NSCL

THE GREENSHEET

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REA BEAM MONITOR

Contributor: Tom Ginter

In early September the company Integrated Sensors, LLC, in collaboration with the Levin group at the University of Michigan, completed a highly successful beam test at ReA as part of its DOE SBIR Phase II project "High Performance Scintillator and Beam Monitoring System". Small Business Innovation Research (SBIR) is a federal initiative to promote entrepreneurial innovation in support of national needs.

In this case, the goal is to develop a versatile and easy-to-implement system capable of providing beam diagnostics across a wide dynamic range of beam isotopes, energies, and intensities. Applications foreseen at FRIB include beam imaging and intensity measurement at the driver linac, in the fast beam environment, and for reaccelerated (ReA) beams.

The system consists of a machine vision camera pointing at a ladder of thin novel scintillator materials intercepting the beam. The following ReA diagnostic systems were used as a reference during the beam test: a Faraday cup for measuring beam intensities above 25,000 particles/s (pps); a silicon detector for counting beam rates below 100 pps; and a conventional camera/viewer setup for imaging the beam above ~10,000 pps. The goal of the test was to demonstrate that the new system could replace the imaging and counting functionalities of all three with enhanced performance.

Results:

- The new system was able to accurately measure beam shape and position, with updates once per second, from 500,000 pps down to a few pps with a spatial resolution of less than 10 µm. The system has the capability to function with much more intense beams, but this was not the focus of the test.
- The system demonstrated its ability to measure beam current accurately over five orders of magnitude down to single particles. In the absence of backgrounds (e.g., stray light in the beam pipe), the beam current uncertainty was ≤5%.
- Unlike existing diagnostics, the ultrathin (6 µm) scintillator allowed the krypton-86 beam at 2.75 MeV/nucleon to continue down the beamline.
- The first figure shows the position of individual beam particles in a one-second interval when the beam intensity was less than 10 pps – the height of the peaks is proportional to the light output of each beam particle. The test showed that such an image is achievable as an on-line diagnostic.
- The second figure shows an image of the beam at an intensity of 50,000 pps, illustrating the improvement in the output available with more beam.

All testing objectives were met within the very short beam time allocated. The next stage of the project is to bring the research and development achievements of Phase II to a commercial prototype designed for real customers. The beam monitor's success at ReA3 has already generated significant interest at other laboratories including ANL-ATLAS and BNL-NSRL.

The SBIR team was impressed with the high level of support and professionalism the lab provided – including User Services, Business Support, the operators, and in particular the ReA team.

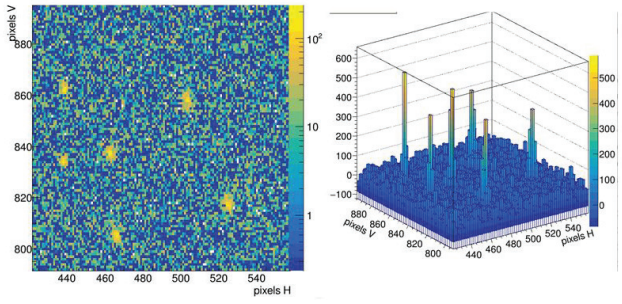

Figure caption: 2D and 3D representations of a 2.75 MeV/u Kr-86 beam at an intensity of <10 pps showing the position of individual beam particles in a 1-second exposure.

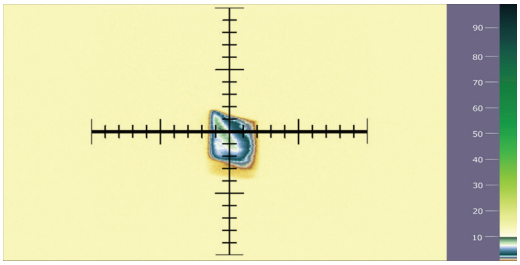

Figure caption: An image of the same beam at an intensity of 50,000 pps. The crosshair locates the center of the beam pipe and covers a 20 mm x 20 mm cross section of the beam path.

EMERGENCY TRAINING RECAP

Contributor: Melissa Congleton

The FRIB Laboratory had a secure-in-place drill on October 26. This drill was part of the laboratory emergency exercise plan, which includes drills for three main types of emergencies. These emergencies are categorized by those necessitating responses of evacuation, seeking shelter or, as in this drill, securing in place. The key is to know what type of emergency you are dealing with in order to respond appropriately.

- Evacuation emergencies are those that require laboratory evacuation (such as fire, some chemical spills, or bomb threats).
- Seek-shelter emergencies are those that require you to seek shelter (often triggered by tornado warnings). Many shelter locations are highlighted in yellow on the emergency maps located throughout the laboratory.
- Secure-in-place emergencies are those that require you to find a way to get out of sight. This type is one way to respond to a person actively committing violence. Securing in place should not be confused with seeking shelter.

For the recent drill, it was requested people secure in place due to the scenario of violence. Many successfully turned off their office lights, closed and locked doors, became quiet, silenced cell phones, and found ways to get out of sight. Many found where they wanted to secure in place was either not secure or taken by another person, so they located an alternate secure location. The importance of these drills cannot be understated. When emergencies occur, the more we have mentally and physically practiced our responses, the better prepared we will be. And with a lot of changes at FRIB, such as office moves and construction projects, the need continues to think of alternate ways we may need to respond in an emergency.

VIRTUAL CONFERENCE REQUESTS NOW IN INTRA ENTERPRISE

Going forward, if you would like to attend a virtual only conference, attend a hybrid conference virtually, or attend an in-person conference on MSU's East Lansing campus, you are able to submit a request in Intra Enterprise.

It is similar to submitting a Request for Travel Authorization, but bypasses impertinent information we would normally ask for when there is actual travel involved. Please follow these steps:

- Log into Intra Enterprise with your FRIB credentials
- Click 'Time and Attendance' on the left sidebar
- Under the Travel heading, click Request for Travel Authorization
- Click Submit a New Travel Request
- Be sure to mark YES for "Is this request for a virtual conference…"
- Complete required fields as you normally would

Please note, if travel is required to attend the conference, submit a regular Request for Travel Authorization.

REA UPDATE

This week, ReA is delivering silicon-32 rare isotopic beam to an experiment at SOLARIS with the Helios-type silicon array. The beam is being provided by BMIS, which is working stably since the beginning of the run. The beam intensity delivered presently is in excess of one million particles per second, which is compatible with the user requirements. In order to clean-up the silicon-32 from a sulfur-32 (stable) contamination, a stripper foil is being used in the ReA6 beam line. As the charge state 14+ (fully stripped for silicon) is selected, the sulfur contamination is suppressed by a factor 10. The beam provided to the experiment has a purity of the order of 90%. This experiment will continue up to Friday 11:00PM and will restart next Monday.

SEMINARS

- TUESDAY, NOV 23 AT 11:00 AM
  Online via Zoom, Passcode: 48824
  Sophia Han, UC, Berkeley
  'Probing Exotic Matter in Neutron Star Cores with G-mode Oscillations'

The Greensheet archive is available here