Status of the NIMROD upgrade

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The upgrade to the 4pi detector NIMROD has made great progress since the last report [1]. The forward rings (~3 to 45 degrees) have been augmented with the appropriate Si detectors ranging in thicknesses between 150 and 500 microns. From 45 to 90 degrees CsI coverage is completed and some Si installed for energy calibration. Efforts have begun to estimate the cost of completing Si coverage in this angular region. The ISiS detector (~90-177 degrees) has been installed.

New fabrication methods are being investigated for construction of the ion chambers. The new construction procedures will provide better grounding for the windows thus yielding better shaping of the field within the chamber.

The installation of Indiana motherboards for the ISiS detectors has been modified to allow the neutron ball to be opened and closed without dismounting of the motherboards. In the new configuration Faraday cages are provided for the motherboards to minimize the baseline noise.

The Si bias power supply system for the ISiS detectors has been installed and is operational. The system allows control of the bias online and is able to read the leakage current of each detector. Adapting this system for use on the detectors in the forward rings failed due to the lack of flexibility in voltage polarity. In its place a system of passive distribution boxes has been incorporated.

Significant effort was put forth to bias the target ladder assembly to reduce electrons impinging on the Si detectors. At 10^-5 vacuum the HV assembly will hold approximately up to 30kV without significant sparking.

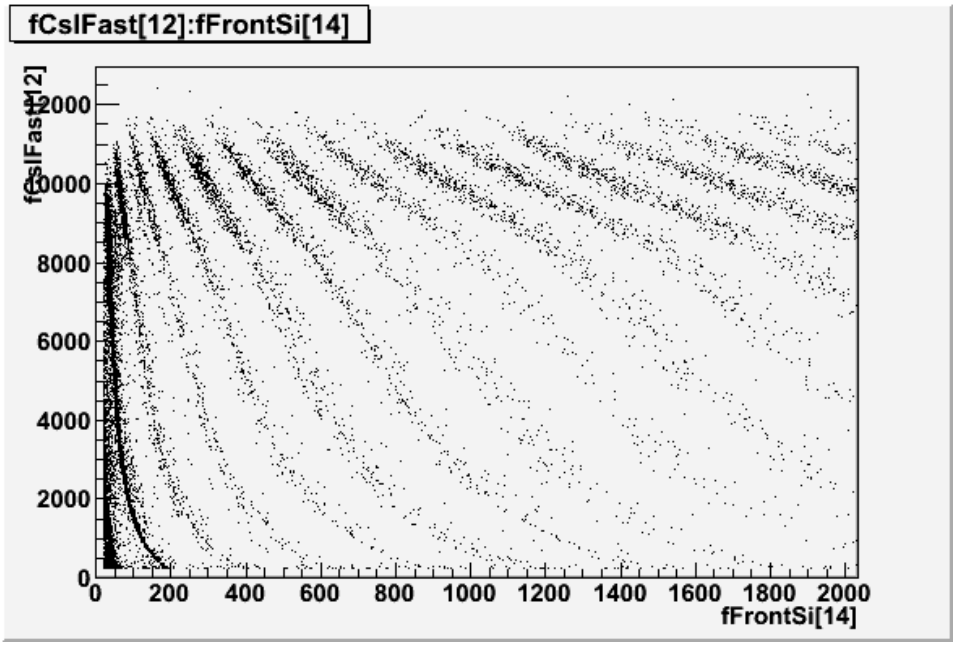

Figure 1. Si(x-axis) vs CsI (y-axis) showing isotopic resolution.

Experiments have been successfully conducted to rigorously test the apparatus. In the most forward ring (ring 2) silicon detectors yield excellent elemental resolution. However, they do not have isotopic resolution as they appear to have suffered some radiation damage. Isotopic resolution on Si-CsI telescopes can be easily seen for all of the other rings [Figure 1&2].

The neutron ball surrounding the vacuum chamber is operational. The efficiency in its new configuration has been calibrated with a ^{252}Cf source. The observed efficiency agrees with GEANT calculations which give the efficiency for low energy neutrons at approximately 70 percent.

The analysis tools based on the CERN ROOT software, including a software filter for the NIMROD, has been incorporated into the Cyclotron Application software tools, Cycapps. All software has begun to be updated for the new detector configuration. The software filter will allow simulation data to be compared with the experimental data directly. The NIMROD experimental campaign has started. Several systems of experiments have been proposed. The first data set will be taken in April with the others to follow starting during the summer.

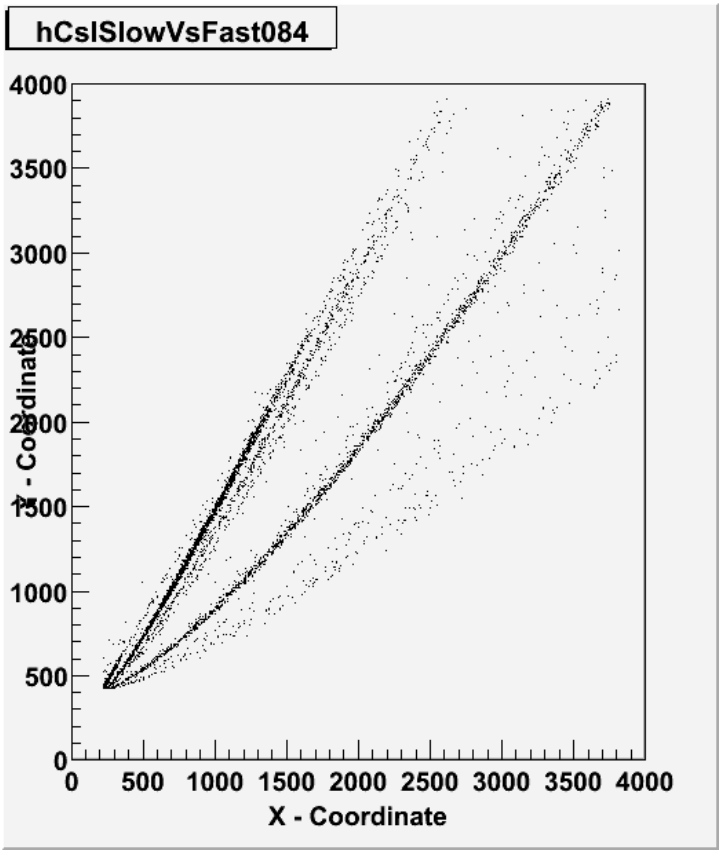

Figure 2. CsI fast vs slow.

[1] S. Wuenschel *et al.*, *Progress in Research*, Cyclotron Institute, Texas A&M University (2005-2006), p.II-17