NSCL

THE GREENSHEET

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STABLE HV SYSTEM FOR LASER SPECTROSCOPY MEASUREMENTS

Contributed by Adam Dockery, Tanaka Chonyera, Kristian König, Kei Minamisono

At the BECOLA facility, laser resonant fluorescence spectra are measured to study the size and shape of rare isotopes. The nuclear size effect, however, is very small and all experimental parameters need to be known very precisely. One of such parameters is the beam energy of rare isotopes, which is given by a high voltage power supply and is typically 30,000 V at BECOLA. To be sensitive to the size effect of a nucleus, the voltage needs to be know to much better than 1 V and very stable (~30 parts per million).

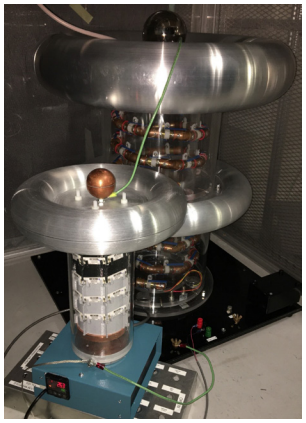


Figure 1: New (front) & old (back) voltage dividers.

The high voltage is usually measured by a long resistor chain that divides the large voltage into small voltages of typically 10 V that can be precisely measured using a commercial voltmeter. With help from PTB, the German metrology institute that is world-leading in high-voltage measurements, a new high voltage divider was constructed at BECOLA. It uses precision resistors that were individually characterized and grouped in order to compensate each other's temperature-based variation of resistance to achieve highest stability. Figure 1 shows the newly constructed voltage divider (front) together with the old divider (back).

Series of measurements were performed to characterize the performance of the new divider. The dotted lines in figure 2 show typical voltage measurements as a function of time. The new voltage divider (dotted blue) shows significant improvement over the old divider (dotted red), which shows much larger fluctuation. Note that there is still slow drift of measured voltage by the new divider, which is mostly caused by the temperature variation of the high voltage power supply itself.

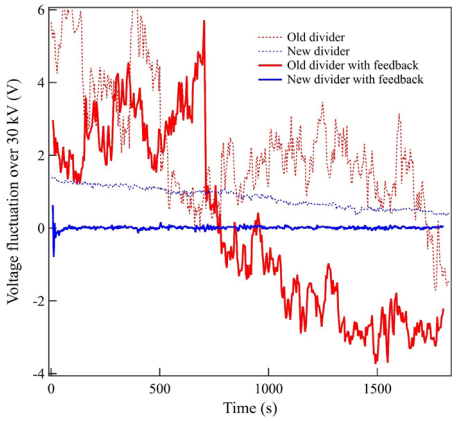


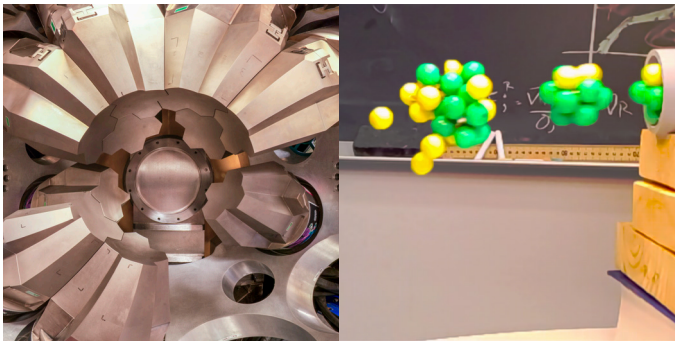
Figure 2: Voltage fluctuations of the old and new voltage dividers relative to 30 kV. The solid and dotted lines are voltages measured with and without the voltage feedback system turned on.

In order to make the high voltage system more stable, a feedback system was developed. The voltage, which was precisely measured by the new divider, was compared with a pre-set voltage value, and the difference was fed back to the high voltage power supply. The resulting measurements are shown in figure 2 as solid lines. The slow drift of the power supply and also small local variations are mostly removed (solid blue), and much more stable high voltage has been achieved. Here the voltage is stable within 0.05 V relative to 30,000 V (2 ppm). On the contrary the feedback system did not perform well enough for the old divider (solid red), due to the large fluctuation of the old divider reading itself. The new high voltage divider and feedback system significantly improve on the performance of the old system and greatly aid laser spectroscopy measurements for nuclear structure studies at BECOLA at FRIB.

FRIB COUNTDOWN PUBLIC EVENT

On **Saturday, April 23 from 11am-5pm,** our laboratory will host the "FRIB Countdown" event, welcoming the public to explore rare isotope research. We need your help to make this event happen! Make a difference for our community and also get free food and an event t-shirt. You can volunteer by completing this form by Friday, March 25, and encourage your friends and colleagues to sign up with you. Email Outreach Coordinator Zach Constan (constan@frib.msu.edu) with any questions!

FRIB Photo Contest 1st place: Phil Morrison, "RFQ Power Coupler Port"



FRIB Photo Contest 2nd place (tie): Shumpei Noji, "Ten GRETINA Quad Detector Modules at the S800 Entrance"; Kyle Godbey, "Collision"

PHOTO CONTEST WINNERS

Contributed by Zach Constan

The FRIB Outreach Committee is excited to announce the winners of the "What FRIB Means To Me" photo contest, as selected by your votes!

Congratulations to the winners, who will receive cash prizes and have their framed photos exhibited in the space outside of 1300 Auditorium. Many other excellent submissions have been selected as honorable mentions and will also be part of the exhibit. Please help us celebrate the contest winners at an awards ceremony in the 1300 Auditorium at noon on Friday, April 1.

FLAMMABLE LIQUIDS

Contributed by Becky DeZess-Smith

Improper storage and handling of flammable chemicals, and failure to recognize and control ignition sources, have accounted for many industrial accidents involving flammable liquid use. Statistics indicate that more than 20% of industrial fires and 15% of office fires start with the ignition of a flammable or combustible liquid.

A combustible substance is one that catches fire and burns easily. A flammable substance is one that continues to burn even after the ignition source is removed. Flammable liquids burn with intensity. This accounts for the rapid heat buildup and how fast the fire spreads. It is important to realize that the liquid itself does not burn, but its vapors, which are invisible and generally heavier than air, burn. Always consult the safety data sheet (SDS) provided by the manufacturer to determine the flammability of a particular liquid.

When storing or working with flammable liquids, take precautions to eliminate ignition sources, including open flame, electrical switches, open motors, static electricity, friction and mechanical sparks, heat guns, cutting and welding and radiant heat. Consider: what flammable liquids are you using or storing? Are there any ignition sources around? Take a moment to inspect your work area and ensure all flammable liquids are properly labeled and stored. Any questions regarding the proper labeling or storage of flammable liquids should be directed to the Safety Office.

REA UPDATE

Contributed by Antonio Villari

This week, ReA3 is delivering silicon-32, silicon-28 and silicon-30 for an experiment on the general purpose beam line in ReA3. All beams are being produced by two batch mode ion sources (BMIS), one for silicon-32 and another for silicon-28 and 30. About five beam energies per isotope are being prepared and delivered to the experiment, which will run until Wednesday, 3/30.

SEMINARS

- FRIDAY, MAR 25, AT 5:00 PM
  Women Making Science Event
  Molecular Plant Sciences Rm 1200
  Dr. Gemma Reguera, MSU Microbiology
  Dr, Kaitlyn Cook, MSU Physics
  Dr. Emily Josephs, MSU Plant Biology
- WEDNESDAY, MAR 30 AT 4:10 PM
  Women and Minorities Lecture Series
  1300 Auditorium and Zoom
  Arlene Modeste Knowles, American Institute of Physics
  "The TEAM-UP Report and Supporting African American Physics & Astronomy Students"

The Greensheet archive is available here