NSCL

THE GREENSHEET

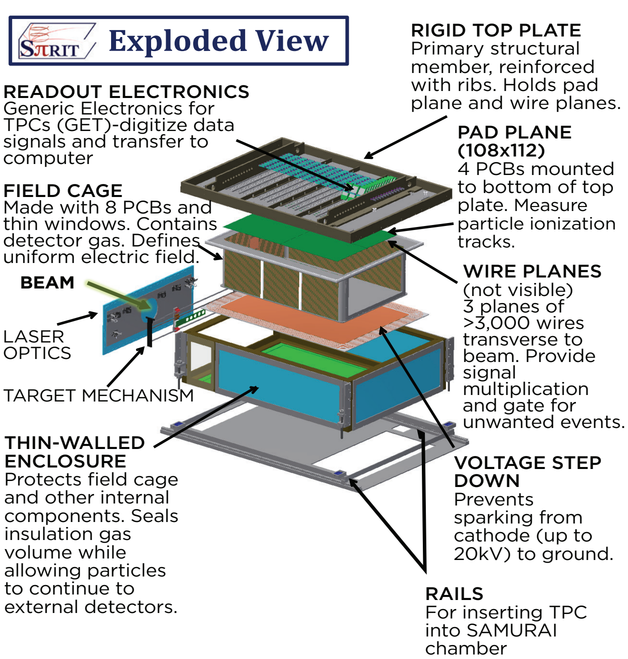
June 13, 2014 | VOLUME 33 NUMBER 23

THE SYMMETRY ENERGY PROJECT

Contributed by Betty Tsang

In order to study the properties of nuclear matter over a range of nuclear matter densities, an international collaboration called the Symmetry Energy Project, has been formed. It will co-ordinate experiments to be performed at different facilities in the world, including NSCL/FRIB, RIKEN, GSI/FAIR, Lanzhou CSR and RAON. Determination of the density dependence of the symmetry energy is important to understand properties of neutron stars and rare isotopes.

At NSCL/FRIB, detectors such as the AT-TPC, LANA, MONA-LISA and HiRA allow investigations of the symmetry energy at the lower energies and densities. During the past three years, the HiRA group and its international collaborators have built a DOE-funded time projection chamber (TPC), christened the SAMURAI Pion-Reconstruction and Ion-Tracker Time-Projection Chamber (SπRIT-TPC). It will be used in conjunction with the SAMURAI magnetic spectrometer RIKEN, to explore the symmetry energy at twice the core density of a ^{208}Pb nucleus. A TPC allows 3-dimensional track reconstruction of emitted particles, including pions. The SπRIT-TPC will investigate the symmetry energy via measurements of the spectra and flows of pions and other light charged particles at higher energy and higher density collisions at the RIBF facility at RIKEN.



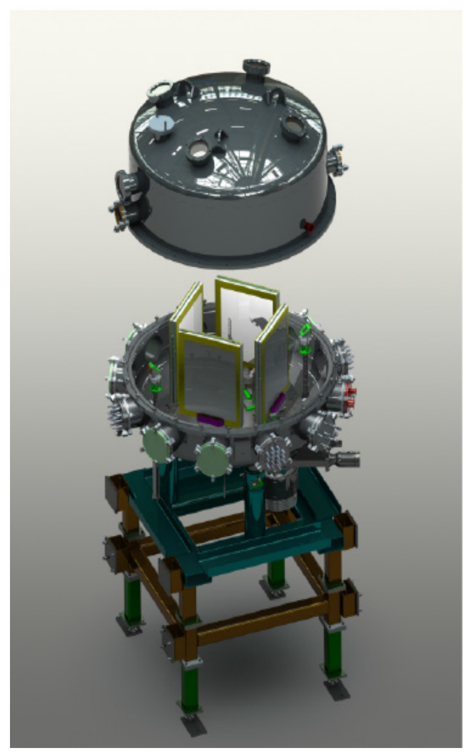
The picture shows a schematic drawing of SπRIT. One can explore various parts of the TPC interactively on the website .

The SπRIT was shipped to RIKEN in February. Rebecca Shane, together with Jon Barney, Justin Estee, Bill Lynch and the Texas A&M collaborators will be traveling to RIKEN to work on the installation of the SπRIT into the SAMURAI dipole this summer.

COINCIDENT FISSION FRAGMENT DETECTOR

Contributed by Zach Kohley

The production and study of superheavy elements (SHEs) is of significant importance to the nuclear science community, as it seeks to address questions about the limits of the chart of the nuclides, the evolution of shell structure in the heaviest nuclei, and the location of the predicted island of stability. The use of stable beams with stable/actinide targets in heavy-ion fusion reactions places a constraint on which superheavy elements can be produced and, in particular, will not provide a mechanism to reach the proposed island of stability. The use of neutron-rich radioactive ion beams would remove those constraints and provide an opportunity to produce more neutron-rich SHEs. Very few experimental measurements have been completed using radioactive ion beams (RIBs) in fusion reactions focused on SHE production.



Mechanical design rendering of the CFFD. The 4 PPACs are shown (yellow frames) surrounding the target in the center of the chamber. The beam will enter from the left and pass through the position sensitive MCP before impinging on the target.

The ReA3 facility will provide a unique opportunity to study the SHE production mechanism with neutron- and proton-rich RIBs.

The Coincident Fission Fragment Detector (CFFD) is a new device that is currently being constructed at the NSCL for measurements of fusion-fission and quasifission reactions at the ReA3 facility. The CFFD will consist of 4 large area (30 cm x 40 cm) parallel plate avalanche counters (PPACs), 2 position sensitive timing micro-channel plate detectors (MCPs), and 2 silicon monitor detectors. From the time-of-flight and position measurements of the PPACs, the velocity of the binary fission-like fragments can be reconstructed and the mass ratio of the fragments can be calculated. Measurements of the angular and mass distributions of the fission-like fragments will allow for detailed analysis of the RIB induced fusion reactions. The results from these measurements will guide the future experiments at FRIB aimed at the production of new neutron-rich isotopes of SHEs. The fabrication of the chamber and detector components of the CFFD, is on-going with a completion date scheduled for mid-July.

HEAT EXHAUSTION AND HEATSTROKE

Heat-related illnesses occur when a person's body can't keep cool. As the air temperature rises, the body stays cool when sweat evaporates. On hot, humid days, the evaporation of sweat is slowed by the increased moisture in the air. When sweating isn't enough to cool the body, the body temperature rises. Causes of heat illness include exposure to high temperatures in combination with high humidity, and strenuous physical activity. Children, elderly, and obese people have a higher risk of developing heat illness. People taking certain medications or drinking alcohol also have a higher risk. However, even a top athlete in superb condition can succumb to heat illness if he or she ignores the warning signs.

Heat exhaustion is a result of the body overheating. Symptoms include heavy sweating and a rapid pulse. Warning signs of heat exhaustion include:

- Headaches, dizziness, light-headedness or fainting.
- Weakness and moist skin.
- Mood changes such as irritability or confusion.
- Upset stomach or vomiting.
- Heavy sweating.

Without prompt treatment, heat exhaustion can progress to heatstroke, a life-threatening condition. Fortunately, heat exhaustion is reversible. In most cases, heat exhaustion can be treated by doing the following:

- Rest in a cool place. Keep legs elevated higher than the heart. Drink cool fluids. Stick to water or sports drinks and avoid alcohol or caffeinated drinks. Apply cool water to the skin.
- Loosen clothing and remove any unnecessary clothing.

Heatstroke is a life-threatening condition that occurs when the internal body temperature exceeds 104 F. The onset of heatstroke requires immediate medical attention to prevent brain damage and organ failure. Often, one of the first signs that body temperature is too high is the cessation of sweating, skin will be hot and dry to the touch. If you suspect that someone has heatstroke, you should call 911 immediately and render first aid until paramedics arrive.

SEMINAR

- WEDNESDAY, JUNE 18 AT 4:00 PM
  NSCL Lecture Hall
  Magne Guttormsen, University of Oslo, Norway
  "Exploring the Nuclear Quasi-Continuum with the Oslo Method"
- THURSDAY, JUNE 19 AT 11:00 AM
  NSCL Lecture Hall
  Judi Brown Clarke, MSU
  "Diversity: An Inclusive Culture is an Incubator for Creativity and Innovation"

BBQ LUNCH

Next Wednesday, June 18th, the lab will host a BBQ. The cost is $4 per person and will be held in the Atrium at noon. Lunch will include brats with all the fixin's, coleslaw, potato salad, veggies, beans, dessert, water and pop.

PEOPLE AT THE LAB

Alicia Palmisano and Brandon Elman are both Graduate students who started at the lab this week. They will both be working in Experimental Research.

Many outside users will be arriving at the lab next week.

For experiment 11006 Pfutzner:

Robert Grzywacz, University of Tennessee Knoxville
Karolina Kolos, University of Tennessee Knoxville
Marek Pfutzner, University of Warsaw
Marcin Pomorski, University of Warsaw
Wojciech Dominik, University of Warsaw
Zenon Janas, University of Warsaw
Chiara Mazzocchi, University of Warsaw
Magdalena Kuich, University of Warsaw
Aleksandra Lis, University of Warsaw
Grzegorz Kaminski, University of Warsaw

For experiment e10003 Sasano:

Masaki Sasano, RIBF, RIKEN

Working with MoNA group:

Warren Rogers, Westmont College
Sierra Garrett, Westmont College
Rachel Parkhurst, Westmont College
Joe Finck, Central Michigan University
Elizabeth Havens, Central Michigan University
Lauren Heilborn, Texas A&M University

EDITOR: ERIN O'DONNELL | 517-908-7198 | ODONNELL@NSCL.MSU.EDU

Operation of NSCL as a national user facility is supported by the Experimental Nuclear Physics Program of the U.S. National Science Foundation