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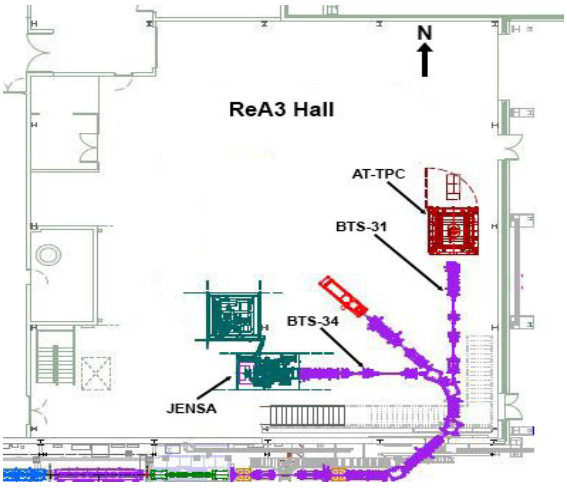
L-LINE EXTENSION PROJECT UPDATE

Contributed by F. Montes and D. Wahlquist

The L-Line Extension beam-line leading to the Active Target Time Projection Chamber (AT-TPC) inside the ReA3 hall has been successfully completed and commissioned. Ion-optical elements in the beamline include six magnetic quadrupoles and two pairs of steering magnets. There are two diagnostic stations, which are currently equipped with insertable beam apertures, a Faraday cup and a beam viewer. Additional diagnostic devices can be added in the future.

The commissioning of the beamline was performed using a molecular hydrogen beam produced by the off-line ion source on the ReA3 platform, and accelerated to an energy of approximately 2.7 MeV/u before being transported to the last diagnostic box. Beam line settings used in the successful transport of the beam were also found to be in good agreement with the expected settings in a detailed optics file prepared in advance.

Work is progressing on the third and final BTS-34 L-Line Extension beamline leading to Jet Experiments in Nuclear Structure and Astrophysics (JENSA). The six quadrupole magnets, two corrector magnets and two diagnostics boxes have been installed and aligned. Beamline vacuum is expected to be established later in January in preparation for the beamline commissioning in mid-February. The figure below shows the floor plan of the L-Line Extension additions.



Floor plan of ReA3 hall showing L-Line extension additions.

TOWARDS CONSTRAINING THE NUCLEAR SYMMETRY ENERGY

Contributed by Bill Lynch

The development of powerful rare isotope facilities such as the Coupled Cyclotron Facility and FRIB provides scientists with the opportunity to create and study the properties of neutron rich nuclear matter in the laboratory. By doing so, scientists can test theories in the laboratory that are being used to describe neutron rich objects like neutron stars.

One important outcome of this research will be an improved understanding of the symmetry energy, which describes how the nuclear part of the total energy of pure neutron matter differs from that of matter composed of equal numbers of neutrons and protons. Scientists would like to know how the symmetry energy changes as matter is compressed because that would allow us to calculate the pressure provided by the symmetry energy to support a neutron star against gravitational collapse into a black hole.

Over the last few years, Zbigniew Chajecki, Daniel Coupland and Michael Youngs and their collaborators have been comparing the energies of neutrons, protons and other light particles expelled from compressed neutron rich nuclear systems. The symmetry energy pushes neutrons out while pulling protons into such systems. By comparing neutron and proton energies, they have been able to gain insight into how the symmetry energy depends on how much system is compressed and how fast these neutrons and protons are moving.

An unexpected by-product of the studies is the realization that equivalent information, at the percent level, can be obtained by precision measurements of the hydrogen and helium isotopes. It comes from the observation of scaling laws that relate the energy distributions of light particles to each other. This opens the possibility of new measurements of the symmetry energy and a better understanding of how these data can be compared to theoretical calculations.

WRAPPING UP GRETINA

Contributed by Alexandra Gade and Dirk Weisshaar

The First Stage of Gamma-Ray Energy Tracking Array (GRETINA) completed its very successful first science campaign at NSCL in June of 2013. Twenty four experiments were run with GRETINA and the S800 spectrograph operating in tandem. The first result from NSCL are already published in *Physical Review C* as a rapid communication

that was selected as Editor's Suggestion. You can read it here: http://prc.aps.org/abstract/PRC/v88/i4/e041302.

After its yearlong stint at NSCL, GRETINA was moved to Argonne National Laboratory (ANL) where it will be used for gamma-ray spectroscopy experiments with stable and radioactive beams at Argonne's facilities. Currently, 5 of the 7 GRETINA detector modules are running at ANL, while the 6th module was sent for development purposes to Lawrence Berkeley National Laboratory (LBNL). The 7th module is still at NSCL, awaiting shipment back to the manufacturer in Europe for repair and upgrade.

The upcoming campaign at ANL will nevertheless run with the full complement of 7 GRETINA modules, totaling 28 crystals, as the 8th GRETINA module - the first step towards the full GRETA array - has arrived at LBNL in early December. After completion of its acceptance tests and characterization, it is expected to go into operation for GRETINA's experiments at ANL together with the 6th module which is currently prepared for shipment from LBNL to ANL. A 9th GRETINA detector module is currently being built by the manufacturer CANBERRA and delivery is expected later in 2014.

In 2015, GRETINA will return to NSCL's S800 for a second science campaign with fast rare-isotope beams, likely with more than seven detector modules, exceeding the detection efficiency achieved in the previous campaign.

REGISTRATION NOW OPEN FOR TWO SPRING EVENTS AT NSCL

Registration is now open for the 12th International Symposium on Electron-Beam Ion Sources and Traps (EBIST'14) and a two-day satellite workshop on Applications of Highly Charged Ions (HCI-App). Both events will be held on May 18-23 (2014) at NSCL.

The purpose of the EBIST'14 symposium is to discuss progress and exchange ideas in the design, development, applications of electron-beam ion sources and traps, and the physics of highly charged ions studied with such devices. Subjects such as charge breeding, ion-surface interaction, x-ray atomic spectroscopy, and laser spectroscopy will be covered. More information can be found here: http://meetings.nscl.msu.edu/EBIST14/

NSCL's research capabilities with rare-isotope beams have recently been expanded with the addition of the ReA post-accelerator that employs an Electron Bean Ion Trap (EBIT) as a charge breeder. In addition to providing highly charged ions for reacceleration it will be possible to utilize this EBIT for applied science with stable as well as radioactive highly charged ions. The purpose of the HCI-App workshop is to discuss and evaluate such applied science opportunities at NSCL and other highly charged ion facilities. Workshop topics include next-generation charge breeders, material/surface science, biophysics, and nuclear isomer research with highly charged ions. Learn more about the workshop here: http://meetings.nscl.msu.edu/EBIST14/HCIApp_home.html

COPIER SAFETY

While they may look innocuous, photocopiers do pose a few potential hazards. Clearing paper jams in printers and copiers will expose users to hot or moving parts, sharp edges, pinch points, or exposed electrical parts. Modern machines should have such risks designed out and should turn off automatically upon opening of the machine. Caution should be used to prevent being burned by some of the internal parts as they do not cool off instantly.

SEMINARS

- TUESDAY, JANUARY 7, AT 11:00 AM
  NSCL Seminar Room
  Nobuo Hinohara, University of North Carolina at Chapel Hill
  Microscopic Description of Large-Amplitude Collective Dynamics in Nuclei
- WEDNESDAY, JANUARY 8 AT 12:00 PM
  Staff Info Talk in the Lecture Hall
  Michael Goodrich, MSU FRIB
  Why is Quality Important? Your Responsibility in Meeting Customer Requirements
- WEDNESDAY, JANUARY 8 AT 4:10 PM
  NSCL Lecture Hall
  Boris Kayser, Fermi National Accelerator Laboratory
  Neutrinos and the Matter-Antimatter Asymmetry of the Universe

PEOPLE AT THE LAB

Sergio Rodriguez began working at lab on December 23. He is a Mechanical Engineer who will be working in the Accelerator Systems with Matt Johnson.

Kandy Slack was recently hired as an Information Technology Professional in the NSCL Computer Department.

Masanori Ikegami also started at the lab this week as the ASD Installation Manager, his line manager is Jie Wei.

Stanley Paulauskas started as a Researach Associate this week, and he will be working with Oscar Naviliat-Cuncic.

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