

# Report from Multi-Purpose Detector

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# Multi-Purpose Detector (GArGON?)

- HPgTPC + ECAL + Magnet
  - Much of discussion here was focused on HPTPC, but need to identify opportunities in the whole system
- Some groups are identified here with specific items. Have had some informal discussions with other groups
  - US Interest: Fermilab, University of Texas Arlington, University of Minnesota Twin Cities, University of Wisconsin/PSL, College of William and Mary, University of Colorado Boulder, Indiana University, University of Minnesota Duluth, University of California at Santa Barbara, Indiana University, Michigan State University

# HPgTPC Systems

- Central readout chamber
- Field cage
- High voltage
- Gas system
- Light collection
- Calibration system (optical and field measurements)
- Slow controls/monitoring
- Front-end electronics
- Data acquisition
- Pressure vessel

We have weekly meetings of  
the HPgTPC+ECAL subgroup:  
**Tuesdays 10:00AM CT**

Email Jen if you would like to  
be added to the mailing list.

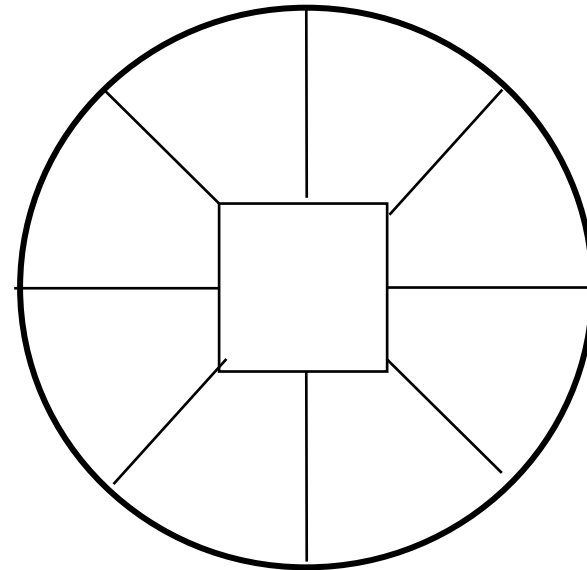


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# ECAL Systems

- Need a reasonably optimized design in place for CDR
- Likely barrel pieces nestled in magnet and endcap ECALs
- Materials
- Light collection
- Support structure (likely closely correlated with magnet structure)
- Electronics
- Data Acquisition

# Magnet Systems

- Magnets
- Field mapping (especially interaction with 3DST-S magnet)

# R&D

- What is the timing of possible R&D funds? Any funding before TDR deadline?
- Specific high priority R&D items:
  - Test breakdown voltage of planned gas mixture (UTA summer project)
  - Light collection system
  - Readout electronics
- Other prototyping
  - Field cage
  - Central readout chambers
  - Integration testing
  - Calibration system

# Physics Studies

- Identifying ND requirements for LBL analysis
- Demonstrate ability of HPTPC to constrain argon cross sections
- Feasibility study of absolute energy scale calibration with kaons, lambdas
- Demonstrate ability of HPTPC+ECAL to reconstruct neutrons using time-of-flight
- Constrain detector response & energy scale of LAr
- Demonstrate constraint of  $\pi^0$  backgrounds in LAr by measurements of  $\nu_e$  in Gar
- Demonstrate ability to constrain  $\nu_e$  and anti- $\nu_e$  backgrounds in the beam
- Identify if there are any advantages to using the low- $v$  method to complement other detectors
- Feasibility study of measurements with other target gases in HPgTPC (H<sub>2</sub>, D<sub>2</sub>, ...)



# Interfaces with Other Systems

- If moving with DUNEPrism, you'll need to calibrate fields at each step.
  - Might need built in movable-probes.
- If no ECAL, need a way to trigger cosmics for calibration
- Do we need a full ECAL on upstream between Argoncube and GArGON or something thinner to aid tracking?
- Synergies with 3DST (light collection, electronics?)
- Common DAQ?