MPD Geometry Status.

ND Software meeting

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The software.

dunendggd

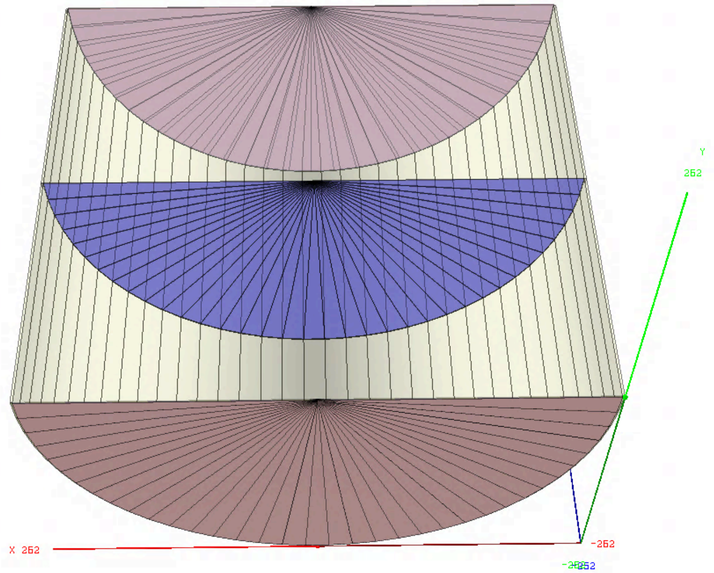
https://github.com/gyang9/dunendggd

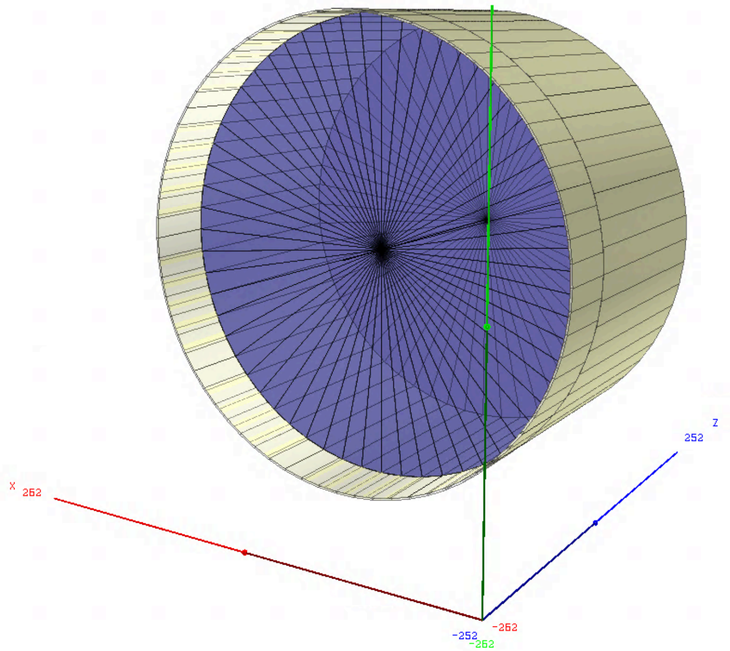
- How is the geometry generated for the MPD
  - Use of the common geometry software based on python: gegede
  - Specific package for the ND: dunendggd
- Contains all geometry configurations and scripts containing the core geometry code
- MPD:
  - duneggd/Active/NDHPgTPC.py (Contains the construction instructions)
  - duneggd/SubDetector/NDHPgTPC.py (Handles the construction)

The TPC geometry.

Called by GArTPC.py

- Build the TPC that includes
  - A cylinder with the TPC chamber volume filled with Ar Gas
    - Radius 2740 mm, Length 5200 mm
  - Two sensitive volumes
    - Radius 2600 mm, Length 5000 mm
  - A centrale cathode
    - 2 layers of mylar (0.02 mm) separated with honeycomb structure (6 mm)
  - Readout Pads structure
    - PCB (support not modelled) of 5 mm
  - Field cage
    - Honeycomb structure surrounded by kevlar and tedlar (21.3 mm)
- Missing are support structures and services

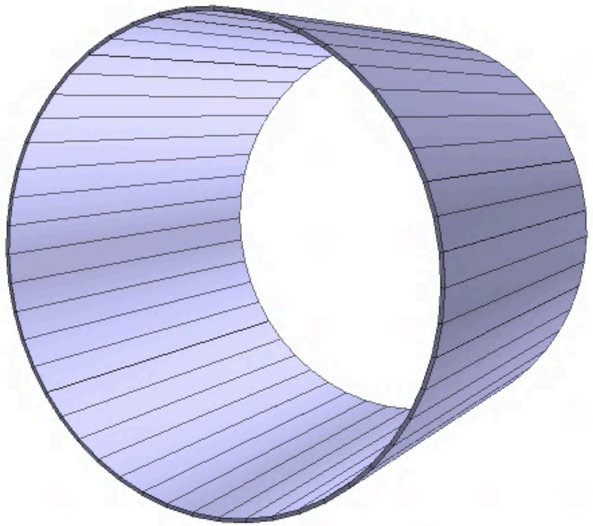


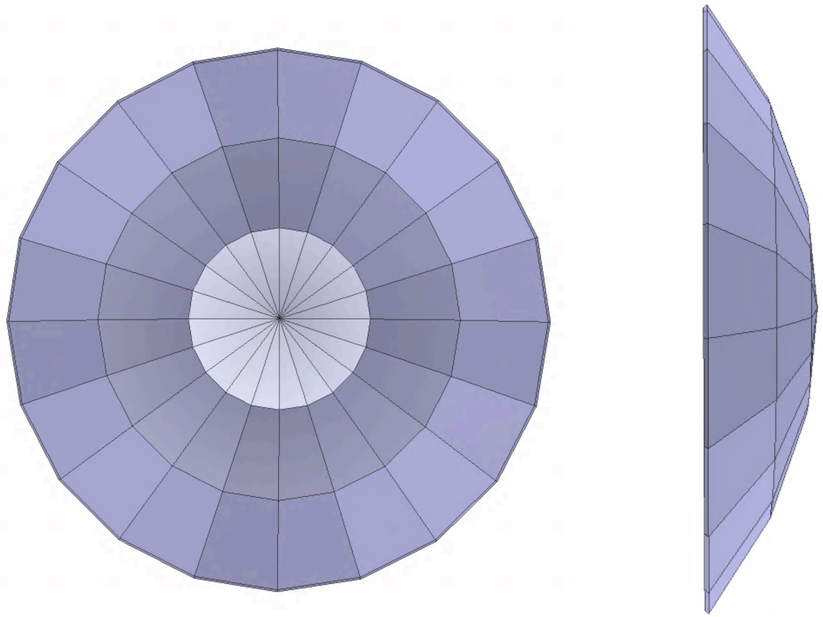


The Pressure vessel geometry.

Called by NDHPgTPC.py

- Build the Pressure vessel (PV) in two steps: Barrel/Endcap
- Material Al, Radius 2740 mm, Thickness 44.49 mm (0.5 X_0)
- Endcap bulge 100 cm
- Missing
  - services
  - support structure (feet and for the ECAL)
  - no flanges
- Design might need some changes in future

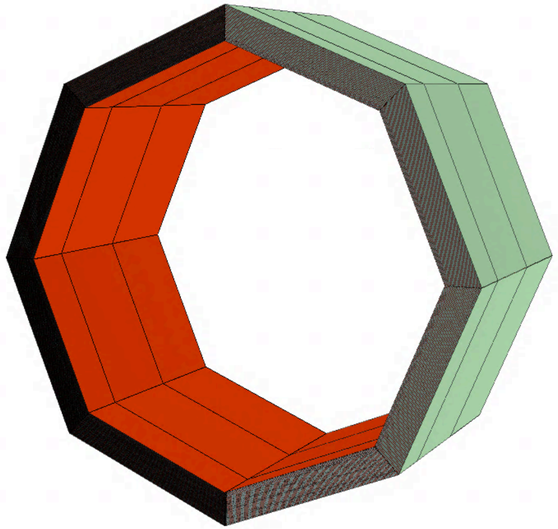


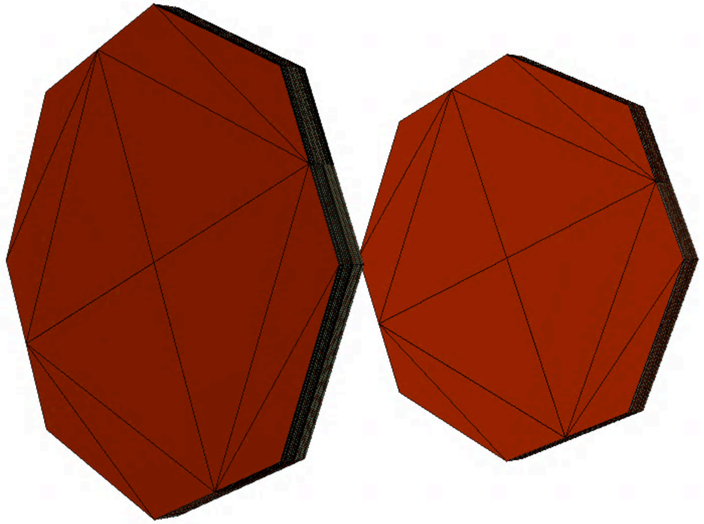


The ECAL geometry.

Called by NDHPgTPC.py

- Build the ECAL in two steps: Barrel/Endcap
- Polyhedra regular
  - Number of sides can be changed: default 8
  - Endcap is a boolean operation of two volumes (Polyhedra/ Cylinder)

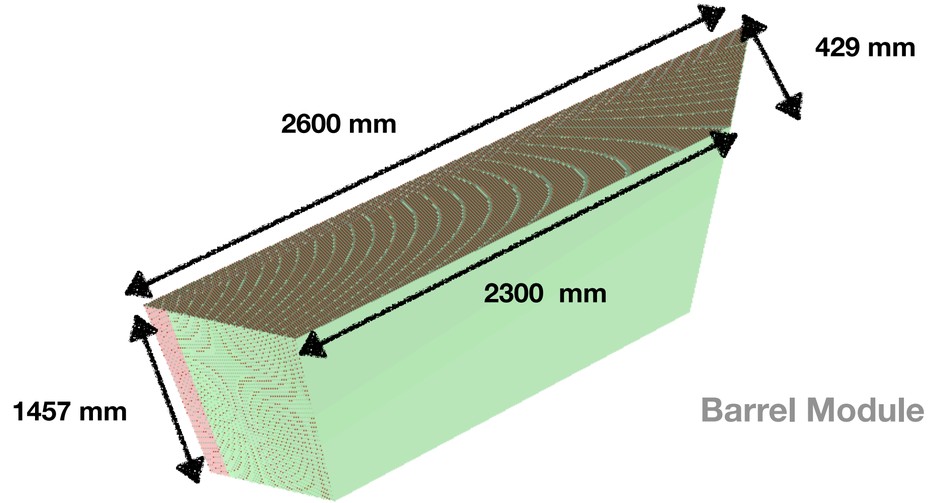




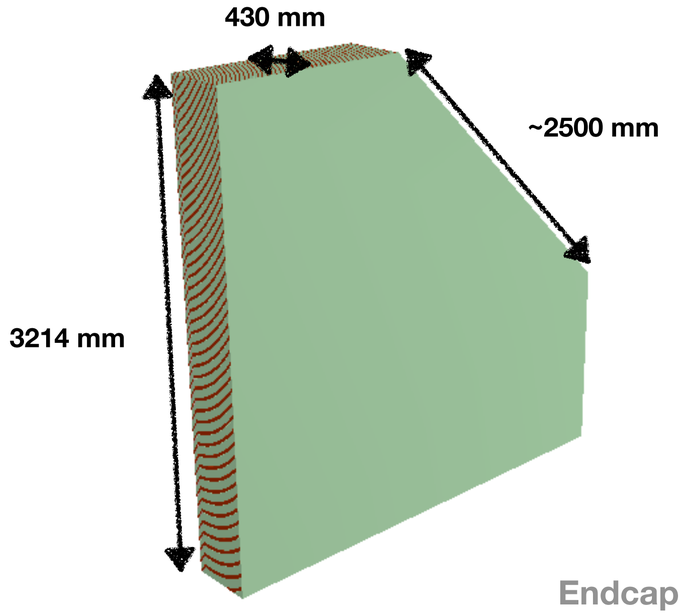
The ECAL geometry.

Called by NDHPgTPC.py

- Build the ECAL in two steps: Barrel/Endcap
- Polyhedra regular
  - Number of sides can be changed: default 8
  - Endcap is a boolean operation of two volumes (Polyhedra/ Cylinder)
- Barrel
  - Each ring made of individual modules (5 modules in total in length)
  - Width 1457 mm, Length 2300-2660 mm
- Endcap
  - Modules are a quadrant (boolean between square/Polyhedra), 4 modules per side. Size ~ 3200 mm
- Missing
  - Support structures
  - Services



Barrel Module

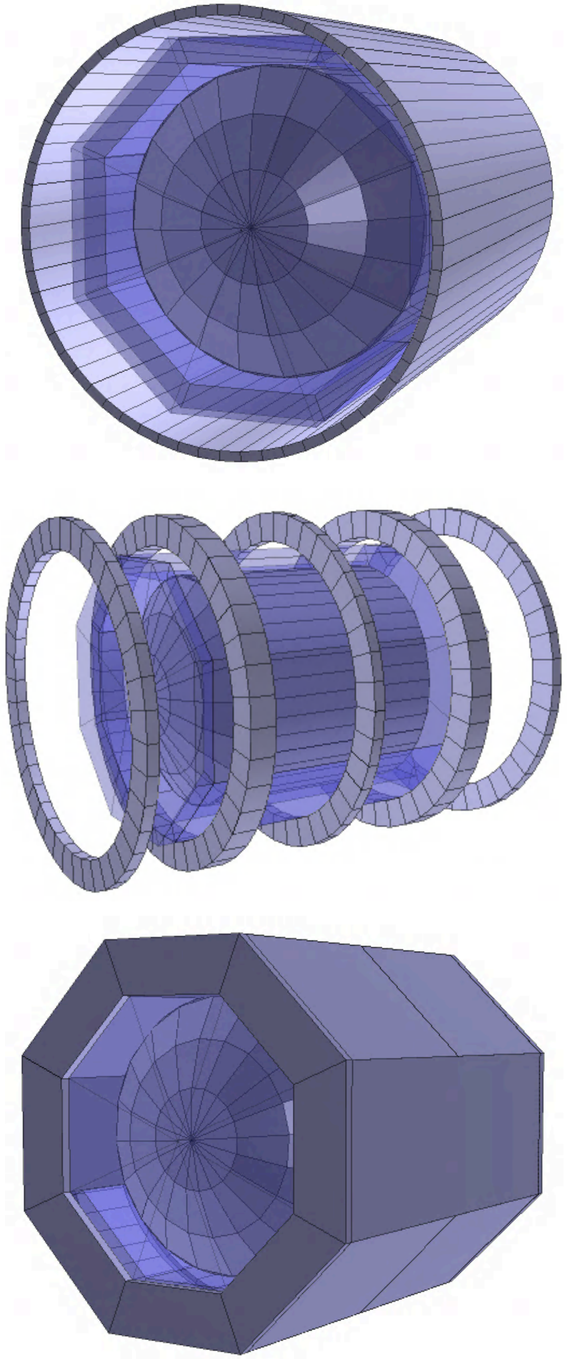


Endcap Module

The Magnet geometry.

Called by NDHPgTPC.py

- Different types of magnets implemented
  - Uniform (Cylinder of around 100 ton)
  - 2,3 and 5 Helmholtz coils
  - SPY
- Mass is in the order expected
- The SPY model includes a Yoke with an integrated Muon ID detector (3 layers of Iron, 5 cm with Sc 1.67 cm)
  - Includes the open window in front of the LArTPC
- No proper materials (supra-conducting magnet), cryostats and services implemented



Backup Slides.