

# CAPTAIN Report – FY15 Q1

## 1. Argon engineering run

On 30 September 2014, we filled the Mini-CAPTAIN detector with liquid argon for the first time. It took approximately 12 hours to cool and fill the detector with purified liquid argon. The detector is shown in Figure 1.

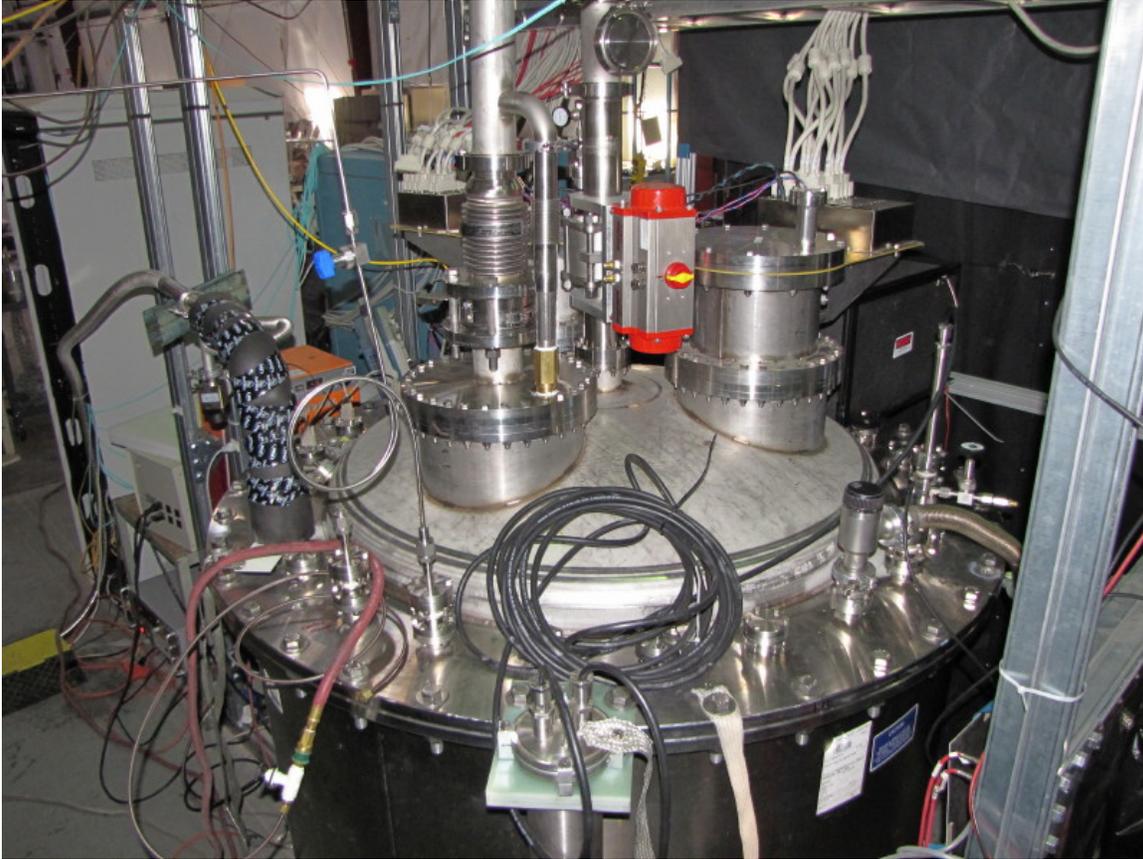


Figure 1: View of cryostat and cryostat penetrations.

The engineering run allowed us to test the filling procedures and was the first end-to-end test of the cryogenic system including the in-line filter. After filling, we carried out a series of data-taking runs with periodic triggering, cosmic-ray triggering and laser triggering. A significant analysis effort was inspired by the first collection of data with argon in the detector.

## 2. Post-run activities

After letting the argon boil-off, we carried out a variety of activities to improve the operational performance of the detector. We did several stand-alone tests of the in-line filter – especially of the filter regeneration procedure. We made several DAQ

improvements associated with the event-timing. We added a heater to allow for faster boil-off of the detector.

### **3. Recirculation and condensing purification system**

We began assembly of a purification system based on a SAES getter. Gas flows through the SAES system and is subsequently condensed with a liquid nitrogen-based argon condenser. The purified liquid then flows to the detector. Our goal is to deploy this system in the second argon fill.

### **4. Development of Letters of Intent**

The CAPTAIN collaboration produced two letters of intent to the Fermilab PAC for low-energy and medium-energy neutrino running. The low-energy running will be carried out at the Fermilab Booster Neutrino Beam facility. The CAPTAIN detector will be deployed in an off-axis position to be exposed to the flux of neutrinos from pions that stop in the collimator. The neutrino spectrum is well-constrained. The measurements will allow us to measure low-energy charged-current electron neutrino scattering for the first time in a liquid argon time-projection chamber. The medium-energy running will take place in the Neutrinos from the Main Injector (NuMI) beam-line together with the Minerva collaboration. We will make detailed measurements of neutrino-argon interactions in the GeV neutrino-energy regime. Both were submitted in December and defended at the January PAC meeting.