

# Particle Post October 2012

*"In order  
to succeed,  
your desire  
for success  
should be  
greater than  
your fear  
of failure."*

~ Bill Cosby

Previous issues

## Note from the Chair Thomas Roser



We closed the books on fiscal year 2012 and it was an outstanding year with probably the most successful RHIC run in its history, smooth operation at NSRL and BLIP, great progress in the R&D projects and a good safety performance with only one DART and two additional recordable injuries at the Department. Congratulations to everyone.

The refrigerator for the SRF gun and accelerating cavity of the Energy Recovery Linac (ERL) is now operating and will make it possible to start commissioning of this new accelerator. The steps are powering the electron gun, producing electron beam, transporting and accelerating the electron beam, recirculating the electron beam and then decelerating the beam in the same cavity that was used for acceleration. This is the start of a very busy period for the ERL team.

It is also time for the annual performance appraisals process. I know that everybody at C-AD is well above average in their performance. However, over the last few years we experienced significant grade inflation. We need to reset our grading scale. I requested that all supervisors award DP levels only for exceptional performance during FY2012 but not to more than 10% of the employees. Thank you for your understanding and cooperation.

## Administration Stephanie LaMontagne-McKeon



October 1<sup>st</sup> marked the beginning of a new fiscal year. We begin the year with a Continuing Resolution and preliminary budget guidance from DOE



that provides budget authority equivalent to that provided in FY 2012. Thus, FY 2013 will be the fourth consecutive year at the same funding level.

Please note, however, that this is a situation for which we have prepared.

Over the prior three year period, C-AD has reduced staff and exercised continuous constraint on purchasing activity. Year end procurement commitments in FY 2012 of \$2.9M are ~10% less than in FY 2011 and nearly 40% less than in FY 2010. Electric power cost, has been effectively “capped” under the Laboratory’s contract with NYPA and in FY 2012 was the lowest in at least a decade. In each year, we have maintained a budget reserve substantial enough to enable us to commence operations during a Continuing Resolution. As a result of these efforts, C-AD has been able to continue annual operations of limited duration.

Despite this, RHIC Run 12 was a success on which we plan to build during the 15 weeks of cryogenic operations in the current year.

## Accelerator Division Wolfram Fischer



The NSRL run has started, and will continue until Thanksgiving. BLIP operation is scheduled to commence on 17 December, and we are planning to start the RHIC cool-down to 4K on 7 January 2013. For this the Siemens motor still needs to be repaired, at a factory off-site. We are asked to prepare for pp2pp operation, where intentionally large beams will collide in IP6 for a few days. We are still discussion whether pp2pp would run before or after the regular 255 GeV polarized proton run. Also under discussion is a few-week Au-Au run at 7.5 GeV/nucleon, slightly below the nominal injection energy, at the end of Run-13.

## Experimental Support & Facilities Division Phil Pile



We are still holding to a 7 January start RHIC Run 13. Our budget guidance allows for 15 weeks of operation, perhaps 20 weeks if power rates remain favorable. We will begin with 255 x 255 GeV polarized protons with plans to accommodate a four day special STAR pp2pp run.

The STAR detector solenoid has been rolled back into the IR with a new 4 cm inside diameter beryllium beam pipe. Vacuum work and detector installation is



in progress. The PHENIX experiment work for this shutdown is proceeding well with some delay in the Vertex Tracker (VTX) detector installation but not enough to affect the schedule. Preparations are in still progress (no installation yet) to install more shielding in the North and South tunnels to reduce background from beam loss affecting operation of the Resistive Plate Chamber (RPC's). We expect both experiments to be ready for beam by the first part of January.

NSRL began Run12C for NASA on 4 October with plans to run until 19 November.

The NASA run will be followed by NSRL beam operations in support of National Reconnaissance Office (NRO) experiments aimed at studying ways to improve electronics survival in space. The NRO experiments are tentatively set for the week of 10 December. Both the Tandem (early silicon and protons) and EBIS (other ions) are being used for these experiments.

BLIP is scheduled to begin operations with LINAC beams on 17 December and will continue into early summer.

We have made good progress on ladder issues since the laboratory redefined the "Red" tag criteria. Although there are still a lot (but less than half) of our ladders that have not yet been inspected the number of "Red" tagged, do not use, ladders is minimal so with proper work planning we can access most of our critical areas.

## Accelerator R&D Division Ilan Ben-Zvi



The R&D ERL is making good progress even during the RHIC shut-down. The most notable recent achievement has been the successful operation of the liquid helium refrigerator, which will serve not just the ERL but also the collection of nearby superconducting RF (SRF) cavity test facilities. This success will lead us very soon to cool-down of the SRF cavities of the ERL, in particular the first cool-down of the gun, to be followed by conditioning of the gun cavity (also called "cold emission test, or CET). In the next few months we should have the great milestone of electron beam from the gun.

The 56 MHz SRF cavity has arrived at BNL back from the final welding step at Niowave Inc. This concludes the Niowave 56 MHz cavity contract. A few other items are in preparation, such as the cryomodule, the quiet helium system, HOM and other couplers etc. We are looking forward to the installation of the completed system in the RHIC tunnel during the next shutdown and to the luminosity increase of RHIC, part of the RHIC II RHIC upgrade.

The 112 MHz SRF gun for the Coherent electron Cooling (CeC) proof-of-principle (PoP) experiment is making very good progress. We plan to test the gun with electron beam in early 2013 at Niowave's plant. The purchase order for the 5-cell SRF cavity has been placed with Niowave. The CeC PoP experiment continues to enjoy good funding from the DOE Office of Nuclear Physics.

We welcome Robert Kellermann to the Accelerator R&D Division. Robert will be working with David Pate and Thomas Seda in technical support of the ERL and associated systems.

**NSRL** Derek Lowenstein

NSRL, a joint effort of C-AD and the BioSciences Department, formerly Biology and Medical Departments, is now in its tenth year of operation. The first run of this cycle, starts on October 4, with a silicon beam and will end on November 19 with an iron beam. In between, we will be delivering several other ion species, from protons to iron. We will be hosting the order of 150 scientists during this first running period. The major scientific focus will continue to be the assessment of risk and the mitigation of the risk to astronauts from galactic cosmic rays and solar particles. NSRL will be making full use of the EBIS injector capability during the upcoming cycle and the next two cycles, that will start in March 2013 and end by July 2013. After the October / November run,

NSRL will deliver beam for the National Reconnaissance Office (NRO). The NRO focus will be the continuation of electronic upset studies in commercial chips and circuits. We expect that they will also run in July, after the NSRL program.

**Operations** Paul Sampson

The AGS Booster was restored to operation late last month. This was completed on schedule, safely and efficiently. The Tandem and EBIS injectors were also brought on-line and are providing ions and protons to the Booster, which is presently delivering beam to science users at NSRL.

Elsewhere around CAD, shutdown work continues to make progress. Installation of components for the e-lens is evident both inside and outside of the RHIC tunnel at the 10 o'clock region. Work on the water-cooled buss, installation of cable tray and electrical as well as power supply and instrumentation systems will continue to ramp up throughout the month. Roof repair to the 1010

trailer, which houses some of the e-lens equipment, should be completed by the end of October.

Elsewhere around RHIC, major works continue to proceed. The phase separator for the 56MHz cavity RF system will be delivered and placed in the ring this month while bake-out of the RF system components is completed. Some pre-tests of the RF Landau cavities where completed before bake-out and full RF system check out will follow phase separator installation. During these tests, the 4 o'clock area of RHIC will remain locked up for part of the daytime hours. Other efforts around the RHIC ring and in support areas continue, see the link below for details. Installation of components for Stochastic Cooling will begin as they are received from the shops and vendors.

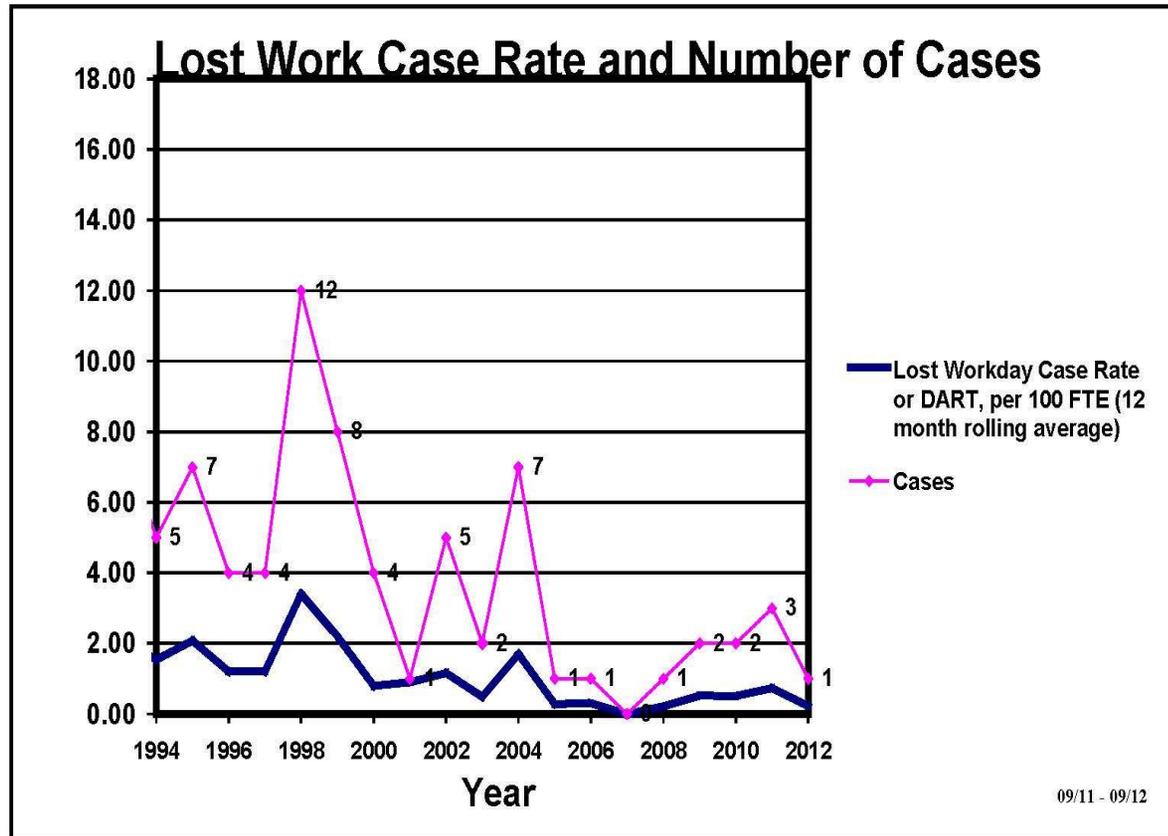
AGS shutdown work is beginning to progress with major efforts focused on installation and testing of the new Access Controls System, and IPM and BBQ systems as well as removal of legacy cabling. Also in the AGS, magnet re-positioning, corrector power supply tests and LLRF development are ongoing. Removal of V line transport magnets has been completed while removal of the g-2 ring elements is ongoing.

The first maintenance day for the Booster and injectors is scheduled for Wednesday October 17<sup>th</sup>. It is scheduled for 5 hours and will be completed in the morning. Another maintenance day may be held on the 31<sup>st</sup> if necessary.

To view a list of the approved work for maintenance days or the shutdown, go the [Job Request System](#) and select the appropriate date. This link is behind the firewall and requires privileges to view.

For schedule updates see: [This Week](#), which can be viewed by all.

## Safety Stats



### C-AD Occupational Injury Statistics

For Year 2011      For Year\* 2012

First Aid Cases	4	2
Recordable Cases	3	2
Lost Work Cases	2	0

**LOST WORK Cases**

**J**

**U**

\* Calendar Year through 9/12

**REMINDER:** TLD exchange is done the *FIRST FRIDAY* of the Month.

**EXCHANGE DATE: FRIDAY, NOVEMBER 2, 2010**

*Pete Cirnigliario*



**Arrivals**

Roger Bonati re-joined the department on September 7. He is working with Ioannis Marneris in the Electrical Systems Group.

Robert Kellermann joined the department on September 24. He is working with Dave Pate and Tom Seda in the Accelerator R&D Division.

William Needrith joined the department on September 24. He is working with Ray Karol in the ESSHQ Division.

**WELCOME!**

**Departure**

Simon Edwards, Machine Operations Group working with Peter Ingrassia left on September 26.

**GOOD LUCK!**



**RHIC Newsletter.** Please click on link to the left to view the latest web publication of RHIC News.



We wish all of you born in **October**  
a happy and healthy year ahead.  
**Birthday people ONLY** click on cake



## Fun Time

Play the classic game of **Blackjack** in JavaScript! (You might also know it as "21"). The object of the game is to get the closest to 21. If you get higher than the dealer without going over, you win! Good

luck, and don't gamble. J

Score:	Dealer		Card(s):
	Player		Card(s):

Free JavaScripts provided

by [The JavaScript Source](#)



## Did You Know

Insert something.

By [Liz Seubert](#) | October 5, 2012

## Superconducting Magnet Researchers Develop Exciting New HTS Technology



With two of their world-record-breaking solenoid coils in the foreground are members of the Superconducting Magnet Division (SMD): (front, from left) William Sampson, High Temperature Superconducting Magnet R&D Group leader Ramesh Gupta, and Lakshmi Lalitha; (back, from left) SMD Head Peter Wanderer, Richard Meier, Piyush Joshi, Mechanical Engineering Group Leader Michael Anerella, Sebastian Dimaiuta, Ray Ceruti, Toby Levine, Glenn Jochen, Michael Shivers, Kengo Nakao, and Tom Van Winckel. Among those not in the picture are: Frank Corbin, John Cozzolino, Joe D'Ambra, Arup Ghosh, Henry Hocker, Dean Ince, William McKeon, Joseph Muratore, Ed Sperry, Jesse Schmalzle, and Yuko Shiroyanagi.

World records have been broken this year not only in sports by Olympic athletes in London, but also in high temperature superconducting magnet technology by the Superconducting Magnet Division (SMD) staff at BNL.

Superconducting magnets, which are essential in accelerators like the Relativistic Heavy Ion Collider (RHIC) and the Large Hadron Collider (LHC) in Switzerland, are made with conventional, low temperature superconductors and require cooling by liquid helium, now in short supply. They operate at temperatures below 5 Kelvins (K) (-450 degrees Fahrenheit) and magnetic fields below 10 Teslas (T). For the past decade, however, Lab researchers have explored a new class of superconductors called high temperature superconductors (HTS) that can operate at temperatures as high as 77 K, achieved by cooling with cheap, plentiful liquid nitrogen, or can create very high magnetic fields — more than 20 T — when cooled to about 5 K.

“Brookhaven was one of the first national laboratories to start research and development [R&D] on HTS magnets at a time when there were many skeptics,” said Peter Wanderer, who heads the Superconducting Magnet Division. “We were encouraged by BNL management to take on this exploration, which has been well rewarded. Recent success at BNL has advanced the technology to a level that HTS magnets are now being considered seriously in the upgrade of current accelerators — for example, the LHC — and future accelerators, such as a muon collider.”

## Achievements

Examples of BNL past achievements in HTS R&D include a 100-millimeter (mm) aperture coil made with 1.2 kilometers of HTS, which achieved a peak magnetic field of 9 T — a record high field for an HTS coil of this size. Another success has been a 25-mm aperture coil that reached 16 T — a record high field for an HTS coil, beating the previous record by about 50 percent.

“We are fortunate to have a very skilled and creative team of scientists, engineers, and technicians contributing to this pioneering HTS magnet R&D,” said Ramesh Gupta, who heads the HTS Magnet R&D group. “William Sampson, a senior scientist and winner of the IEEE award for Applied Superconductivity Research, plays a key role.”

## Goal: Muon Collider

Since 1969, scientists have been interested in the idea of colliding muon particles, which because of their unique properties, could reveal new physics. With the discoveries of a Higgs-like particle at the LHC, there has been renewed interest in a collider using muons because they would be well-suited to detailed studies of these particles.

However, several required technologies for muon colliders are not yet developed, according to Robert Palmer of the BNL Physics Department, who has been working on a muon collider for many years. One challenge has been to develop extremely high field superconducting magnets — 30 T or more — that are essential for achieving high luminosity, a term related to having a sufficient number of collisions.

For this purpose, the past achievements of Gupta’s group developing solenoid coils of 9 T and 16 T peak fields are very promising.

“In the next step,” said Gupta, “we will put the two record-breaking solenoids together and add a few more coils. If all goes well, we will reach more than 20 T.”

These magnets are being developed as a part of a collaboration with Particle Beam Lasers, Inc. through the Small Business Innovative Research program. The high performance conductor material is provided

by SuperPower, Inc.

Gupta explained that reaching 20 T with HTS alone will be an important milestone in the technology. This, when combined with a solenoid of about 10 T made with conventional superconductors, offers a clear path to 30 T.

## HTS Advantages

Rather than developing a program that is narrowly focused on a single design or application, the group is taking advantage of the unique properties of HTS for developing technology for a variety of applications.

Among these is a low field (below 1 T) HTS solenoid operating at about 20 K for the BNL Energy Recovery Linac, being built in the Accelerator R&D Division of BNL's Collider-Accelerator Department. A medium field magnet (2-3 T), subjected to extremely high radiation and heat loads has been developed for the Facility for Rare Isotope Beams (FRIB), planned for Michigan State University. The FRIB magnet has demonstrated stable operation at high temperature (30-50 K) with record heat loads. These demonstrations have led to making HTS magnets, for the first time, part of the baseline design of a major accelerator facility.

The Magnet Division has also successfully built HTS magnets with coils carrying over 4,300 amperes, a record high current in HTS coils.

## Meeting the Challenges

A major challenge with any high-field magnet is dealing with the large stress and strain on the conductors created by huge magnetic forces. To overcome this, the Magnet Division's mechanical engineering group, led by Michael Anerella, is building a special segmented support structure for high-field magnets.

Another major R&D effort is to protect HTS coils from permanent damage in the event of a "quench," or a sudden loss of their superconducting properties.

"Piyush Joshi has developed new fast electronics that detect small changes in voltages even against the large background noise and large inductive voltages," said Gupta. "This development has so far proven to give enough warning to shut down the system and extract the stored energy, but significant work still remains for large systems."

## HTS Magnets in Other Applications

While successful development of HTS magnets is expected to revolutionize accelerator technology, it is likely to have a major impact on many other fields as well. These include magnetic levitated trains (Maglev), magnetic resonance imaging (MRI) and other medical uses, nuclear magnetic resonance, energy storage, and national security.

Another significant project for the group is the design, construction, and testing of a large, about 25 T HTS coil for a high energy density superconducting magnetic energy storage (SMES) system. In this project, the Magnet Division is working with scientists in the Condensed Matter Physics and Materials Science Department to develop SMES technology in partnership with industry. This,

if successful, will create a SMES system with energy density considerably greater than has been previously possible.



**The Food Pantry needs our help.....**

*If everyone can bring in at least one non-perishable food item, this would help the local food pantries in our area. There are so many families who are in need of food and depend on their local food pantry to have at least one meal a day. With the food supply so low, the volunteer's who help out at our local food pantries can't help those in need. So please.....bring whatever you can to replenish the food supply for those in need.*

*Your donation of any non-perishable food item can be left in the box marked "Food Drive" located in the 911A Lobby. Your continued support is appreciated.*

*Thank you.*



**WHEN:**

Brookhaven Veteran's Association  
Adopt-a-Platoon Team  
is having its  
**Book & Bake Sale**



Thursday, October 25th

TIME: 11am to 3pm  
WHERE: Bldg. 400 Lobby  
COST: \$1 per item (books or baked items)



Bakers needed!!!

We ask that you please wrap whatever delicious goodie you make. Cookies, cupcakes, breads (sliced) should be individually wrapped in cellophane which will be sold for \$1 each so please size accordingly. Please bring your baked items to Lobby 400 at 11am on October 25, 2012. We greatly appreciate your help.



All proceeds from the sale will go towards the efforts of Adopt-a-Platoon to support our Troops in Afghanistan. Please check out our website: <http://www.bnl.gov/bera/activities/va/Adopt-A-Platoon/>



**ALUMNI NEWS: AGS/RHIC/C-AD RETIRED CROWD - We'd enjoy hearing from you and what you have been up to. Please send your notes to [pmanning@bnl.gov](mailto:pmanning@bnl.gov)**

**HAPPY RETIREES!!**



You can catch up on all of Eric Forsyth's travels by clicking on his sailing yacht below.



## October 2012

Sunday	Monday	Tuesday	Wednesday	Thursday	Friday	Saturday
	1	2 Physics Colloquium, "Implications of the Higgs Discovery on SUSY Models", Sven Heinemeyer, IFCA, Spain, 3:30pm, Bldg. 555 Hamilton	3	4	5	6
7	8	9 BSA Distinguished Lecture, "The Atomic Bombs President Truman Did Not Drop", Michael Devine, Director, Harry S. Truman Library, 4pm, Berkner, Room A	10	11 Urban Science Lecture "The Promise of Urban Science", Dr. Steven Koonin, CUSP, NYU- Poly, 4pm, Bldg. 555 Hamilton	12	13
14	15	16	17	18	19	20
21	22	23	24 Joint BNL/Stony Brook High Energy Theory Seminar, "TBA", Eduardo Ponton Bayona, Columbia U., 2pm, Bldg. 510 Small Seminar Room	25	26	27

28	29	30 Physics Colloquium, "TBA", Prof. Giuseppe Mussardo, U. of Trieste, 3:30pm, Bldg. 555 Hamilton	31 			
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# November 2012

Sunday	Monday	Tuesday	Wednesday	Thursday	Friday	Saturday
				1	2	3
4 Daylight Saving Time ends	5	6 Election Day	7	8 BSA Distinguished Lecture, "History of Topology of Spheres", Prof. John Milnor, Dept of Math, Stony Brook U., 4pm Berkner	9	10
11 Veterans Day	12 Lab Holiday	13	14	15	16	17
18	19	20	21	22 Lab Holiday 	23 Lab Holiday	24
25	26	27	28	29	30 Research Symposium "BNL Young Researcher Symposium", 10am, Berkner	



**We Remember**  
Sept. 11, 2001

**USS New York - A ship forged from the steel of the World Trade Center**

**Editor:** Pamela Manning x4072