DUNE 35t Prototype

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All Experimenter Meeting
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The 35t Cryostat

- Prototype many of the design features of the DUNE far detector.

- Run 1 (Jan-Mar 2014) successfully achieved good LAr purity within the membrane cryostat.

- Run 2 (~now-April 2016?) includes small-scale detector (field cage, TPC, photon detectors, external counters).
Current Status

- Filled with liquid argon!

Sheffield Camera System
(movie taken by T. Alion)
Filling the Cryostat...

- Piston purge air in cryostat with gaseous argon using technique pioneered by LAPD:
  - December 28—29.

- Recirculate gas through the filtration system to remove impurities.
  - December 30 — January 8.

- Cool and down fill!
  - Cooling started January 26.

- Filled by February 2 (~2 weeks ago!).

Huge thanks to Russ, Alan and co. for working through the holidays!
Piston Purge & Gas Recirculation

Ignore O$_2$%, taken off-line

N$_2$ = 18 ppm
H$_2$O = 25 ppm
O$_2$ = 0.2 ppm

R Rucinski
• Spray LAr into the cryostat for ~couple of days to reduce the temperature in the cryostat.
Detector Status

• Cool down and filling has had no obvious impact on the detector components.

• No breaking in APA wires, field cage.

• Bias voltage on APA wires and low current in field cage were held constant and monitored during the period.

• The hardware components were all operated throughout the period, with many DAQ runs taken.
High Voltage

- Successfully turned up to 60kV (250V/cm) a few times.
- Plan to go to 120kV (500V/cm) for physics data taking.

A Hahn
LAr Purity

- Pumps turned on Thursday (11th Feb) afternoon.

Purity increasing

O2 gas analyser: ~500 ppt

Last night
DAQ and Electronics

- DAQ stable and in a working state; can take runs for up to an hour including all detector components and whilst writing data to disk.

- Coherent noise on the TPC readout is higher than anticipated (total noise ~4 times greater).
  - Working on this. Could be ‘lesson learnt’ from this prototype.

- Photon detectors look good:
  - Single SiPM measurement after cooldown.
  - Change is 1p.e.
Commissioning Ongoing...

- Next ~2-4 weeks.
  - Pumps turned on last Thursday (thanks to PPD mechanical engineering process controls group!);
  - HV turned on last Friday;
  - Work on noise as purity increases;
  - PD SiPM voltage scan to determine operating voltages (~last week);
  - PD detector monitoring of radiological backgrounds from start of recirculation;
  - Threshold for hit finding;
- Run for ~6-8 weeks.
  - Some time at 60kV, some at 120kV.
First Muon Track!

Collection

Induction

Induction

Waveform for single channel
Backups
35t Geometry

T Alion