

# CAPTAIN Report – FY16 Q3

## 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. While the detector did not reach the ideal operating parameters for the run (purity levels were above specification due to a leak) useful data is being analyzed by the collaboration. Figure 1 shows the time of flight of the incident neutrons on Mini-CAPTAIN recorded by the photon detection system (PDS). One can see the gamma flash at the start of the spectrum at short times. Figure 2 shows a preliminary plot of the total charge in the detector (in scintillation light measured in photoelectrons) versus the incident neutron energy as measured by the time of flight. These data are the first to measure the linearity of the charge in liquid argon by neutrons at these energies. Mini-CAPTAIN is the first liquid argon time projection chamber looking at a neutron beam sample.

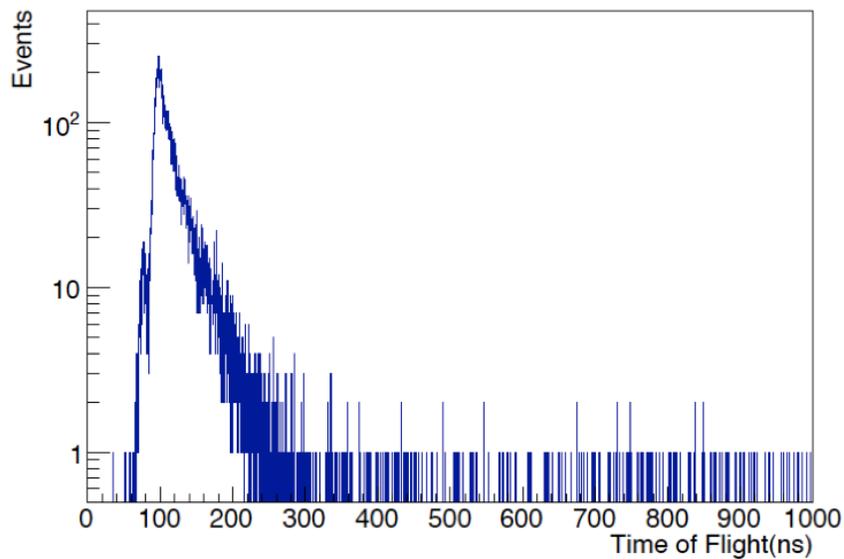


Figure 1: Preliminary – Time of flight of neutrons as measured using the Mini-CAPTAIN photon detection system.

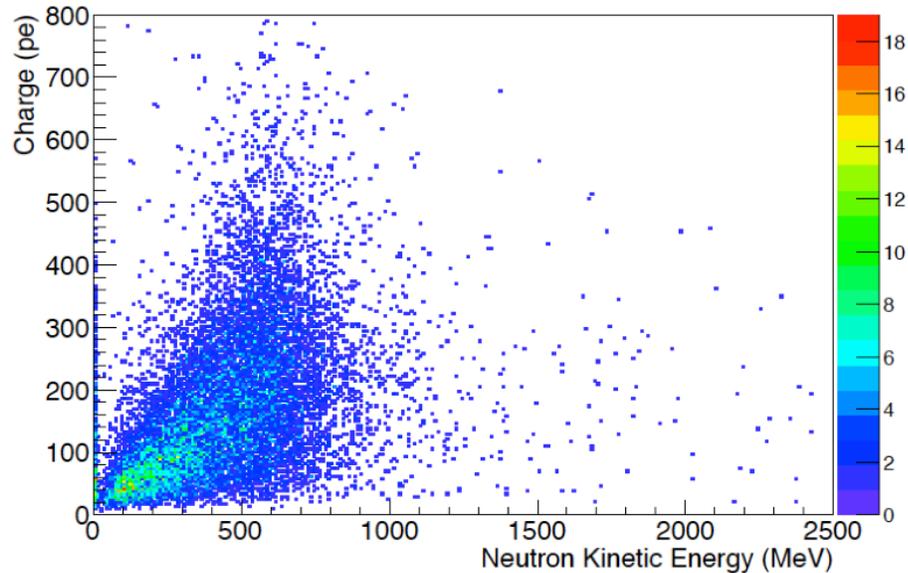


Figure 2: Preliminary – Total charge from scintillation light as measured by the Mini-CAPTAIN photon detection system versus the neutron energy from the time of flight.

## 2. Preparation for Second Neutron Run

Further evaluation of the Mini-CAPTAIN neutron run has led the collaboration to determine that an in-situ liquid purification system is necessary to reach and maintain the required liquid argon purity level. The collaboration has engaged an Italian vendor, Critec, to supply a liquid recirculation system that would operate in the space constraints within Mini-CAPTAIN. A purchase order is pending from Los Alamos. The system will arrive in Fall 2016 so the second neutron run will now take place at the start of the LANSCE 2017-18 run currently scheduled for July 2017. This will allow adequate time to install the new system and be ready for neutrons at the start of that run cycle.

## 3. CAPTAIN-MINERvA Project

In May, the CAPTAIN-MINERvA project was rejected by FNAL management prior to Stage 2 approval. Funding for the portion of the project that was aligned with Fermilab operations and support were not available. The collaboration is evaluating the options for other funding sources or to pursue a low-energy neutrino program as an alternative. A collaboration meeting has been scheduled for July 2016 to discuss this issue.