

CAPTAIN Report – FY16 Q2

1. Neutron Run at LANSCE

The Mini-CAPTAIN detector operated at the WNR 15R beamline from February 23-28, 2016 triggering on neutrons from the LANSCE facility with energies up to 800 MeV. Figure 1 shows the detector in the beamline at WNR and the crew that operated the detector over the six days and providing continuous monitoring around the clock. The detector electronics performed remarkably well with noise levels much lower than required. A slight leak in the recirculation system limited the purity of the liquid argon but ionization in the time projection chamber were observed. The photon detection system also operated well and provided a trigger for the data acquisition system. The data taken during the run are currently under analysis by the collaboration. Figure 2 shows a sample event. Mini-CAPTAIN is the first liquid argon time projection chamber looking at a neutron beam sample.

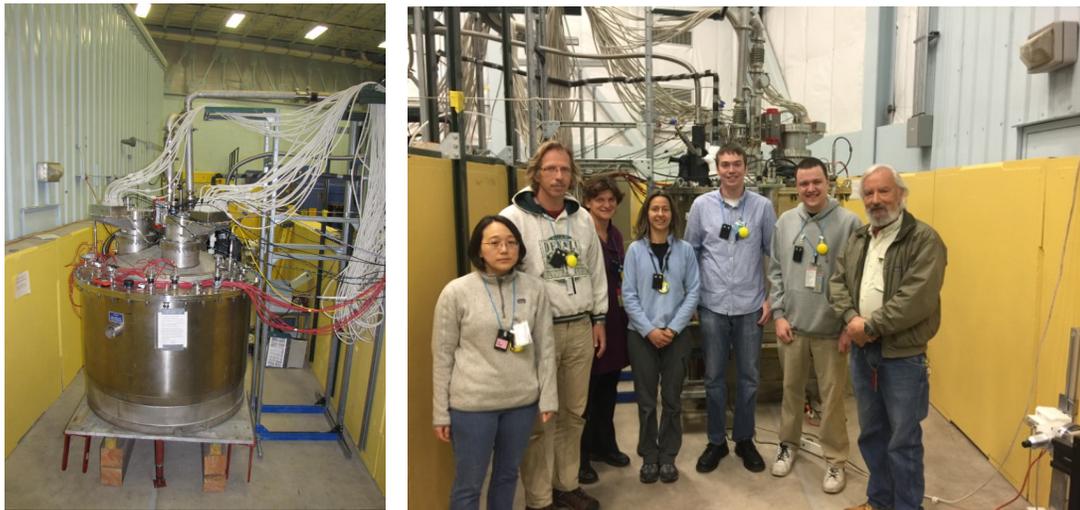


Figure 1: (Left) Mini-CAPTAIN detector inside the neutron beamline at the WNR facility at LANSCE in February 2016. (Right) Neutron running shift crew prior to run start.

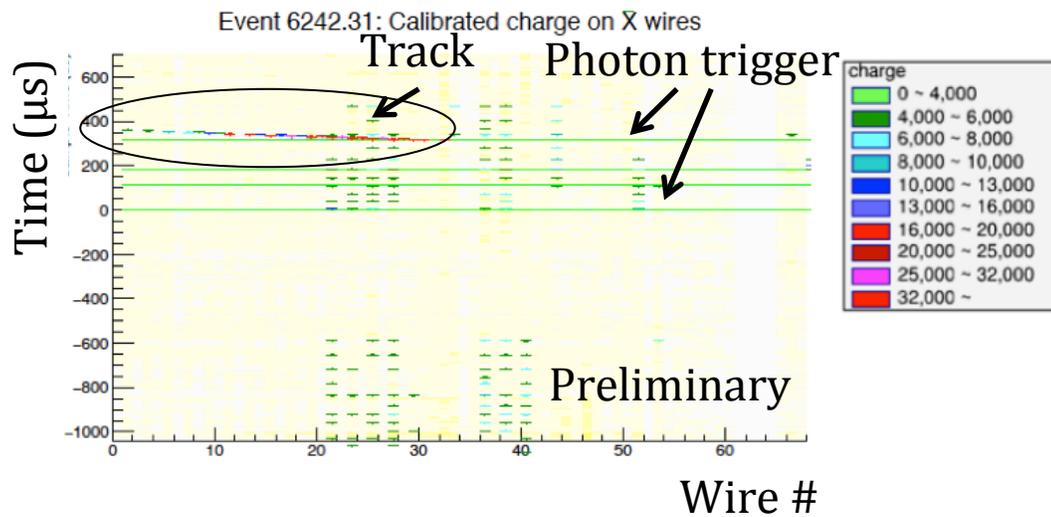


Figure 2: A sample event from Run 6242 during the neutron running of Mini-CAPTAIN. The green lines show when the photon detection system triggered and a track in the TCP is shown in the upper left of the plot. This is the ionization track detected on one (X) of three wire planes (X, U, V).

2. Preparation for Second Neutron Run

Upon completion of the first neutron run planning began for a second run in the neutron beam to gain more statistics to provide neutron cross-section measurements with further improved purity. A small leak was fixed in the recirculation system and a purity monitor with 10x the sensitivity to oxygen levels (200 ppt) has been purchased for use with institutional funds. The Mini-CAPTAIN detector will remain in the beamline (now that the beam cycle has ended) and will continue to be operated. A number of cosmic-ray runs have been taken and will continue to monitor the health of the detector. A proposal is being prepared for the neutron run time in the next beam cycle, which will start in September 2016.

3. CAPTAIN-MINERvA Preparations

Preparations continue for the CAPTAIN-MINERvA experiment. LANL provided technical details of the CAPTAIN cryostat construction and specifications for safety reviews at Fermilab. In addition, Fermilab has developed a ventilation plan that will keep the underground space for the experiment at the ODH-0 level. The two collaborations have planned a joint meeting in early April 2016 to continue discussions on the experiment and resolve governance issues for the joint collaboration. It is anticipated that Stage 2 approval will be sought at the summer meeting of the Fermilab PAC.