

Contact: [C. Scholl](#)

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May 2014

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Quote of the Month: "We in science are spoiled by the success of mathematics. Mathematics is the study of problems so simple that they have good solutions." - Whitfield Diffie

## WORD FROM THE:

Administration

Accelerator Div.

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## NOTE FROM OUR CHAIR: Thomas Roser



RHIC continues to run exceptionally well. The integrated luminosity of this gold-gold run will be more than all the previous gold-gold runs combined.

In the meantime preparations for the shutdown work has begun. This will again be a very busy summer and fall. The main focus in RHIC will be the installation and start of testing of the equipment for the Coherent electron Cooling test. A superconducting electron source is already in place in the 2 o'clock area and initial test will be done during the summer. Next comes the beam transport line and, by the end of the year, a new superconducting accelerating cavity and eventually a wiggler section and beam dump. The goal is to be able to test as much as possible of this new electron accelerator during run-15. Then, during the 2015 shutdown, the wiggler section will be installed in the 2 o'clock interaction region merging the electron beam with the gold beam of the yellow ring. This will then allow us to test, for the first time, this new, very powerful beam cooling technique during run-16. Coherent electron Cooling is essential for eRHIC to reach the very high luminosities with achievable polarized electron beam intensities.

## VIEW [CONFERENCE PROJECTIONS FOR 2014: DUE ASAP](#)

## DID YOU KNOW??

**Check out who received an employee Service Award this year!** 2014 Collider-Accelerator Dept. employees who received a [Service Awards](#). Last yeas Service Awards are listed [here](#). 2012 Service Awards are listed [here](#).

**CONGRATULATIONS BILL WENGI!** ~ Bill received a "Distinguished Asian American Professional" Award ~ [read more about it here](#)

**Congratulations Stephen Gill ~ he has another addition to the family!** ~ Steve's son Stefan with his wife Christina had thier fist child Angelina Julia Gill ~ Jan. 27th, 2014

## EVENTS/SEMINARS...



Check out the [BNL Calendar](#) for upcoming events & Seminars or the [Upcoming Conferences & Workshops](#) page for workshops and Conferences happening at BNL.

June 11 - (Berkner Hall B | 12pm) Brookhaven Women in Science (BWIS) Event

June 12 - (Bldg 817- Rm 4 | 11am) C-AD Accelerator Physics



*Steve Bellavia captured pictures of - interaction Galaxies, "The Whirlpool", 23 million light years away..*



*He also took pictures of a globular cluster and a baby deer born near bldg 510~ [See pictures](#)*

Seminar

June 17-20 - (Bldg 555-HSR | 9am) RHIC/AGS Annual Users' Meeting

June 17 - (Bldg 510-LSR | 3:30pm ) Physics Colloquium "Tensor cosmology with BICEP/Keck experiments" Presented by Chao-Lin Kuo, Stanford U.

June 18-19 - (Brookhaven Center | 9:30am) Blood Drive

June 18 - (Berkner Hall Aud. | 4pm) Brookhaven Lecture "495th Brookhaven Lecture" Presented by Istvan Dioszegi, Nonproliferation and National Security Department

June 19 - (Bldg 510-SSR | 3pm) Particle Physics Seminar "Vector boson scattering and quartic gauge couplings at the LHC," Presented by Anja Vest, Technische U. Dredsdn, Germany

*Do you have to give a talk?*

**Public Speaking Techniques:**

**Verbal & Non-verbal**

*Presented by:*

*Theodore Sampieri Ext: 4894*

*12:00 – 1:00 Fridays*

CAD Building 911

*Large Conference Room: 2<sup>nd</sup> Floor*

*July 4th - \*\* Lab Holiday\*\*\**

### ***Congratulations Dr. Cheng-Yi Chi! -***

One of our PHENIX collaborators, Cheng-Yi Chi, received a prestigious award last month presented at the "Real-Time Conference" in Nara, Japan. The award is presented to someone who has made significant and outstanding contributions to work in the community. The plaque reads "This Award is presented to Dr. Cheng-Yi Chi for three Decades of Development and Timely Delivery of Outstanding Electronics for the Readout of Detectors in Nuclear and High-Energy Physics Experiments". Congratulations to Chi! Cheng-Yi was instrumental in designing and implementing the PHENIX data acquisition system. The below picture was taken at the presentation ceremony.



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### **IN OTHER NEWS...**

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***A Chilling Medical Trial ~ Using Emergency Preservation and Resuscitation, or E.P.R. [Read about it](#)***  
*Surgeons at U. of Pittsburgh Medical Center practice a procedure that involves draining the blood and replacing it with cold salt water.*

***Organic Cat Litter Chief Suspect in Nuclear Waste Accident ~*** It turns out there's more to cat litter than you think. It can soak up urine, but it's just as good at absorbing radioactive material. .. [Read More..](#)

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### **WHAT'S GOING ON IN OUR NEIGHBORHOOD?**

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***Interested in Cycling?*** <http://www.bicyclelongisland.org/majoride.htm>

***Interested in Running or Walking?*** Check out the [lirunning March Calendar](#) for the following events: Long Island Adventure Race (Calverton/Sept 14); R.O.C. Race (Brooklyn/Sept. 13); Survival Race (Sept. 28) and more..

***For the Kids:*** Marvel Universe LIVE! (August) @ [The Nassau Coliseum](#).

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### **DAY AT THE VINEYARDS...**

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***Macari Vineyard ~*** [MATTITUCK] June 13 ~ In Store tasting at the Wine Guy; June 18 ~ Wine Dinner at One Main Restaurant

***Duckwalk North ~*** [SOUTHOLD] No Events Posted  
***Duckwalk South ~*** [WATER MILL]

***Castello di Borghese Vineyard & Winery ~*** [CUTCHOGUE]  
\*\* Vineyard Tours & Wine Tastings Every Thursday & Sunday @1pm & FREE Jazz Every Saturday (2~4) with Marguerite Volonts\*\*

***Stony Brook Events:***

***The Red Skelton key!*** ~ May 3 ~ June 14 (11:30am~) Popular Musical and high tea luncheon

***Salt Marsh Scientists:*** Jul 14~18 (10:00am~1:00pm) Ages 12~17 are invited to become experts of the salt marsh environment.

***Salt Marsh Explorers*** ~ Jul 28 ~ Aug 1 (10:00am~1:00pm) Ages 5 ~8 are to Join us for a week long hands on program that combines outdoor investigations at an 88-acre wetland preserve, lab work at the Ernst Marine Conservation Center, crafts and tons of fun at this 5 day program.

***Nassau Coliseum ~***

***Upcoming shows:*** American Idol Tour June 11 & 23; Miley Cyrus (August); Enrique Iglesias & Pitbull (Sept); Cher D2k Tour (Sept)

***June 14&15*** ~ Universe Health & Fitness Expo  
October ~ Home Show

***Check out Erik Forsyth's Travel's:***



[HTTP://WWW.YACHTFIONA.COM](http://www.yachtfiona.com)

***Jamesport Vineyards*** ~ \*Live Music from 1~4pm every Sat & Sun\*

***Martha Clara Vineyards*** - [RIVERHEAD] ~ \*\*Live Music every weekend\*\*

***Palmer Vineyards*** - [RIVERHEAD] May 18 ~ Paint & Sip;  
**Memorial Day Weekend** May 24 Beatle Coverband 3:30~6:30; May 25 Cravin Band (Classic Rock hits for 60's & 70's) 2~6pm & May 26 "The Guitar Man" 1~5pm

***Pindar Vineyards*** - [PECONIC] ~ \*Live music Every Sat 1~5pm\*

***Baiting Hollow Farm Vineyard***~ [CALVERTON] \*Music every Sat & Sun from (2~6)\*

***Thursdays ~ Happy Hour!***

***Paumanok Vineyards*** ~ [AQUEBOGUE] No Events Posted August 5~15, 2014 ~ Paumanok Mediterranean Wine Cruise

## NOTE FROM OUR ADMINISTRATION: S. LaMontagne



As we begin planning for maintenance and upgrade activities during RHIC's annual shutdown, please keep in mind that funding for M&S in the current year is constrained and is likely to be more so in FY 2015. We have advised the Nuclear Physics Program Office that a run of 22 weeks is possible without an increase in budget authority; however, continued spending at the current rate puts that plan at risk.

This year, I have asked Paul Sampson to request and record an estimate of procurement activity for each of the tasks to be scheduled over the shutdown. The estimates need not be as precise as those you prepare for upgrade and/or construction activities but sufficient to ensure that we do not over reach. With limited funding, it is important that we do not invest in shutdown activities for which we lack the materials funding to complete, i.e. it is better to complete 10 efforts than make partial progress on 15.

In addition to optimizing material expenditures over the shutdown, it is important that we be attentive to the project numbers used on time cards, work orders, web reqs, etc. Many of our personnel are simultaneously involved in multiple efforts, some of which are funded by sources other than DOE Nuclear Physics. All resources, be they labor or material, should be charged to the appropriate program; in instances where the benefit is realized in multiple programs, expense should be shared amongst the programs in proportion to the benefit. Each of us is responsible to the organization to understand what program(s) benefits from our efforts and when we are unsure,

to seek clarification.

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## NOTE FROM OUR ACCELERATOR DIVISION: Wolfram Fischer



RHIC Run-14 continues to deliver record luminosities. Now running at 25x the design luminosity, Run-14 Au+Au luminosities delivered to STAR and PHENIX exceed the luminosities of all previous RHIC runs combined.

While we deliver luminosity, progress is also made with a number of upgrades. First a dynamic beta-squeeze was tested, i.e. the reduction of the beam size in the experiments a few hours after the beginning of a store. The squeeze at the interaction point however increases the beam size in the nearest quadrupoles, but with cooled beams this is possible. Second, the new 56 MHz superconducting RF was tested up to 300 kV and with 56 bunches. Third, an electron lens demonstrated that it could run a close to full current without causing additional emittance growth.

Meanwhile we also have the first RHIC store (18381) that used Au beam from the Laser Ion Source (LION). LION has the potential to increase the Au intensity further. This, together with the fully commissioned 56 MHz SRF cavity, can yield another factor of two in the Au+Au luminosity bringing the total to 50x the design value.

Preparations are under way to switch RHIC to h+Au on 16 June 2013. h is the nucleus of the helium-3 atom, and has two protons and one neutron. As a projectile it is interesting to the experiments because of its somewhat triangular shape. h+Au will be a new running mode for

RHIC and requires careful preparation from all involved. The RHIC run is planned to end on 7 July 2014.

### Upcoming events:

11-13 June 2014	NPP Program Advisory Committee – STAR and PHENIX run plans
17-20 June 2014	RHIC and AGS Annual User's Meeting
9-11 July 2014	DOE Review of Low-Energy RHIC electron Cooling (LEReC) Project
15 July 2014	DOE Close-out Review of Electron Lenses Project
21-23 July 2014	Workshop on Transformative Hadron Beam Lines

## NOTE FROM OUR EXPERIMENTAL SUPPORT & FACILITIES DIVISION: Phil Pile



The high energy gold-gold run at 200 GeV per beam continues with great performance from the machines and stochastic cooling. The present plan is to end this part of the RHIC run on Monday morning, 16 June and begin setup for a 3 week helium 3 on gold run at 200 GeV/n. This will be the first time we have collided helium 3 with anything in RHIC. The PHENIX experiment, as of 16 June last week, already exceeded its goal by more than 40% and by the end of the gold run should have exceeded their goals by about 75%. As of last week the STAR experiment was within about 5% of achieving their “luminosity hungry” goal for the MTD program, a goal that should be exceeded by the end of the run. However, the STAR experiment has another goal that is “running time hungry” that involves the new Heavy Flavor Tracker (HFT) and this goal (1.3 billion triggers!) may not be reached by 16 June. The STAR experiment further optimized their running conditions to better address their “running time hungry” event collection efficiency by changing the store length from 10 to 11 hours and changing the forced luminosity reduction to start 2.5 rather than 3 hours after the start of the store. The reduced luminosity impacts the “luminosity hungry” trigger collection but is necessary in order to turn on the HFT triggers as the HFT is rate limited at about a 50 kHz ZDC rate. Berndt Mueller has reserved the right to delay the switchover to helium 3 gold should the HFT based STAR goal need more running time. Berndt has asked the Nuclear and Particle Physics Program Committee (the committee meets this week) for advise on this issue. A decision is expected by mid-week.

Another good month for BLIP and the MIRP production team with enough Sr-82 production in BLIP together with irradiated RbCl material from Arronax in France to meet the orders recieved from the US medical community. R&D experiments aimed at the eventual use of accelerator produced Ac-225 for medical use continued this month with a short irradiation of a thorium foil on 5 May. The irradiated foil was shipped to ORNL for processing. A long eight day irradiation of three foils is planned to begin on 20 June and again shipped to ORNL for processing and limited distribution for clinical trials. A 66 MeV irradiation of a SrCl<sub>2</sub> target was conducted today (9 June) to empirically determine the optimum beam energy. SrCl<sub>2</sub> targets are used to produce the Y-86 medical isotope. BLIP will remain operational through July but target processing will continue through mid-August.

NSRL continues its run for radiobiology experiments. NSRL Run 14 A ended on 16 May with NSRL 14B starting on 27 May. Beams planned for Run 14B include protons, carbon, helium, oxygen, silicon and titanium. Beams for the last week will come from the Tandem accelerators since this will be the start-up week for the helium-3 gold run. NSRL 14 B is scheduled to end on 20 June.

## NOTE FROM ACCELERATOR R&D DIVISION: Ilan Ben-Zvi



### **eRHIC:**

The cost estimate work for the FFAG eRHIC has been started. It would lead us to much better understanding, supported by actual numbers, on how sizable are the cost savings due to the use of FFAG technology in the eRHIC design. It is planned that the cost estimate process will take 4 months and will provide us with the machine cost right in time of beginning of DOE Long Range Plan activities, which start in the fall.

### **Polarized electron gun:**

This past month the Gatling gun project accomplished many important milestones. Most notably, the gun was moved from the vacuum vessel manufacturer Transfer Engineering in Fremont California to Stangenes Industries in Palo Alto California where high voltage testing will be performed (see photo). For the first time outside of BNL the cathode preparation system was successfully tested producing gun cathodes with acceptable quantum efficiency. The Gatling gun vacuum system that includes the gun system, the cathode preparation system and transfer line was fully assembled in its final location in preparation for high voltage gun testing. After only a modest bake out, the gun system achieved an excellent vacuum level in the mid  $10^{-11}$  Torr range.

### **The LHC Accelerator R&D Program Group:**

The Double Quarter Wave Crab Cavity (DQWCC) work was very well appreciated in the external review in early May. A strong team of six reviewers from various laboratories over the world were invited by CERN to review the progress of all three crab cavity candidates. The BNL design was remarked as the simplest and most advanced design by the review committee, and was recommended to give the highest priority for proceeding towards SPS beam experiment. The Lancaster University crab cavity group from UK requested to support the DQWCC development, and put their cavity program on hold. The cavity engineering drawing will be released to the manufacturer, Niowave Inc., in late June.

### **The Coherent electron Cooling experiment:**

We have continued our work on the installation of the CeC PoP equipment. Cables were pulled, cryogenic pipes welded, fundamental power coupler installed, the cathode launcher mechanism was aligned to be centered with the 112 MHz gun. Critical design review was held on May 21-22. The AES manufactured cavity will be installed into the cryostat.

### **The Accelerator Test Facility:**

During May 2014 two experiments were successfully performed at the ATF: 1) Studies of current density modulation of an electron beam propagated through a plasma in the quasi-nonlinear regime (QNR), by users from UCLA, and 2) characterization of transient noise induced in a Mercury Cadmium Telluride (MCT) detector array by 70 MeV electrons, by users from the NASA Jet Propulsion Lab.

For the UCLA experiment, the ATF achieved a beam size of  $6\mu\text{m}$  at the entrance to the plasma capillary. Plasma focusing effects allowed the beam to be kept at a small size for the entire 25mm length of the tube. During the experiment the density of the plasma, through which the electron beam travels, was varied and at specific densities the beam was seen (via OTR) to experience transverse modulations about the beam axis.

The JPL experiment group came to the ATF to test shielding intended to protect equipment that will be sent on a future mission to Jupiter's satellite, Europa. During that mission, the spacecraft will be aggressively bombarded by high-energy particles and the ATF was used to simulate this. The shielded MCT camera was exposed to a 70 MeV electron beam and data were recorded at varying bunch charges. This data will be compared to Monte-Carlo simulation and used to develop improved shielding.

We gave a brief tour on Monday to an SPIE chapter of about 16 students and professors from the City College of New York. Being interested in optics, they were very excited to see our CO2 laser, experimental hall, and Ion generation experiment.

### **Energy Recovery Linac:**

Since May 28, ERL testing has been conducted under the low power limit operation. Thanks are due to all groups who helped to make this happen. We conducted the first beam test. Details of the first run: [http://www.cadops.bnl.gov/cgi-bin/elog/view.pl?elog=ERL\\_stay&shiftlog=Wed May 28 2014 9%3A14%3A14 AM](http://www.cadops.bnl.gov/cgi-bin/elog/view.pl?elog=ERL_stay&shiftlog=Wed_May_28_2014_9%3A14%3A14_AM).

At 1.2 MV voltage on the SRF gun, dark current on the order of a few micro Amps has been observed and measured. Dark current image at YaG screen can be seen at [http://www.cadops.bnl.gov/elog/graphics/rhic-au\\_2014/Fri Jun 6 2014 152148 5964.gif](http://www.cadops.bnl.gov/elog/graphics/rhic-au_2014/Fri_Jun_6_2014_152148_5964.gif)

The cathode imaging system is now available, and we were able to control laser spot directly on the cathode.

[http://www.cadops.bnl.gov/elog/graphics/rhic-au\\_2014/Fri Jun 6 2014 134042 26522.gif](http://www.cadops.bnl.gov/elog/graphics/rhic-au_2014/Fri_Jun_6_2014_134042_26522.gif)

With the cathode stalk inserted, the SRF gun has been running for the first time continuously at 1.2MV. Conditioning of the gun is underway. We will be back to the beam test in the second half of June.

HTS solenoid was tested up to 35A for 5 sec every 5 minutes. We will run solenoid focusing during next beam test.

Preparation for high power commissioning of the gun is under way. The extraction line magnets, parts of vacuum system, beam dump are installed ready to be installed as soon as first beam test run. The Accelerator Readiness Review (ARR) has been scheduled for July 29-31.

### **Superconducting RF:**

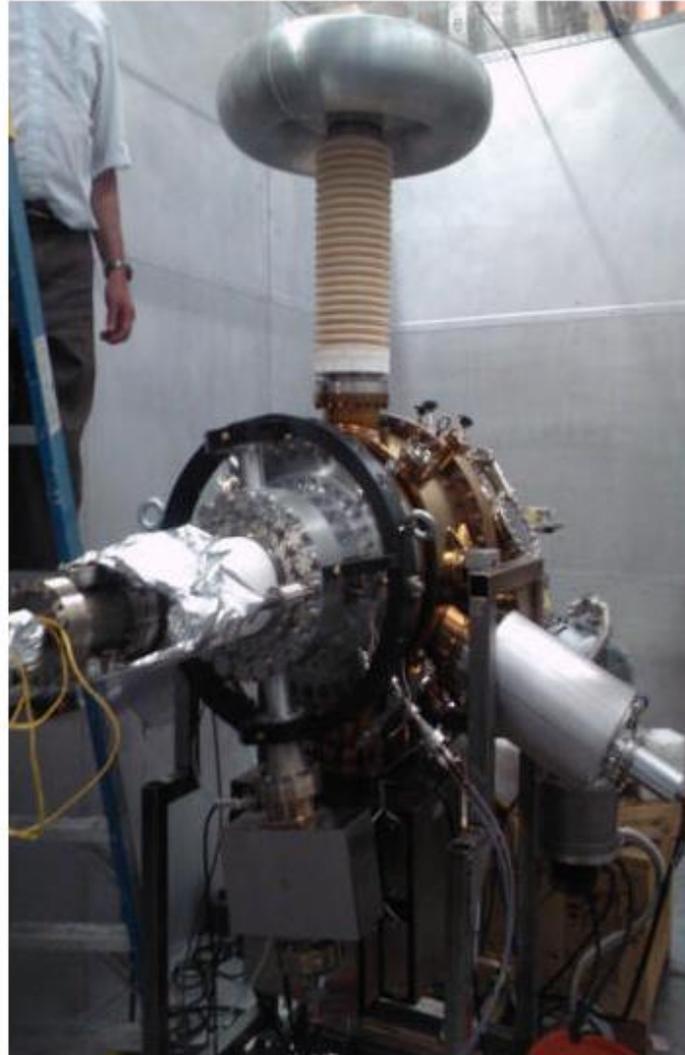
56 MHz SRF cavity for RHIC: The cavity is under active commissioning, slowly inching toward operations. The cavity is limited to about 350 kV by an HOM coupler quench. The cause of this quench is under investigation. With the fundamental damper inserted, the cavity does not disturb normal RHIC operation. During MD the cavity was operated with up to 56x56 bunches so far. The goal is to establish all procedures and sequences necessary to transfer the cavity from commissioning to operations before the end of Run14.

SRF for CeC PoP: There was a successful Conceptual Design Review of the BNL3 cavity cryomodule at Niowave. There are still several action items to close, but Niowave received a go-ahead to proceed with ordering a pressure vessel code compliant cryostat. The expected delivery time is November of 2014.

SRF VTF: The second BNL3 cavity (fabricated by Niowave) was tested at LVTF. Unfortunately, the cavity has reached only ~5 MV/m, limited by heavy field emission. It will be inspected, re-processed and re-tested with the goal to demonstrate at least 20 MV/m. In the mean time, the first cavity, BNL3-1 (fabricated by AES), was shipped to Niowave for integration into the CeC PoP cryomodule.

### **Muon Accelerator Group:**

The HEPAP Particle Physics Project Prioritization Panel (P5) sub-panel issued its draft report this past month. Its recommendations will impact the Muon Acceleration Group's future activities. The Muon Acceleration Program (MAP) which has funded the group till now will be phased out and the group's activities will be shifted to the General Accelerator R&D (GARD) program. The detailed plans of the Office of High Energy Physics in accelerator science and technology will be now the subject of another HEPAP subcommittee, the Accelerator R&D subcommittee.



## NOTE FROM OPERATIONS: Paul Sampson



The FY14 High energy Au-Au Physics run is scheduled to end on June 16<sup>th</sup>. At that time, the changeover to He3-Au will begin with Physics scheduled for the end of the month. The CAD accelerators continue to run reliably, with improvement in peak and integrated luminosity overall uptime. With routine good quality beam from the injectors and reliable Stochastic Cooling and other systems, the stores length is presently 11 hours. PP and He3 commissioning continue behind stores.

Installation and commissioning of major new systems in RHIC also continues on Maintenance Days. Commissioning of the 56MHz SRF with and without beam will be ongoing throughout the month during dedicated Machine Development periods.

Polarized proton setup will wrap up to allow for He3 running in min June. Milestones for the PP setup include the installation of both horizontal and vertical e-IPMs in the AGS, commissioning of which was completed and reliable data seen this month. Setup of He3 in the AGS, which will be utilized for the upcoming He3-Au run, was also completed last month.

The LINAC continues to run well, with continued high current and integrated proton beam delivered to the BLIP targets. Maintenance for BLIP and LINAC continues to run independently from the rest of CAD, synchronized to scheduled target changes and/or failure. LINAC is also delivering Polarized Protons for setup and NSRL running in the Booster and AGS when necessary.

Improvements in performance at EBIS and the laser ion source continue. The EBIS will deliver both He3 and Au for the upcoming run. NSRL Run 14B has begun and is presently running well.

The CAD CATV system display includes daily updates including Testing, power disruptions and outages as well as important dates. This information can also be seen on the web at [RHIC Broadcast](#).

To view a list of the approved work for shutdown or maintenance, 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](#).

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## ARRIVALS: Welcome!

Christina Blas-Cruz ~ Currently transitioning into C-AD Library Assistant

Ammar Morgan ~ (GEM Fellow) ~ Joined the Mechanical Systems Group June 2, 2014

## DEPARTURES: Farewell, you will surely be missed..

Stacey Kuczewski- (Librarian) - Started transitioning to Research Library May 12, 2014

## Guest Notices:

Brian Oerter (V6274), Guest Scientist expiration date July 27, 2014.

Edward Stephenson, (S8320), Admin. Other, expiration date July 9, 2014.

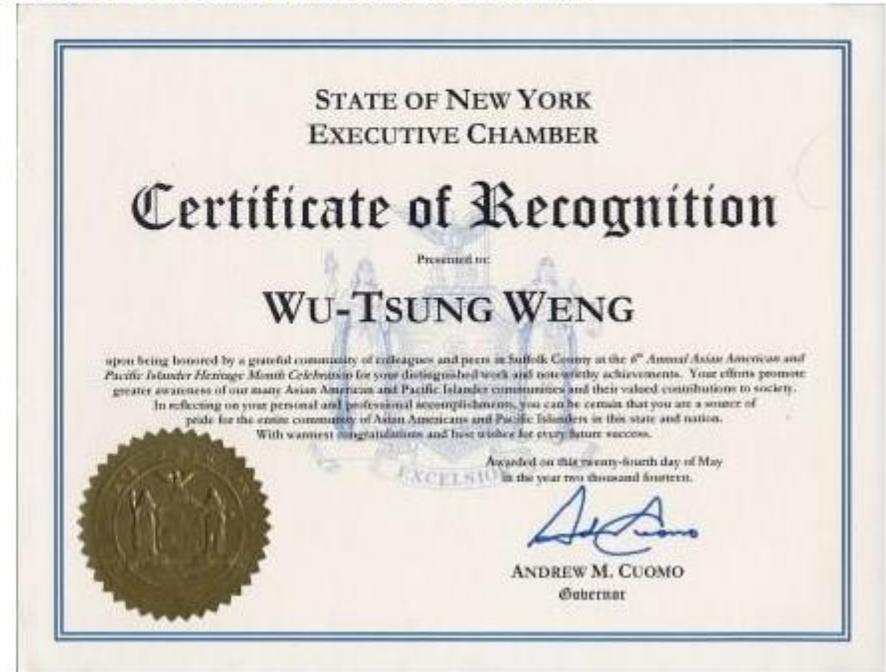
## CONGRATULATIONS: **Wu-Tsung (Bill) Weng**

Our very own C-AD employee Bill Weng was honored as an Asian American professional at a ceremony on May 24, 2014 at the Sixth Annual Asian Pacific American Heritage Month Celebration at Vajiradhammapadip Buddhist Temple and Thai Cultural Center in Centereach. Weng accepted the proclamation from Suffolk County Executive Steve Bellone at the ceremony. To read more about Bill and the award please visit the [BNL Press release page](#).

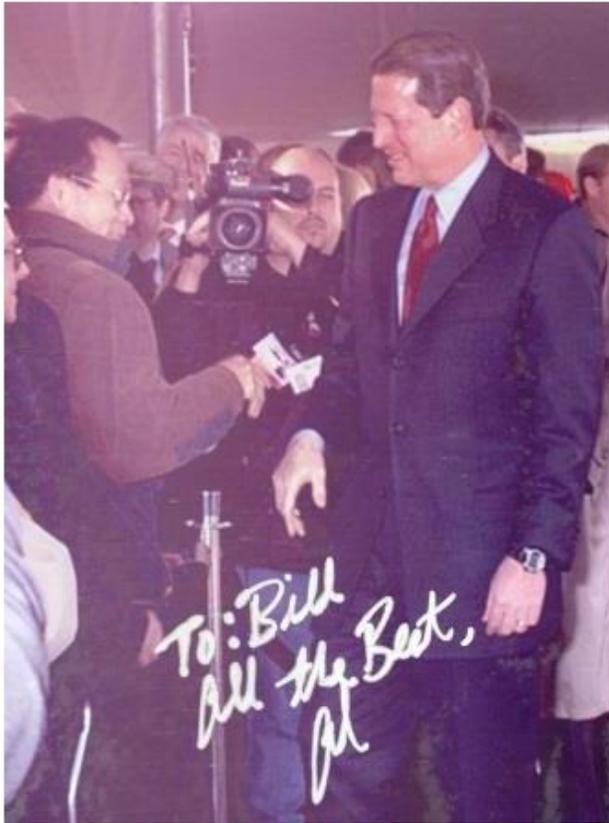
### Highlights of the Award Ceremony on May 24<sup>th</sup> for Bill's "Distinguished Asian American Professional" Award:



Receiving Proclamation from Suffolk County Executive Mr. Steven Bellone



Certificate of Recognition by NY State Governor Mr. Andrew M. Cuomo



At the Ground Breaking of SNS in ORNL in 1999 with Mr. Al Gore



BNL Table at the Dinner after Award Ceremony

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## PHOTOS BY: STEVE BELLA VIA

Steve took advantage of the incredible weather (and no moon) Saturday night / Sunday morning (6/1):

The globular cluster, M13, in Hercules - about a half a million stars in a ball or "globe" (for globular), with a diameter of 145 light years and 25,000 light years from earth.

And the remnant of a star that died, forming the "dumbbell nebula", M27 in Cygnus, about 1.5 light years in diameter and 850 light years from earth



Across the parking lot, on the West side of Bldg. 510 a baby was born about 2 hours prior to the photos



