Yale LArTPC Progress

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Latest News

LArTPC work at Yale is getting very close to a first attempt at seeing tracks!

The pieces needed to get there:

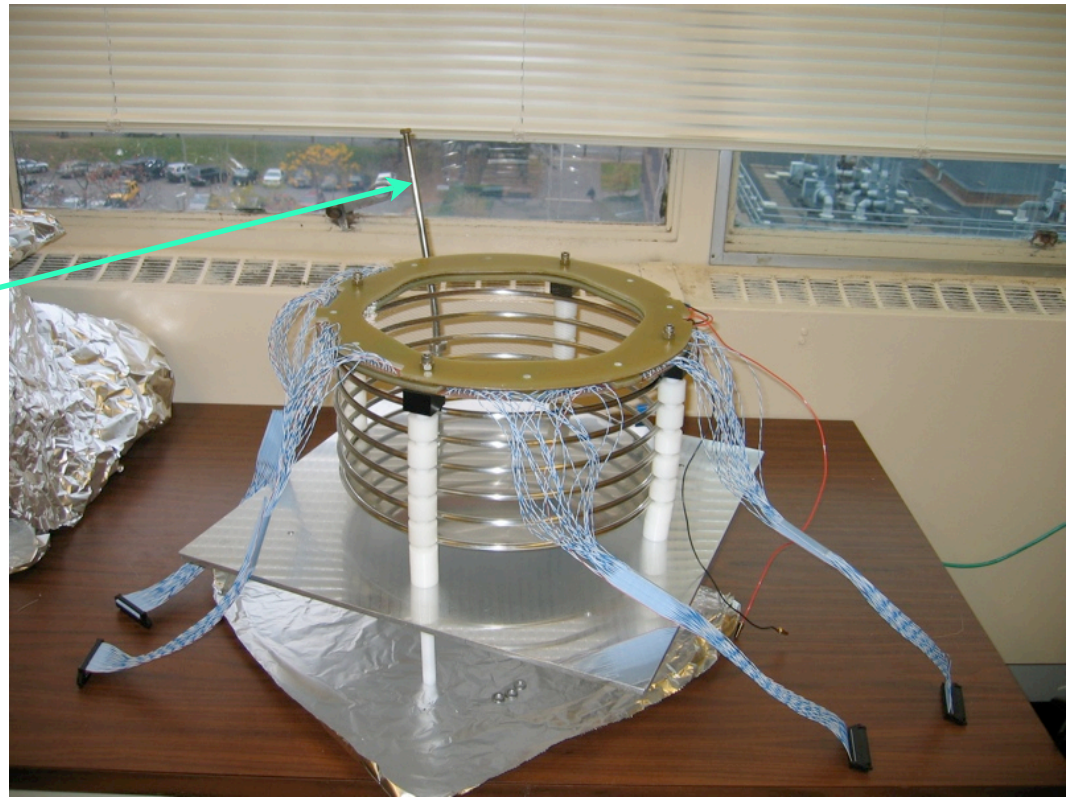
1. TPC Construction
2. Assembly
3. Electronics
4. Purity

TPC Construction

TPC has:

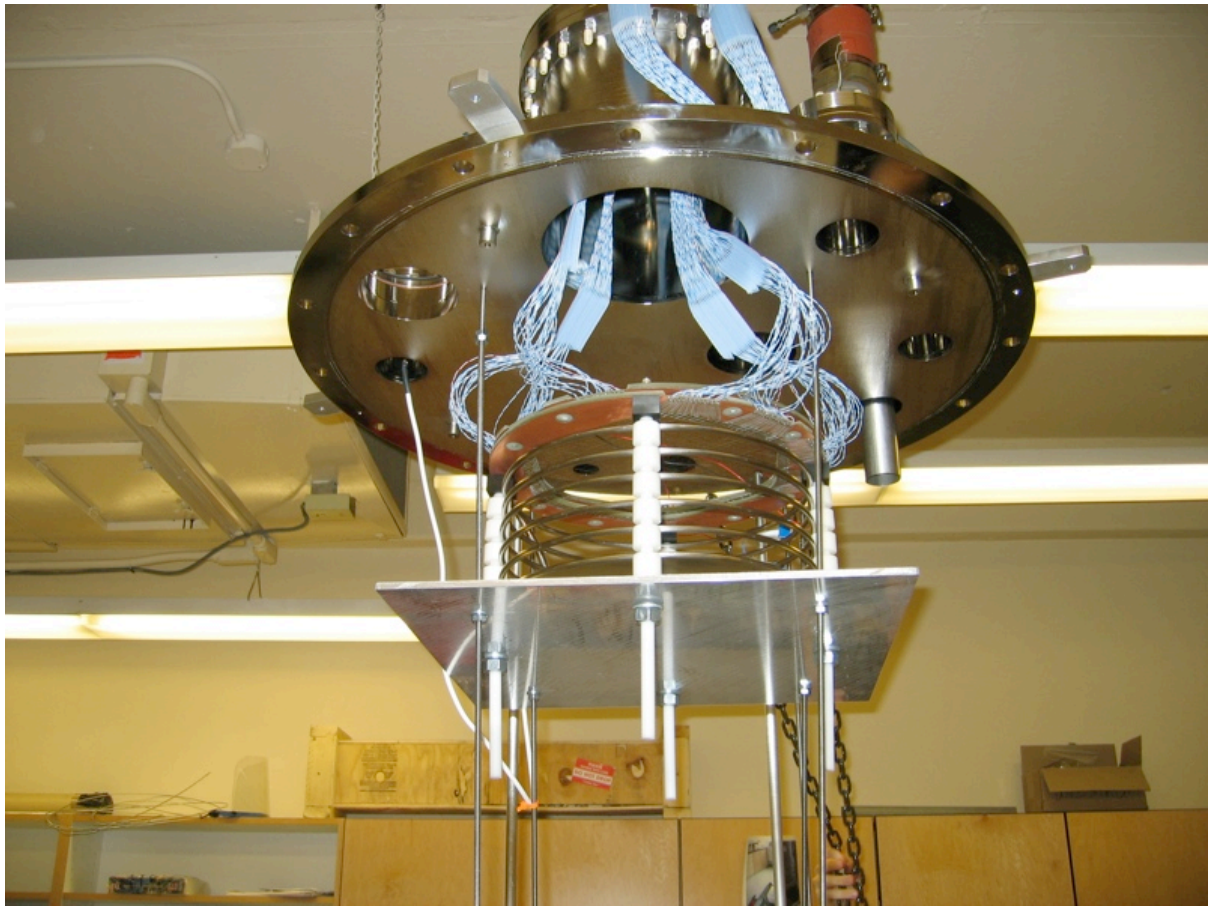
- 2 wire planes (50 wires/plane, 0.2 in. pitch)
- Field cage connected by 100MΩ resistors (<1% tolerance, cold tested)
- So far have successfully applied up to 20 kV with no problems.
- Drift region is currently 6 inches long.
- Top plane is wired for test pulse.

HV connection (since been made much shorter)

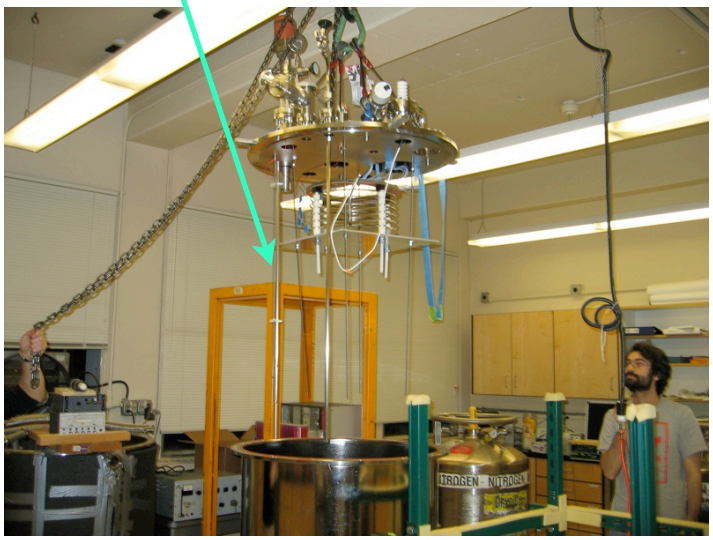


Hanging the TPC

- TPC hangs very close to top flange due to short cables....this will be fixed with longer cables this week.
- Longer cables will help us save time/argon when filling since TPC can sit near bottom of vessel.



Level-meter (good to a few inches accuracy in calibration tests)



Lowering top flange onto vessel

Final Assembly, Vacuum.

- Pumped down to 1.4×10^{-4} mbar when outer bath was full of argon.
- Hans' pressure-relief valve works perfectly! (opens at ~0.3 atm).
- HV was tested up to 20 kV with no problems.

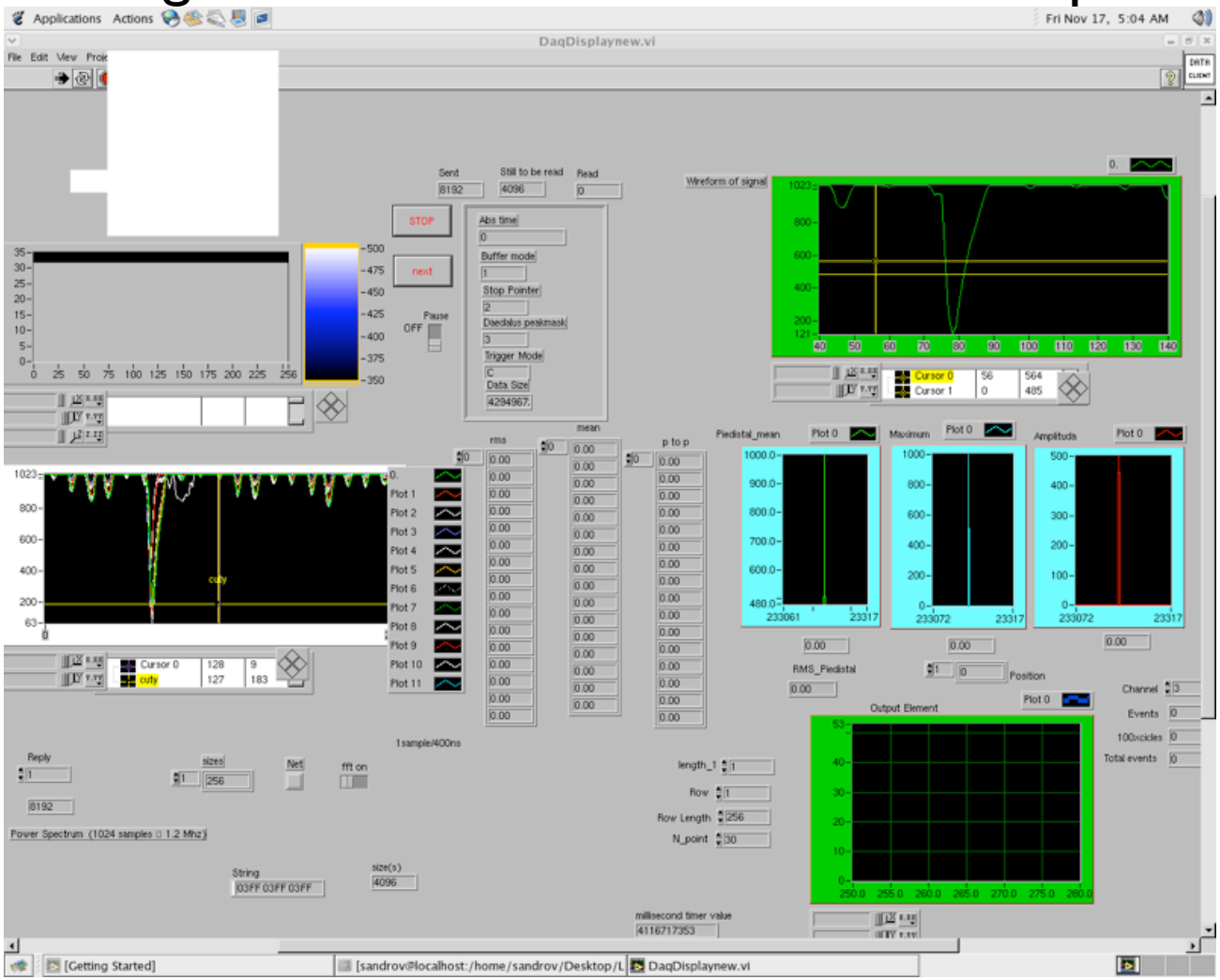
Lowering assembled vessel into outer bath

HV feedthrough (inside plastic container for safety)

Filling outer bath with argon

Electronics

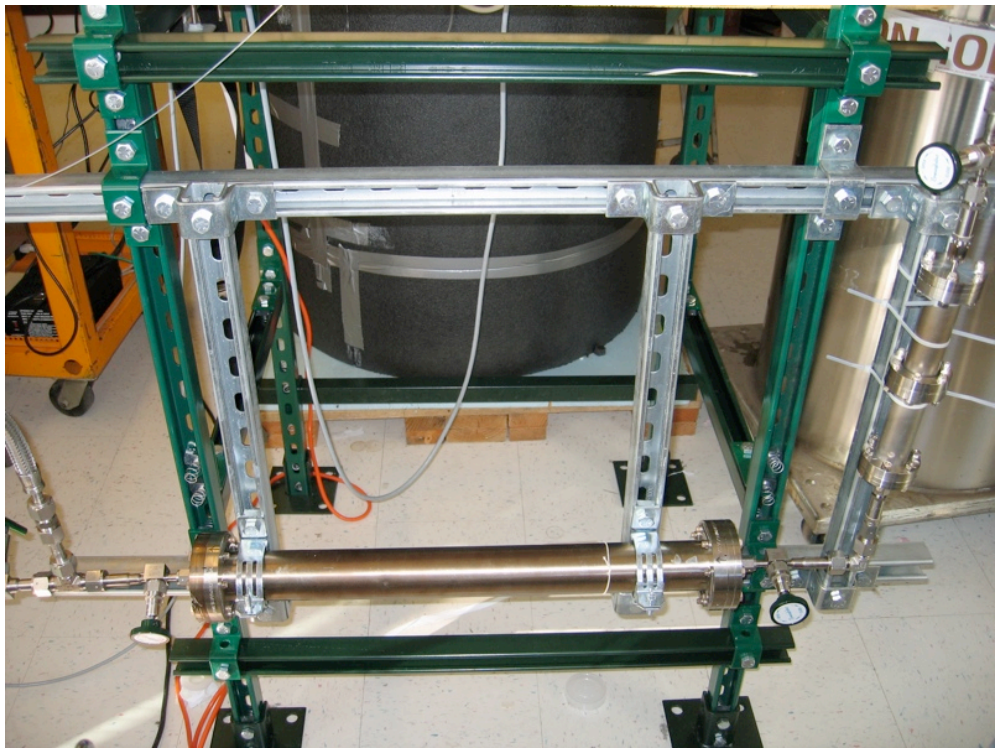
- Sent test pulse into TPC, read out via ICARUS electronics
- Picture is a screen-capture of ICARUS LabView program while reading out test-pulse signals on one half of top wire plane.
- Need some further guidance from ICARUS folks in deciphering each plot.

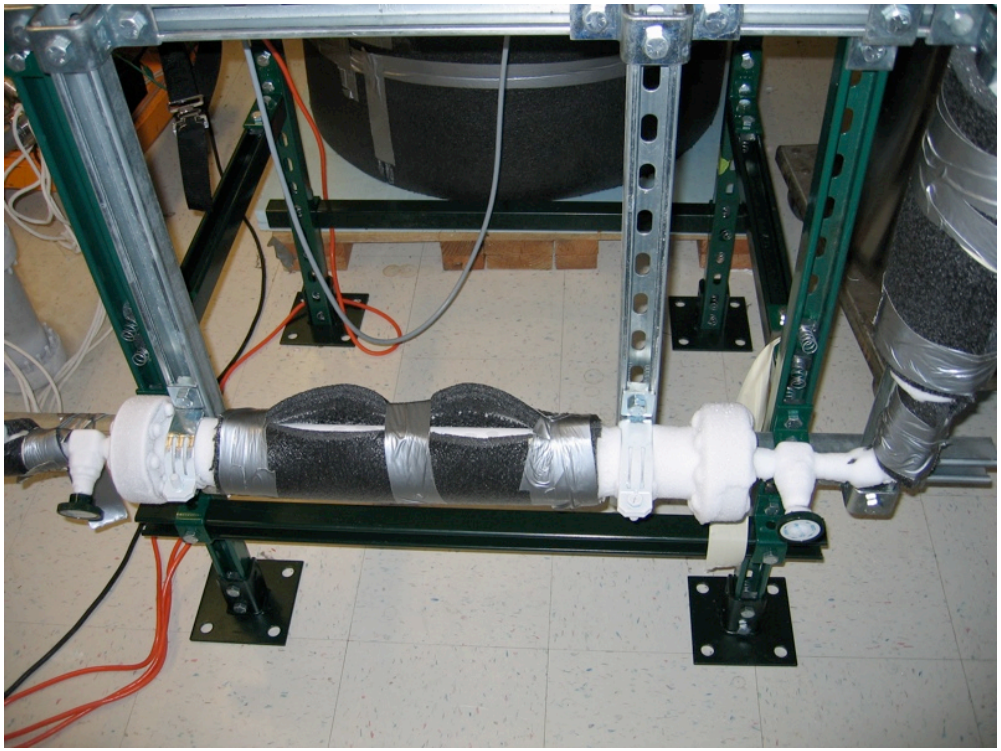


Purity

Biggest challenge for us will be to achieve desired level of purity to see tracks...

- Have had troubles seeing signal using purity monitor.
- We think our filter regeneration failed because we weren't getting things hot enough to start reaction.
- Had some valve troubles with filter we sent to FNAL....hopefully will be fixed soon.





To Do

- Currently attaching longer cables to TPC so we can hang it much lower in the vessel.
- Need to finish building HV filter (have Hans' design mostly built...just need some oil).
- Think about baking (or some other method) assembled chamber to improve our odds of seeing tracks.