DUNE FD Dual Phase TPC

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Dual phase aim and structure

The task of the Dual Phase TPC group is to develop a detailed design of the dual phase Liquid Argon TPC 10 kton fiducial detector for DUNE. This design will be the basis for the DUNE TDR, to be ready for 2019. The starting point design for this detector is contained in the DUNE CDR (Vol 4, chap. 5 released July 2015).

Work packages: see next page

Work packages

PROPOSAL DUNE dual phase far detector work packages

conveners: Marco Zito, Sebastien Murphy

WP1 Chimneys & Feedthroughs	WP2 CRP mechanical	WP3 CRP procurement	WP4 Drift cage & cathode	WP5 Detector control system	WP6 det. installation and integration
• signal + slow control feedthroughs • all crossing pipes including cryo services • pressure relief devices • tight collab. with the group constructing the tank to ensure adequate placement of chimneys • manholes and accesses • check for sufficient clearance of services inside tank from the drift cage	• mechanical design of 3x3 m^2 CRPs frames. • ensure rigidity and stability in cold according to tolerances • motorised suspension system • extraction grid with sufficient tensioning and minimum dead space between modules • field lines simulations to guide design especially at the junction between CRPs • mounting sequences	• purchase & QA of large amounts of LEMs + anodes • logistics for cleaning, testing and storage of LEM+ anodes • adequate HV connections for all devices (up to 15 kV for extraction grid) • ensure of non sparking for connections in GAr • mounting sequence on 3x3 m2 CRPs	• design and assembly sequence of large drift cage • drift cage suspended to cryostat roof • design of cathode based on field line simulation & ensure mechanical rigidity • spark protection device around cathode • voltage divider chain • connection of cathode to HV feedthrough	• complete list of what we want to monitor and for which purpose • construction and calibration of purity monitors, temperature, pressure,voltages and currents monitoring, level meters, cameras etc.. • includes also low voltage (<= 10 kV) connections in Gar or LAr • cabling and connection to racks near the tank.	• construction the detector taking into account the underground environment and limited shaft space + TCO. • All safety related aspects • Ventilation & accesses • clean room(s) • cavern layout and space for racks and detector/tank services • Insure of non conflicts between subsystems • cavern layout and space for racks and detector/tank services

WP responsibles identified: in the process of contacting them

Interfaces

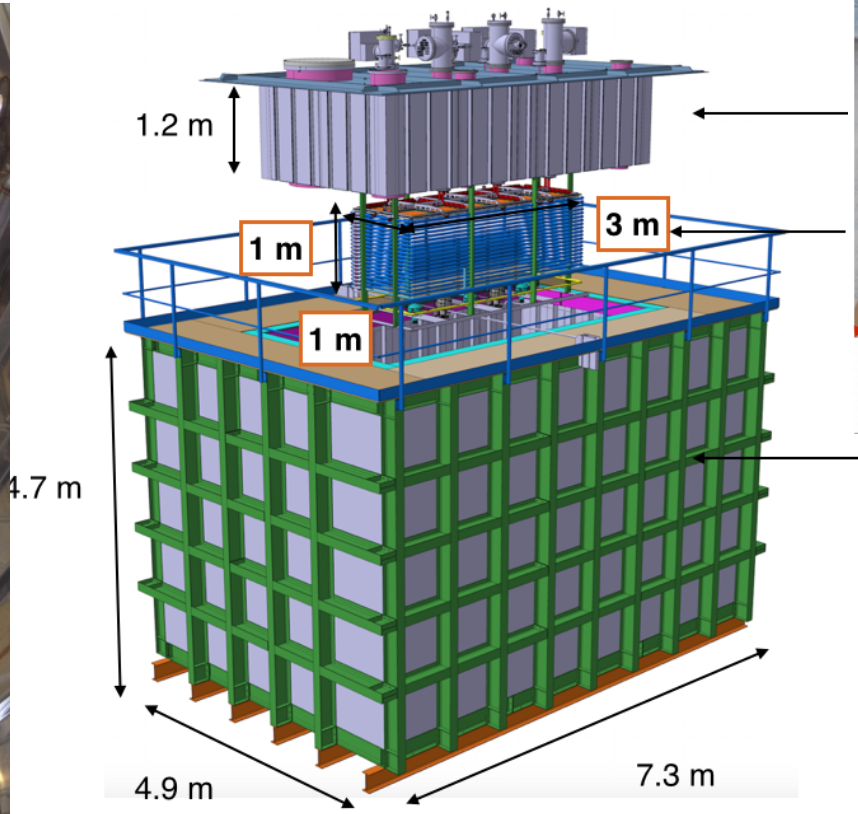
The TPC-2 WG will work in tight coordination with the light readout, the electronics, the HV, and the DAQ WGs.

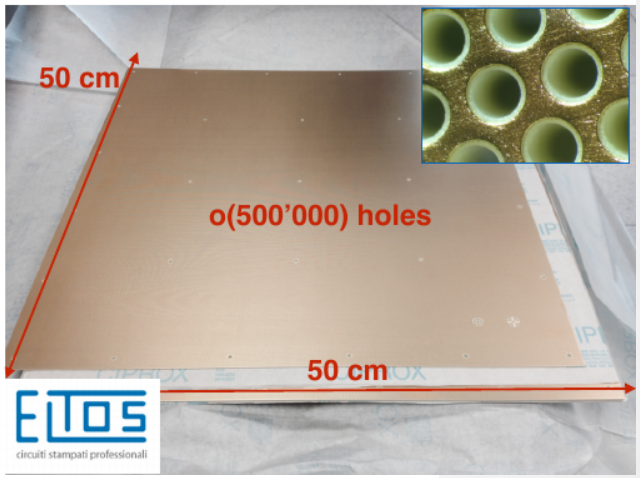
WA105 Sep 20-21 CM

Lively well-attended meeting where good progress has been demonstrated towards WA105 goals

WA105 goals

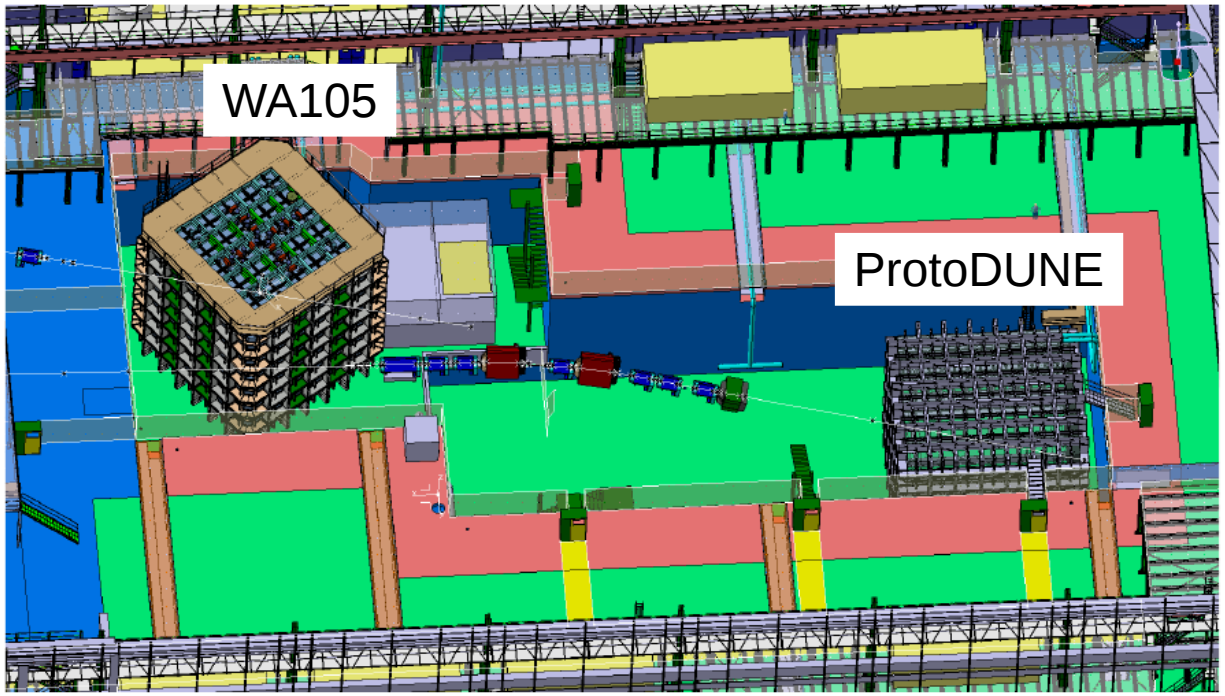
- 3x1x1 m³ (fiducial Lar volume) : tank structure built, top cap arrives Dec 2015, top cap + TPC+CRP installed Feb 2016

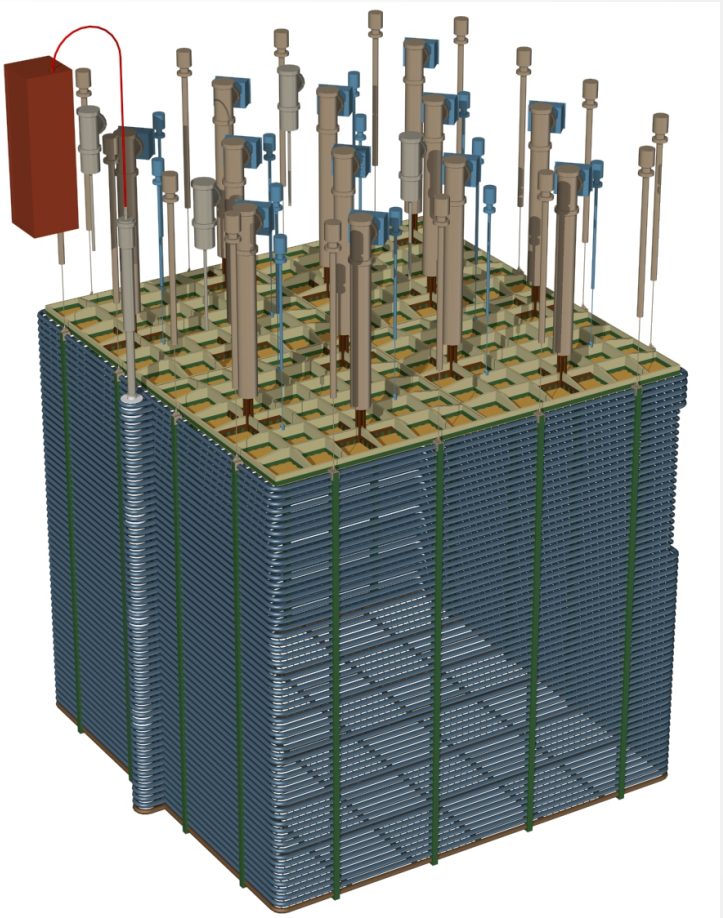




tank outer structure

WA105 demonstrator






Recent progress in EHN1 CERN area

6x6x6 m^3 fiducial volume read out by 4 DUNE-like CRP

Schedule : EHN1 Hall complete in mid 2016, detector installation and commissioning in 2017, charged particle beam test in 2018

DUNE Dual Phase TPC

- In view of the CD-3a, we plan to provide feedback concerning the implications and constraints for the detector installation and integration, in particular with respect to the shaft, the cavern and the TCO+temporary clean room

Next steps

- Dual phase TPC group meeting: we will schedule one meeting in November