different technologies. You can try to measure a small solid angle or try to look at particles that come out in a small range of space but do it with very high precision, which is more what PHENIX is tailored to. At STAR, we try to measure everything that comes out, but we do it with slightly less precision, so our forte is large acceptance, good particle identification, good tracking, and good triggering."

STAR Owl Shift

At another part of the RHIC ring, a night earlier, I watched as the STAR owl shift monitored the beam. Screens commanded the room. The computers, like those at PHENIX, were each focused on various aspects of the detector's function. At STAR, however, there is a different suite of detectors, including the Time Projection Chamber, which identifies and traces the output of the collided particles.

A Ph.D. student from the University of São Paulo in Brazil, Renato Negrao had the job of watching and "recovering" the system.

"We don't have many troubles here," said Negrao. "The detectors work fine when we are taking data. Healthy plots mean good data. If we don't have these guys [working], we don't have data."

For Negrao's fellow detector operator, Geraldo Vasconcelos, a Ph.D. student from the University of Campinas, also in Brazil, another important aspect of taking shifts at STAR is the interactions with the shift crew, with whom he can discuss physics.

"It's not just detectors," said Vasconcelos.

Human or Robot

According to shift leader Leonid Efimov, who has worked at STAR since 2000, the human element is crucial for the appropriate

function of various detector components under different conditions of the accelerator.

"The number of such situational combinations is infinite," Efimov said. Though it's nice to think about building some programmable robots to support successful running with feedback from RHIC to the detectors and in the opposite direction, that seems an almost unsolvable task. "Even drawing up a robust algorithm of the completely automated operating mode looks like a utopia," he said. "Thus, at present, a person is the most reliable operator."

Still, as the years go by, Christie said, the automation of various facets of the detector keeps getting better. And the automation is continuous, with the detector's being consistently upgraded when RHIC isn't running.

"If you have a stable detector, it should take less and less human effort to run it. But we are always updating it," said Christie, who is also in charge of upgrading the system off-season.

During RHIC's run, however, Christie said, he is never not on shift.

"Essentially, if I am awake, I know what's going on at STAR," he said.

Understanding Nature

Christie often leads tours and explains the function of the STAR detector and said this type of basic research is an important human endeavor.

"Basic research is how we've always figured out the new understanding of nature and the new technologies to allow us to study those things," he explained. "These technologies can lead to useful developments in the future that you just can't even conceive of when you start a program like this."

And that is something worth staying up for.

Classified Advertisements

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

Motor Vehicles & Supplies

10 JEEP LIBERTY - 29.5K mi. fully loaded, mint, dk grey, all extrapckgesbuttow, ask/...

...Kelly Blue Book Value. \$22,500 neg. Laura, Ext. 3556, 807-0457 or lbuscemi@bnl.gov. 08 TOYOTA PRIUS - 65K mi. Package #2, metallic grey, keyless entry, back-up camera, CD player, new tires, dealer maintained. \$14,000. Xinhui, 203-915-3885.

01 HONDA ACCORD - 139K mi. V6, Ex Sedan, a/t, dealer maint, new tires/struts, minor body work, like new, \$1K less Kelly's, call/txt. \$4,850. 398-3203.

97 HONDA PRELUDE - 81K mi. silver 2dr coupe, a/t, a/c, p/d, p/w, c/d, 4-wheel disc w/ABS, moonroof, v/gd cond, orig owner. \$4,000. James, Ext. 8403 or jfung@bnl.gov.

68 CHEVY CAMARO - 500 mi. cherry red w/white racing stripes RS/SS a/t, p/b, 500 mi on rebuilt eng, show cond call for pix/info. \$29,000 neg. John, 291-3426.

RIMS W/NEW TIRES - 4 18" RT6 Enkei 360 Perfct Rims; 6 Lug; excel, under 1/yr old, used on Ddge Durango, ask/\$700; pd/\$1,800, pics. 813-6583, steveo302gt@yahoo.com.

TRAILER HITCH - Class 2 hitch, fits full size Blazer or Suburban, inclcs draw bar/\$25. Lynda, Ext. 7235 or fitz@bnl.gov.

TRUCK TIRES - LT275/70R18, Continental Contitrac set of 4/\$100. 404-8109.

Boats

2002 SEASPORT - 20' cuddy, 3.0L MERC i/o w/281 hrs, full canvas,dual batt w/ switch, '02 Venture trailer w/elect winch ask/6800, ext 4180. Steven, 445-2720.

Furnishings & Appliances

BUNK BEDS - 8 yrs old, white/\$200, Dresser/Changing Table, 13 yrs old, white/\$100, great cond. 678-3299 or dgordon@bnl.gov. ENTERTAINMENT UNIT - oak, for up to 36" TV, built in CD Rack; glass display case w/ overhead light; 2/encl. cabinets, excel, pics, ask/\$150. Ext. 3102, zendzian@bnl.gov.

There are more classified ads — look for them on pages 5 & 6 in the special supplement.

Special Supplement: Pages 5 & 6



The first 170 participants arrived at BNL for the June 4 kick off of the Lab's Office of Educational Programs' annual summer internship programs

Brookhaven Lab Welcomes 2012 Summer Interns

Berkner Hall buzzed with excitement on June 4 as the Office of Educational Programs (OEP) rallied the first 170 participants in the 2012 summer internship programs at Brookhaven Lab.

"The science here is deep and rich, and we're addressing some of the most difficult problems in the country," said Ken White, Manager of OEP. "Here, the machines are different, the tools are different, and the opportunities are different. You'll also meet mentors who can guide you throughout your career. This will be a summer of change for you."

White also discussed training and safety before introducing the next speaker, Brookhaven's Deputy Director for Science and Technology, Doon Gibbs.

After Gibbs had also emphasized the importance of safety at the Lab, he told the new interns, "One of the things that really pushes our scientists forward is the chance to talk to

people who are new, because you ask different kinds of questions than we're used to and you make us rethink things — that's a lot more important than you may think.

"Besides benefiting science and educating the country, we're also interested in hiring you," Gibbs added. "One of the best ways to get young people to come back to Brookhaven is to engage them early in their careers."

John Carter, Director of Communications for the DOE Brookhaven Site Office, spoke to the students next. He told them about the importance of safety and personal protective equipment at Brookhaven, appreciating mentors, maximizing the opportunities their mentors can provide, and embracing all that the Lab — a world-class research facility — has to offer.

"Be safe, work hard, and have a great summer," Carter said in closing.

Fostering A New Generation of Scientists

From 17 DOE laboratories, nearly 800 students were selected for internships this summer. The 170 students who just arrived at Brookhaven will participate in a number of DOE educational programs, including the Community College Institute, Visiting Faculty Program, and Science Undergraduate Laboratory Internship.

Students participating in this year's summer programs at Brookhaven also include members of Stony Brook University's group Women in Science and Engineering.

Between now and August 10, participants will work with their BNL mentors in nearly every area of the Lab's scientific community, including at major facilities such as the Center for Functional Nanomaterials, National Synchrotron Light Source, and Relativistic Heavy Ion Collider, and in departments such as Chemistry,

Environmental Science, Instrumentation, Nuclear Nonproliferation, Physics, and Waste Management.

"While most of our summer students have excellent coursework preparation, they lack the experience of working in a laboratory setting such as BNL," said Mel Morris, OEP manager of Special Projects. "This internship experience allows students to make more informed decisions as to their future academic and career choices. We are also fortunate to have staff members who realize the importance of working with young students to help prepare the scientific and technical workforce of the future."

Noel Blackburn, OEP manager of DOE Programs, agreed with Morris and said, "For some of the interns, this is their first experience at a national lab, and we provide a great environment to encourage students in the fields of science, technology, engineering, and math.

When we speak with our interns, they tell us much more often than not that our summer programs had a significant impact on their academic choices. This is, in part, due to our very dedicated mentors who make this experience a time to remember for these interns."

More to Come

A second group of summer program participants, including middle and high school students and teachers, are expected to arrive at the Lab later this month. Throughout the summer, OEP staff at the Science Learning Center will host elementary and middle school students involved in various camps and programs, including the Lab's summer camp for employees' children and the new "Portal to Discovery" camps (see below, left) offered through OEP's partnership with the Long Island Matrix of Science and Technology.

— Joe Gettler

BNL's New 'Portal to Discovery' Offers Hands-on Summer Science Explorations for Students

Three-day mini-camps for grades 4-6, week-long camps for middle and high school students

The "Portal to Discovery," a new partnership between BNL's Office of Educational Programs and the Long Island Matrix of Science and Technology, is hosting a variety of hands-on science summer camps for students entering grades 4-12.

Free three-day mini-camps

Places remain for the free "Astronomy and the Sun" camp at the Science Learning Center, reserved for BNL employees' children/grandchildren who are entering grades 4-6. Two sessions are available: **July 10-12** and **August 6-8**. Times are 8:30-11:30 a.m. Additional sections of this mini-camp will be offered to the public for a nominal fee.

To register for the Science Learning Center (SLC) mini-camp for BNL employees, contact the SLC office, Bldg. 400, Ext. 4495.

Fee-paying week-long programs:

Middle School students: Some places remain in the program in which they will explore **Alternative Energy Sources**, from July 23-27 or August 13-17, 9 a.m.-2 p.m. \$275.

High-School students: Some places also remain in two programs, which are:

Exploring Long Island's Diverse Ecosystems, August 6-10, 9 a.m.-4 p.m. \$300.

Marine Archaeology using underwater Remote Operated Vehicles (ROVs), August 13-17, 9 a.m.-4 p.m. \$300.

For more information call (631) 344-4495 or visit: www.bnl.gov/education/program.asp?q=173.

Bicycle Safety Guidelines and Rules

In summer, many students and other BNLeers ride bicycles. Whether biking on paths or streets, please obey these safety guidelines:

- Do not ride your bicycle on the sidewalks.
- Do not wear headphones while riding.
- Do not talk or text on a cell phone while riding.
- Do not drink and ride.
- Wear a bicycle helmet. It is NYS law for persons less than 14 years of age and BNL policy for all cyclists on site.
- Obey all traffic signals.
- Ride in the same direction as the flow of traffic.
- Ride in a straight line and single file.
- Use a light, reflectors, and reflective clothing in low-light conditions.
- Wear bright clothing during the daytime.
- Use proper hand signals when turning, stopping, or changing lanes.
- Use extra caution when it is raining.
- Walk your bike when using a crosswalk.
- Keep your bike properly maintained so it is safe.
- Be alert for road hazards or cars at cross streets and driveways.
- Be aware of parked cars and watch for car doors that may open.
- Give pedestrians the right of way.

Note: Bicycle helmets are a restricted-inventory item, so you must be authorized by your ES&H Coordinator or someone similar to order one through the PeopleSoft pick-ticket system. LED bike lights are available for BNL-purchased bicycles.

Two BNLers Capture Transit of Venus, 2012

On June 5, when the planet Venus crossed in front of the sun in a spectacular event that will not be seen again until 2117, two BNL employees who are also keen photographers, Phil Harrington and Rick Jackimowicz, captured the moments. Harrington took his photos from his backyard in Miller Place using a 4-inch (102mm) refracting telescope, and as a bonus caught a magnificent rainbow just as the sun was setting. Jackimowicz took his photos from the National Synchrotron Light Source parking lot. The transit began at 6 p.m. but the view at BNL was obscured by clouds. Jackimowicz used a 600mm Nikon telephoto at 1200mm with Nikon DSLR. One that he took 45 minutes into the event shows several sun spots as well as Venus.

Transits of Venus occur in pairs, set at eight years apart. The last one was on June 8, 2004. But each succeeding pair of Venus transits is separated from the previous pair by more than a century. The next pair is expected on December 10–11, 2117, and in December 2125. Transits of Mercury occur much more often, says Harrington — the next one will take place on May 9, 2016. — Liz Seubert



Photo by Phil Harrington

Classified Advertisements

GIRL BEDROOM SET – Ethan Allen White twin bed frame w/ mattress/head/ft brd, frame for pink curtains/incld, night stand w/lamp/writing desk, \$1200. 355-5630.

HUTCH – Oak finish, Hudson collection, modern home desk hutch 44w x 10d x 7h, \$50, needs some refinishing. Mary, Ext. 6344 or phraner@bnl.gov.

KENMORE ELECTRIC STOVE – 30" white, 1/burner-front/right is out, but the other 3 operate well, \$25. 929-4896.

S-BY-S REFRIG – w/h2o/ice dispenser, \$200 obo; Samsung 64" 1080i TV model PCL 5415R projection TV; wks gr8 \$300/obo; port-bl garment steamr/\$20. In Ridge. 404-8109.

PLUSH KING SIZE MATTRESS – w/double twin box springs, 2 yrs old and in a mattress protector, soft. ask/\$700. Kerry, Ext. 3102 or zendzian@bnl.gov.

PORTABLE HOT TUB – 12 jets, seats 4, ask/\$650. Donna, donnamna@aol.com.

QUEEN BDRM SET – v/gd Mahagony wood color q/bed frame w/head/ft brd, q/mattress/sheet, ch-of-drawers w/vanity/night stand, writing desk, \$1500. 355-5630.

Audio, Video & Computers

CAR AUDIO COMPONENTS – Kicker 11ZX700.5 amp and 10DC122 dual sub-wwoofer enclosure, incls 10ZXRC level control, \$600/takes all, new in boxes. Mark, Ext. 3970.

LCD MONITOR – 24" w/all 3 connections: VGA,DVI and HDMI/\$100, comes w/an hdmi cable, I have 2 but selling 1 for now. Carmelo, Ext. 3040 or ccortes@bnl.gov.

MAESTRO GUITAR – new w/case, neck strap, beginner CD, extra strings and care booklet/\$85. Mary, 929-0668.

PHOTO & NEGATIVE SCANNING – www.pictureperfectscans.com scans & enhances 35 mm slides, new, converts them to DVD. Music slideshows avail, Pt Jeff. 928-6469.

Sports, Hobbies & Pets

DIAMONDBACK VIPER – BMX style bike, size gd for teen. Literally lk new/\$75; IN-NOTEK IUC-4100, in grnd invisib fence syst, new in box, \$240. Mark, Ext. 3970.

FISHING ROD – Wright & McGill, Flats Blue 7'6" m action spinning rod, new, grt Inshore spinning rod for LI-Fluke, Bluefish, etc, ask/\$60. Scott, sbronson@bnl.gov.

JETS TICKETS!!! – 3 seats +prkg pass: sect 344 row 7 seats 12/13/14, Reg season games: \$340/face value pre-season games: \$170/half price. Ed, 626-3724.

PIANO- SAMICK UPRIGHT – excel cond, plays beautifully as standard piano, or play digital/cd/karaoke, no need to tune! SXP411, Lt Cherry finish. \$1100/neg. 831-4342.

REEL – Shimano Stradic FI 4000 fishing reel, new, 2 spools, 1/spool w/15 lb pwr pro line, grt for inshore fishing, ask/\$110. sbronson@bnl.gov.

STALLS FOR RENT IN RIDGE – lit ring, plenty of trails, TLC for your horse, sep turnouts, clean, close to Lab! \$525/mo. Lynne, 924-0002.

TAYLORMADE GOLF CLUBS – Firesole irons 3 to 9, PW, AW, SW new grips,great cond/\$125. Stephen, Ext. 5142.

VIOLIN – J.P. Lupot 4/4 by Eastman Strings 2010. Bow, Arcos Brasil Nickel-mounted Pernambuco. Case, Eastman Strings model 1504, \$1400. Ext. 7870, gassner@bnl.gov.

WETSUIT – Youth size 12, barely used, \$50. Lynda, Ext. 7235 or fitz@bnl.gov.

WETSUIT – Tilos mens 7/5 mm full wet-suit, XXL, blue, ankle zippers, excel cond, \$80. Scott, Ext. 7313, 553-2477 or sseberg@bnl.gov.

Tools, House & Garden

2 SKYLIGHTS – 30"x45" sealed in v/gd shape; \$100/ea. 404-8109.

RADIAL ARM SAW – Craftsman 10", \$100. Ext. 7235, 286-1018 or fitz@bnl.gov.

SEVERAL LAWN MOWERS – self-propelled, mulcher, bag, etc, from \$35-\$65. Joseph, 603-6285.

Miscellaneous

3 BIG TIME RUSH TICS – Aug 17th, 7pm, Jones Beach, Section Orchestra E, Row MM VIP. \$480. dmcarthur@bnl.gov.

ESPN AIR HOCKEY TABLE – Glow in the dark, \$50, u-pick-up. dmcarthur@bnl.gov.

LOOKING TO RENT – Looking to rent a 2 bdrm condo in Whispering Pines. Caryn, Ext. 8115.

PROM DRESS – Royal blue w/"bling", size 14, sweetheart neckline, full-length, strapless, unworn, orig tags, pd/\$325, ask/\$200, photo. Ext. 4567, 516-241-4598.

RADIOHEAD TICKET – 1, lawn area, for Wed June 13 show in Camden, \$39.75/obo. Sarah, Ext. 8608 or spoe@bnl.gov.

Yard & Garage Sales

CEDAR DR. MILLER PLACE – Sat, 6/16, 9-2pm Rain date, Sun, 6/17 Office furn, video games, weights, sporting equipment and much more. 403-4218.

Community Involvement

HOUNDS ON THE SOUND – Fundraiser for Save A Pet Animal Rescue of Port Jefferson. Meet at Memorial Park west of Danfords. Registration includes T-shirt and gift bag. 473-6333.

Happenings

KNIT IN PUBLIC DAY – Eastern Long Island Knitting Guild hosting Knit In Public Day on June 16, 11a-3p. Knitters and Crocheters welcomed. For more info or to RSVP, email lcaccavale@bnl.gov. Lequisha, 344-4633.

PANCAKE BREAKFAST – St. Andrew's Episcopal Church, Yaphank, Sat., June 30, 8:00am-12noon, \$8 adults/\$5 srs & kids 5-12, Good food, fellowship, and raffles! Bring a canned food item for LI Cares. info@standrewsyaphank.org.

RETIREMENT DINNER – Join us in wishing our good friend and colleague Paul Ribaudo all the best in his well deserved retirement. 7 pm, Fri. 6/22 at the Cooperage Inn. \$47 includes Dinner and Gift. Dan, Ext. 2121 or oldham@bnl.gov.

ZUMBA! FUNDRAISER – Ladies, come join us for a night filled with dancing and energy! All proceeds go to aiding flood victims in Prattsville, NY. June 14 at 6:15 @LWC, 787 Nesconset Hwy, Nesconset. Christopher, Ext. 3486 or cruggiero@bnl.gov.

Wanted

CAR STEREO REMOVAL TOOLS – Looking to borrow tools to remove old Clarion car stereo. Would also try using universal tools, if available. Joseph, Ext. 3584.

CARPET INSTALLER – need a carpet installed in Port Jeff Station/12x1010m, can trade for hvac work or pay! Ed, 626-3724 or egranger@bnl.gov.

GIFT CARDS – Seeking store gift cards to King Kullen, Stop & Shop or Wal-Mart of any amount for the families at Thee Island INN Soup Kitchen in Middle Island. Greatly appreciated!! Barbara, royce@bnl.gov.

OLD WAVY WINDOW GLASS – I'm looking to restore windows in my 1905 home, I have a few broken panes & would like to keep the same look. I need lg pcs, can still be in frame. William, wfelitz@bnl.gov.

POP TOPS FROM SODA/BEER CANS – Collecting for Shriner's Children's Hospital. Please send or drop off @ Bldg 400A, Transportation Office. Paula, Ext. 2535.

Free

KITTEN – 6 wks or approx 6-8 wks, long haired black/brown tabby male who nearly died and is happy to be alive, v/ sweet/active and loving, eats and uses Litter box on his own. Donna, 344-3541 or donnacar62@aol.com.

KITTEN – playful, 8 wks old, v/cute, white hair w/grey spot on top of head, can email photos. Denise, Ext. 7860 or dcm@bnl.gov.

NTDTV DOCUMENTARY – “Between Life and Death” has won many awards at US international film festivals. George, georgewei@bnl.gov.

PHILLIPS LIFELINE – Receiver and medical alert pendant. Michelle, Ext. 4905.

In Appreciation

To ALL my great colleagues and friends at BNL — I thank you and am extremely grateful for my 19 years at BNL. I will cherish my friendships and acquaintances. I have been privileged to have taught over 20,000 students. Thank you to all who helped to make my time at BNL not only a vocation, but a lifetime memory.

I want to pay tribute to my Training colleagues for their support, friendship, professionalism and exemplary teamwork. I will always remember your stimulating company and our shared laughter and joys. Thank you for your notes of appreciation, words of encouragement, and phone calls over this last year.

We are neither better nor less than anybody else but rather the best or least of ourselves. I am still working on finding the best of me. It is an exciting on-going journey. Although retirement is beckoning me to begin a new chapter of life, I do plan to stay in touch. — Blessings, Buzz Rundlett

For Rent

SPRING HILL, FL – priv ranch on Gulf, 70m Orlando, 45m Tampa, fly Islip direct, near beach/tennis/park, SW architecture, 3/bdrm, 2/bath, d/r, t/p, 2gar, ipp in lanai, fruit trees, see review.oktane.net/House-Tour. \$450/wk. 344-5537.

MANORVILLE – 3 bdrm, 3 bath, furmd/unfurnd nonsmkr, no pets, utils not incl, 7 mi to Lab. \$1,600/mo. Mikki, 516-445-9386.

N. SHIRLEY – 1 bdrm furn apt, near Lab, quiet, clean, sep ent, 1 mo rent/sec, incl all, no smkg/pets. \$850/mo. Ext. 3849.

RIDGE – 3 bdrm, 5 min to Lab, eik, lg den, 1.5 bth, w/d, lg yd, no smkg, water, sewer & lawn maint incl, yearly lease. \$2,100/mo. 504-6143 or pjens330@yahoo.com.

RIDGE – 1 bdrm, kitchenette, full bath, mins to Lab, incls all, sep ent/prkg. \$975/mo. Lynne, 924-0002.

SHOREHAM – 1 bdrm furn apt, l/r, d/r, full kitch & bath, pvt ent/drwrw, util incl, no smkg/pets, 1/mo sec, 5 min to Lab. \$1,150/mo. Judy, 375-7959 or judyb55@optonline.net.

For Sale

SPRING HILL, FL – priv ranch on Gulf, 70m Orlando, 45m Tampa, fly Islip direct, near beach/tennis/park, SW architecture, 3/bdrm, 2/bath, d/r, t/p, 2gar, ipp in lanai, fruit trees, see review.oktane.net/House-Tour. \$120,000 neg. 344-5537.

AMITYVILLE – 2 level townhse w/lake view, 2bdrm, 1.5 bath/updated eik, l/r, gas heat/cac, quiet community, nr village & LIRR, pics avail. \$256,900 neg. 264-2421.

BAYPORT – 2300 sq ft, Frank L. Wright-style mid-cent.-modern hse, 1 wooded acre nr Grt South Bay, 4 bdrm, 2½ bath, open flr plan, lg windws, radiant heat, excel schools, \$525,000. 617-332-6264.

CORAM – Spacious 1 bdrm co-op, updated open kit & bthrm, laundry across from unit, new alarm, MLS# 2501596. Contact for link to listing. \$110,000. Ext. 8329, whalbig@bnl.gov.

CORAM-BRETTON WOOD – 3 bdrm, 2.5 bath, l/r, d/r, new eik/heating/cac/carpets/baths, lg priv bowling/golf/swim/tennis. \$249,900. Bob, 516-314-0234.

RIDGE – custom mint 4 BR, 2.5 bath, 2-car gar., over 2000 sq ft, Col. w/updated windows, baths, spa. Lush landscaping on private acre. \$369,990. Ray, 344-3541.

ROCKY POINT – Freshly painted Co-op, new kitch, remodeled b/r, near all stores and restaurants. \$85,000. William, 525-3239.

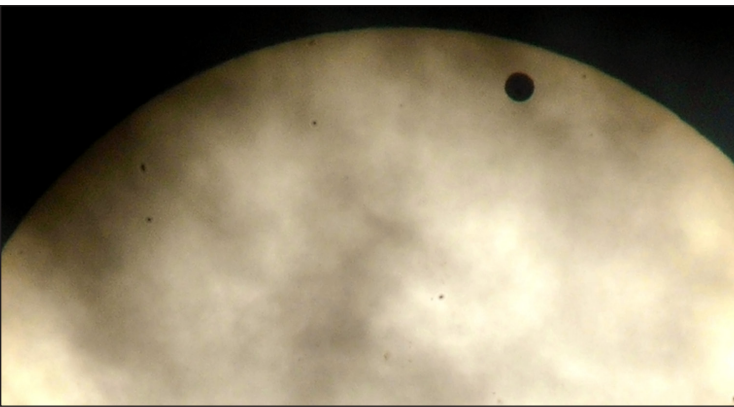


Photo by Rick Jackimowicz



Photo by Phil Harrington

EMS and OSH Management System Audits, 6/19-22

By Bob Lee, EMS Management Representative; Ed Nowak, OHSAS Management Representative; John Selva, EMS/OHSAS Project Manager

BNL's commitment to Integrated Safety Management includes certification to the ISO 14001 Environmental Management System (EMS) and OHSAS 18001 Occupational Health and Safety Management System (OHS).

These rigorous standards are a framework for the Lab to continually improve environmental, safety, and health performance. Each requires an annual audit to maintain certification and allows us to display the mark of certification for NSF International, a not-for-profit, non-governmental organization that is the world leader in standards development, product certification, education, and risk management for public health and safety.

From June 19 to 22, select groups will be subject to audits by NSF International. The audits are scheduled with your EMS and Occupational Safety and Health (OSH) representatives and will occur in the following areas:

- Collider-Accelerator Department
- Community Relations Office
- Environment and Life Sciences Directorate
- Environment, Safety & Health Directorate
- Facilities and Operations Directorate
- Global and Regional Solutions Directorate
- Photon Sciences Directorate
- Physics Department
- Superconducting Magnet Division
- Training Office

What All Employees Should Know

While not all employees will be interviewed, all are expected to know that the Lab has an Environmental, Safety, Security, and Health Policy. This policy is posted throughout the Lab and is available at <http://www.bnl.gov/bnlweb/PDF/ESSHP.pdf>.

Also, all employees must be familiar with the environmental, safety, and health aspects and hazards associated with their work and the consequences that could result from performing work outside of established controls. This is of particular importance with summer student programs.

For information about these programs or the audit, contact:

Environmental Management System (EMS)

Robert Lee, Ext. 3148

John Selva, Ext. 8611

Your EMS Representative

Your Environmental Compliance Representative (ECR)

Occupational Safety & Health (OSH) Management System

Ed Nowak, Ext. 8211

John Selva, Ext. 8611

Your OSH Representative

Your Safety & Health Representative

Talk: ‘Applying Emotional Intelligence to Your Life,’ 6/20

Jude Treder-Wolff of Magellan Health Services will talk on “Applying Emotional Intelligence to Your Life” and how this improves decision making, problem solving and relationships, on Wednesday, June 20, at noon in Berkner Hall, Room B. Sponsored by the Employee Assistance Program, this is Part II of a May 2012 talk. To register, email EAP Manager Nancy Losinno, nlosinno@bnl.gov.

SMITHTOWN – high ranch, dead end, rm for mom, great-rm, attic, gar, bsmt, fpl, Indry rm, cac, Cvac, 4 bdrm, 3 full ba, den, v/priv, walk to town/park/RR/schools. \$450,000 neg. 516-808-3422.

On-Site Service Station

The station, which provides vehicle maintenance and repairs as well as gas, will be closed for vacation on Friday, July 6.