

ECAL Configuration.

DUNE ND Workshop

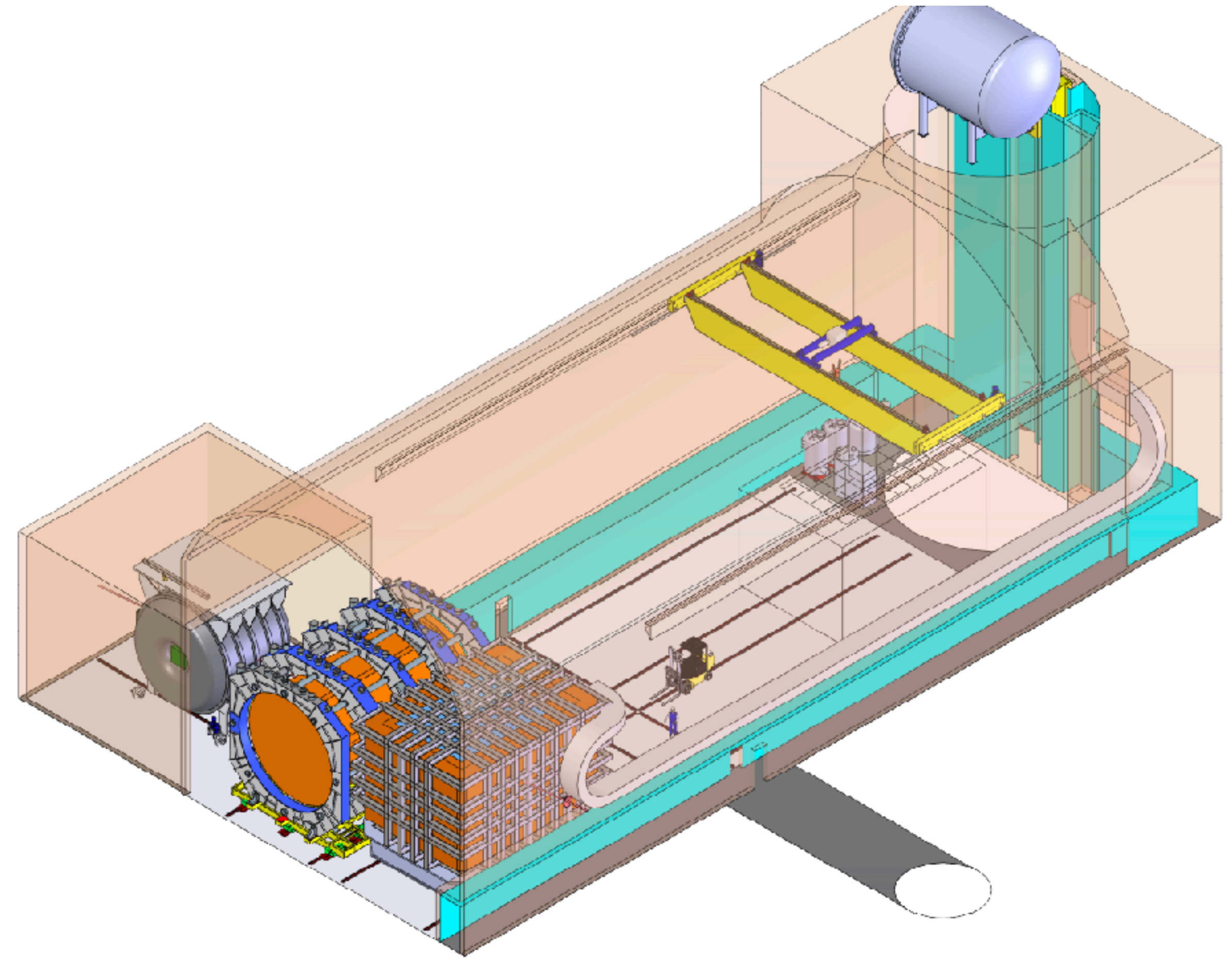
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DESY, 20th October 2019



The Near Detector Hall.

The limited space

- The space in the near detector hall is very limited
 - + may not get the wished size
- Imposes constrain on the side of the TPC + ECAL + Magnet
- The sizes:
 - TPC Radius 2.7 m / length 5 m
 - Magnet Radius 3.5 m
 - -> ~ 80 cm of space for the ECAL

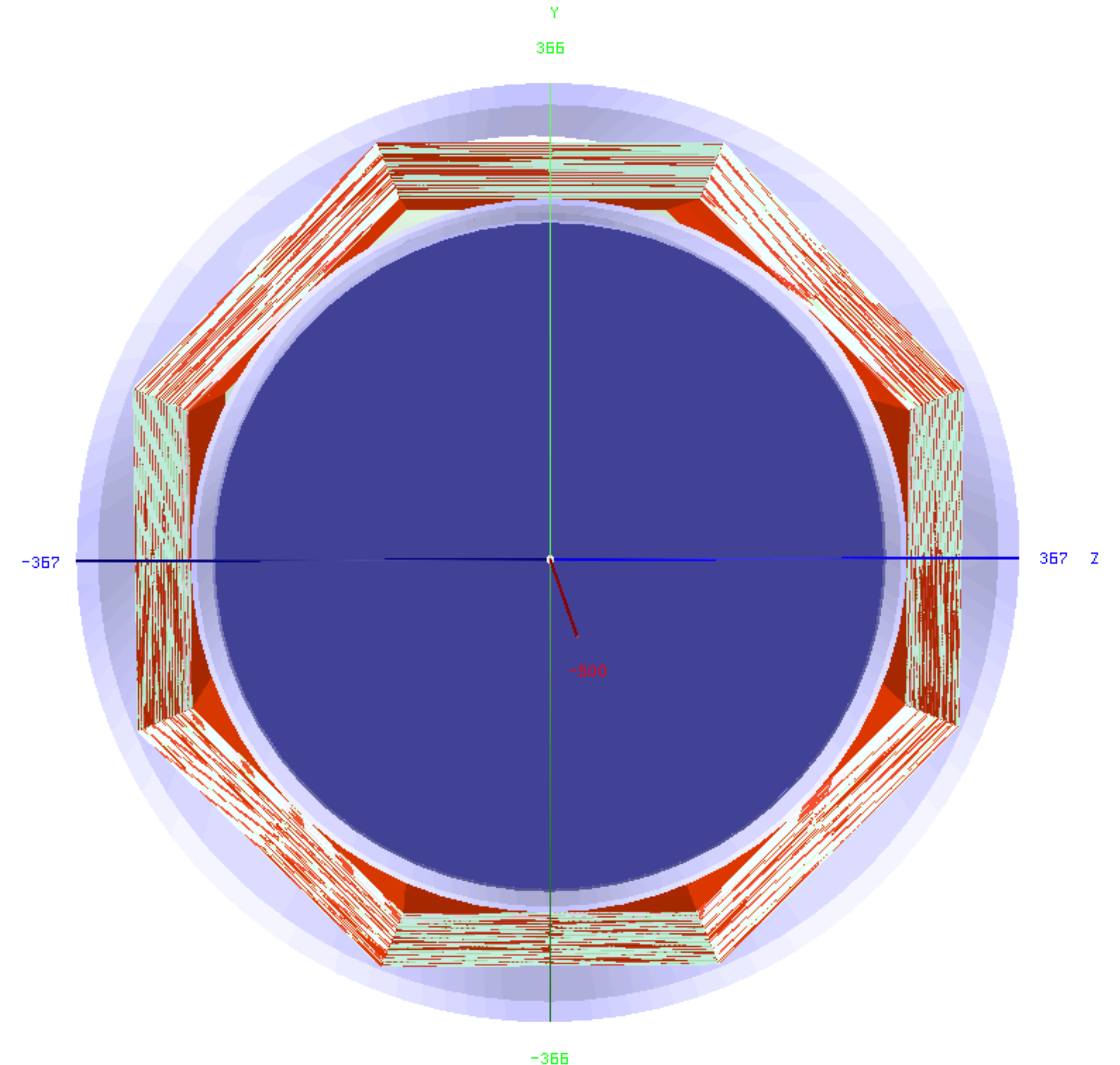


Bob Flight

Baseline Configuration.

Assuming we get what we want

- Less constrain on the size of the MPD
- Octagonal or Dodecagonal geometry around the TPC + PV
- Around 60-80 layers of 2 mm Cu absorber and 5 mm scintillator
- First layers (6-8) would be highly granular
- Space between the magnet coils could be used for the muon system
- Based on simulation studies
 - Energy resolution $\sim 5\text{-}6\%/ \sqrt{E}$
 - Angular resolution $\sim 6.4 \text{ deg}/\sqrt{E}$
 - Neutron detection $\sim 40\%$
- Could be optimized further (Downstream/Upstream...)



Alternative(s) Configuration.

Worst case scenario?

- Much more constrain on the size of the MPD
- Octagonal or Dodecagonal geometry around the TPC + PV
- ECAL directly between the coils due a possible reduction in the MPD size
- Followed by a muon system
- Change of absorber
 - Lead instead of Cu (limited impact as more layers are needed in this case)
- Could limit the number of modules
 - Only downstream + limited endcap + 2 layers upstream for timing? Would certainly be beneficial for background
- Going full strip readout
 - smaller strips? fiberless? Would greatly reduce the cost
- All this part of the ECAL optimization task
- See Frank's slides on Monday

Showing the strength.

Analyses

- Need to define couple of analyses that highlight
 - TPC + ECAL strength
 - ECAL need
- Obvious
 - Timing (background related)
 - Neutrons
 - $\nu_e/\bar{\nu}_e$ bar
 - coherent pion
- Less Obvious ones?
 - Specific channels: NC $1\pi^0$, CC $n\pi$?

Backup Slides.