

The CAPTAIN Program

The Cryogenic Apparatus for Precision Tests of Argon Interactions with Neutrinos (CAPTAIN) program is designed to make scientific and technical measurements that support the development of the Long-Baseline Neutrino Experiment. Key physics measurements are neutron interactions with liquid argon, low-energy (10-50 MeV) neutrino measurements and medium-energy (500 MeV - 8 GeV) neutrino measurements. An important technical development is a laser calibration system for liquid argon time-projection chambers. The CAPTAIN detector is a liquid argon TPC with 5 instrumented tons of argon.

During the Second Quarter, the electronics for both CAPTAIN and its prototype, Mini-CAPTAIN, have been tested warm. The prototype TPC has been completed and mounted (See Figure 1). The prototype field cage was tested at high voltage in air. Development of the cryogenic system continued. The tent for the laser system was completed.



Figure 1: LANL postdoctoral scholar, Charles Taylor, assembles the CAPTAIN prototype detector.

The CAPTAIN collaboration formally approved its bylaws and elected a Christopher Mauger, spokesperson. Clark McGrew (Stony Brook) was appointed deputy spokesperson. The appointment was confirmed by collaboration vote.

The physics running plans for CAPTAIN continued to evolve. The plan is to begin with neutron running at the WNR facility at the Los Alamos Neutron Science Center, followed by low-energy neutrino running in an off-axis

position at the Booster Neutrino Beamline at Fermilab. Subsequently, CAPTAIN will be deployed in an on-axis position at NuMI at Fermilab. Discussions are underway with the Minerva collaboration to take advantage of scientific synergies.

While the delivery of the CAPTAIN cryostat has been subject to many delays, final work is now going on at the vendor. Figure 2 shows a recent photograph of the cryostat on the floor at the vendor. Delivery is anticipated in Quarter 3 of FY14.



Figure 2: Photo from March, 2014, of the CAPTAIN cryostat on the floor at the vendor. The inner vessel passed the pneumatic pressure test. Helium mass spectrometer leak tests are on-going.