

Experiment of the Week

Experiment 11037 is an investigation of collective and single-particle structure in neutron-rich calcium isotopes beyond the $N=28$ shell closure. The Ursinus College Liquid Hydrogen Target coupled with GRETINA enables high-quality inelastic proton scattering measurements of beams with intensities on the order of 10 pps. The kinematics of the collisions of fast beams with protons make it possible to simultaneously study both collective and single-particle structure *via* the inelastic scattering and knockout reactions. The primary goals of the experiment are to extend the understanding of relative proton and neutron contributions to collective excitations in the calcium isotopes to $N=32$ and to better constrain shell-model effective charges in the region. The experiment involves participants from NSCL, Florida State University, and Ursinus College, including five Ursinus undergraduates.

Coupled Cyclotron Facility (CCF)

The cyclotrons are continuing their long run of ^{76}Ge . Until late last Friday, the beam was used by a GRETINA experiment in the S3 Vault. When that experiment ended, the operators took the beam for development and tried out a different cyclotron tune in the K500. On Sunday, the beam physicists developed a new secondary beam and sent it to another S800/GRETINA experiment. The germanium in the ARTEMIS ion source began to show signs of running out the next day. This had been anticipated, and the SuSI ion source was substituted in the early morning hours on Tuesday.

SAMURAI TPC News

A new milestone was reached in the SAMURAI-TPC project this week. This time-projection chamber (TPC) will initially be used for symmetry-energy studies at the RI Beam Factory at RIKEN, Japan. Installed in the dipole magnet of the SAMURAI spectrometer, the TPC will provide momentum determination and particle identification for fragments produced in heavy-ion collisions. By measuring the relative yields of charged pions (and other particles), constraints may be placed on the density dependence of the symmetry energy at around twice saturation density.

The electric-field-defining cage, constructed from large circuit boards with copper strips, was mounted last week onto the top plate over the anode



The detector portion of the SAMURAI TPC is being lowered into a large aluminum enclosure, which provides protection and insulation. The TPC is now ready for testing and debugging, which will begin next week.

and ground wire planes, creating a sealed detector volume for fragment tracking. This assembly was then lowered into a large aluminum enclosure box, which protects the fragile detector and provides an insulation volume. The TPC is now ready for testing and debugging, ahead of the schedule set during the DOE technical review in January. Many thanks to everyone in the lab who has helped, especially John Yurkon and the fabrication department.

NSCL/FRIB hosts “MatX” Workshop

A two-day expert workshop on “Materials in Extreme Environments - MatX” took place at NSCL/FRIB on Monday and Tuesday this week. The MatX workshop brought together about forty scientists from the United States, France, Germany, and the United Kingdom to discuss new opportunities, synergies, and challenges in material science with respect to material in extreme environments. The main topics were Swift Heavy Ion (SHI) induced radiation damage processes and their mitigation, high-cycle thermo-mechanical stresses and material fatigue, the theory of and experiments on ultrafast timescale damage processes with short-pulsed lasers and swift heavy ions, as well as related topics of materials under extreme conditions. The workshop focused on graphite, diamond, and titanium alloys, materials that are critical for FRIB for the production target, the beam dump, and detectors, but that also play an important role in a wide range of applications that demand high performance under extreme conditions.



A prototype Halo Scraper Ring (HSR) is installed in the coupling line between the K500 and K1200 cyclotrons. It is being tested for its ability to detect beam loss and shut the beam off to prevent damage to components.

MaTX Workshop (cont.)

The meeting was concluded with the consensus that MatX was a very useful and stimulating workshop and worth repeating – the next MatX workshop will be organized by GSI Darmstadt in 2014. This 1st MatX workshop was organized by the MSU Strategic Partnership between FRIB, NSCL, and MSU's departments of Physics & Astronomy (P&A), Chemical Engineering & Material Science (CHEMS), and Electrical and Computer Engineering (ECE).

Electrical Engineering Update

The surface of superconducting cavities is extremely sensitive to any damage and should thus be protected from beam loss. For this purpose, the Halo Scraper Ring (HSR) is needed to detect beam loss arising from the failure of any accelerator component. The beam loss, once detected, will activate the Machine Protection System (MPS) in order to turn off the beam in 35 μ s. Also, the system should detect a very low, but long-term beam loss for cavity protection. A prototype of the HSR was installed in the NSCL coupling line between the K500 and K1200 cyclotrons. Preliminary tests successfully validated the HSR signal for slow beam losses down to 1nA. Optimization of front end electronics is ongoing and will be tested with beam at NSCL.

Lightning Safety

Over the last 30 years, lightning has killed an average of 62 people per year. Follow these tips to reduce likelihood of lightning injuries.

1. During a thunderstorm, stay or go indoors. If you hear thunder, don't go outside unless absolutely necessary. Count the seconds between the flash and the thunder and divide by 5 to estimate the strike distance (in miles).

2. Stay away from anything that could conduct electricity, like metal pipes, sinks, and phones.
3. Don't use any plug-in electrical appliances like computers, printers or power tools. They could conduct the charge if lightning strikes nearby.
4. Stay in your automobile if you are traveling. Automobiles offer excellent lightning protection.
5. Don't use metal objects outside, like fishing rods and golf clubs. Golfers wearing metal cleats are really good lightning rods.
6. Get out of the water and away from water sources.
7. If you're outdoors, seek shelter in a building. Avoid tall trees, as they attract lightning.
8. If you can't find shelter, avoid the tallest object in the area. If only isolated trees are nearby, crouch in the open, keeping twice as far away from isolated trees as the trees are high.
9. If your hair stands on end or your skin tingles, lightning may be about to strike you. Drop to the ground immediately!

Seminar

- **Thursday, May 23, at 3 PM**

Thesis Defense in the Lecture Hall

Michael Youngs (NSCL/MSU): "Using Emitted Light Clusters as a Probe of the Symmetry Energy"

New Video: "Research Drives America"

You are invited to [watch this new video](#) articulating the importance of funding fundamental research. A link to it can also be found on the NSCL homepage under "Latest News."

People at NSCL

Bob Charity (Washington University, St. Louis), Alan Wuosmaa and Shadi Bedoor (Western Michigan University) will arrive next week to assist with Lee Sobotka's experiment (11011).

Paul Hawks (Central Michigan University) comes to NSCL on Monday to join Ryan Ringle's experiment 13501B.

New graduate assistants are joining the lab in the following research groups: Walter Buhro with Remco Zegers, Adam Jones with Alex Brown, Fei Yuan with Morten Hjorth-Jensen, Xueying Huyan with Oscar Naviliat-Cuncic, Maxime Jajko and Guillaume Astier with Wolfgang Mittag.

Congratulations to Georg Bollen who has been awarded the title of University Distinguished Professor.

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