

CERN Neutrino Platform Hardware

Installation and Maintenance

Kevin Nelson

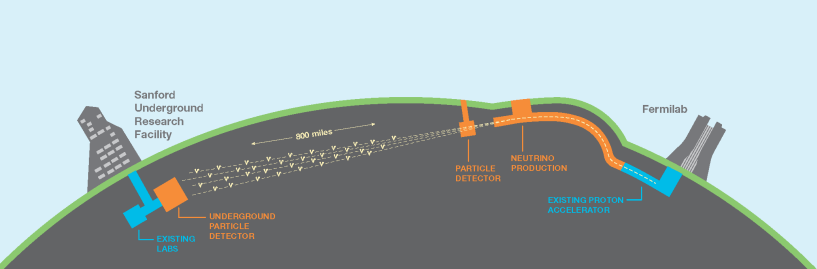
UM CERN REU 2017

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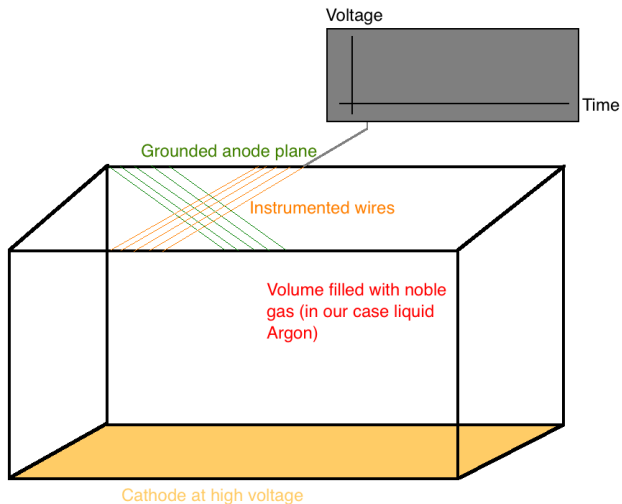
Paradigms of Neutrino Physics

- ▶ Mass eigenstates are not the flavor eigenstates (resulting in neutrino oscillations)
- ▶ We can measure CP violation in the neutrino sector with oscillation experiments (running in neutrino and antineutrino mode)
- ▶ Long baseline oscillation experiments may provide a window to new physics... and possibly new particles

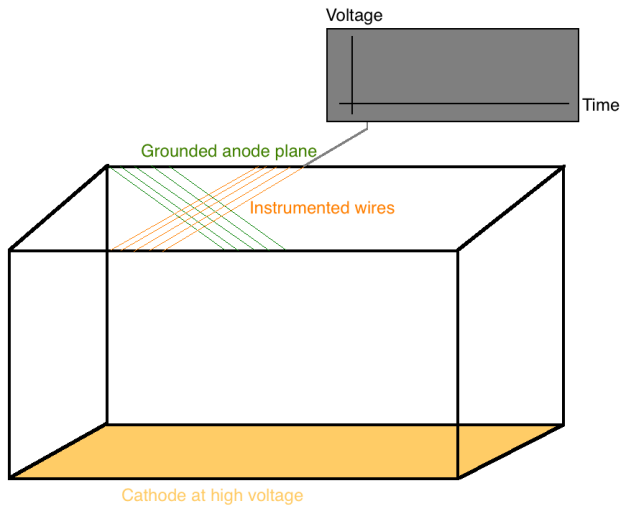
DUNE



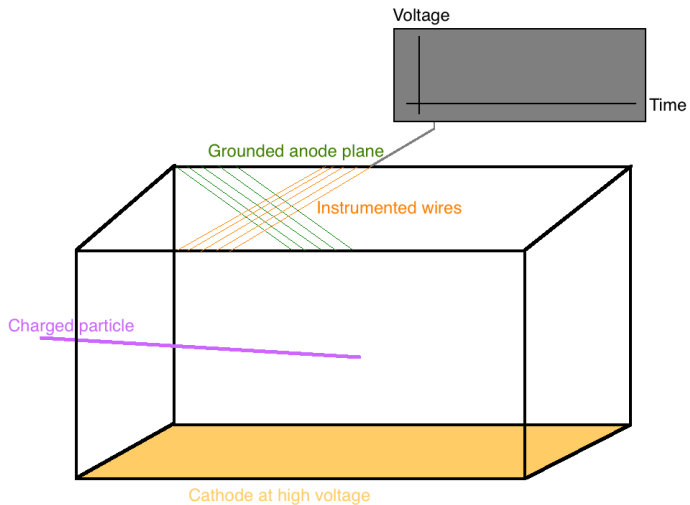
Time Projection Chambers



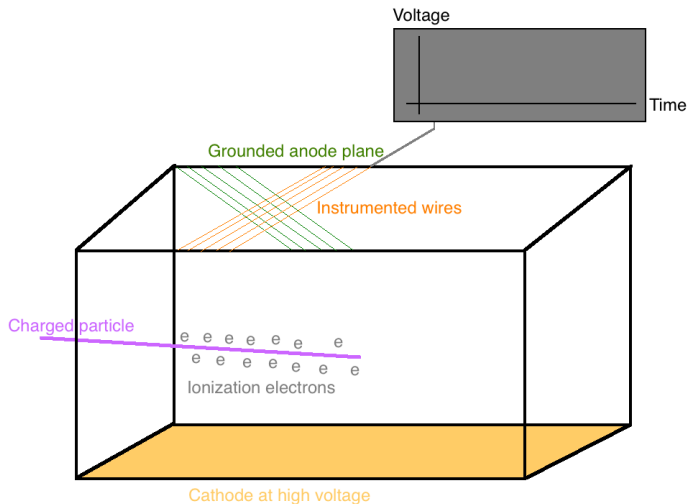
Time Projection Chambers



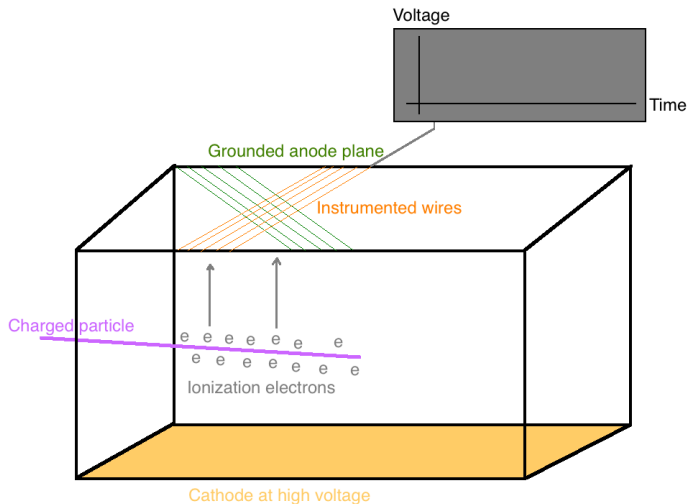
Time Projection Chambers



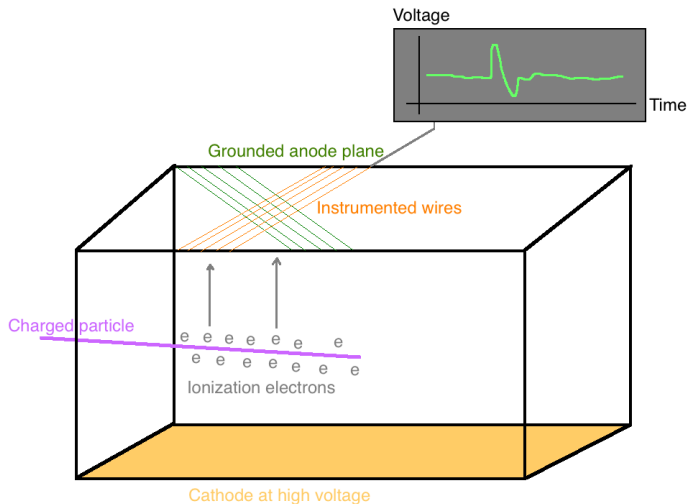
Time Projection Chambers



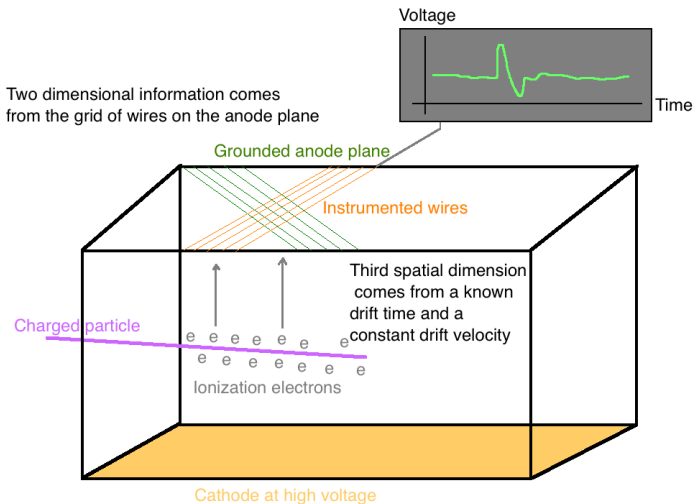
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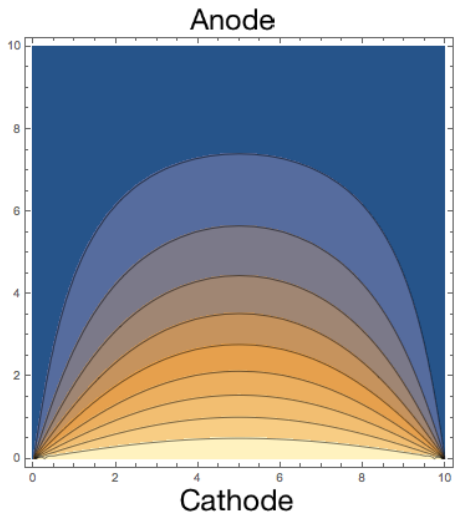
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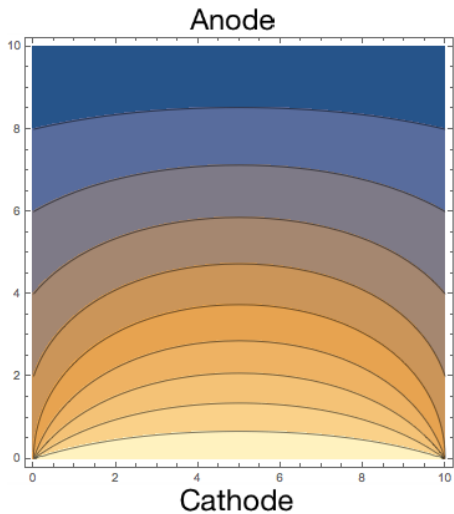
Time Projection Chambers



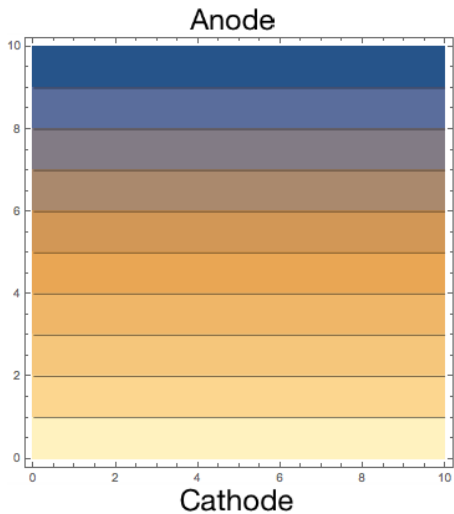
Time Projection Chambers



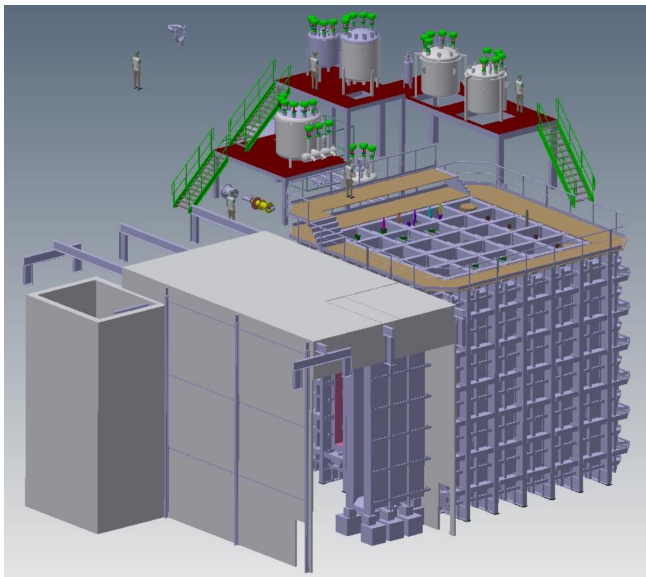
Time Projection Chambers



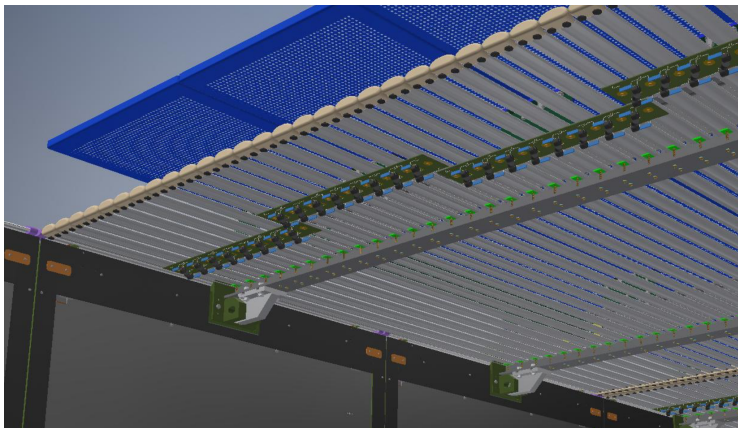
Time Projection Chambers



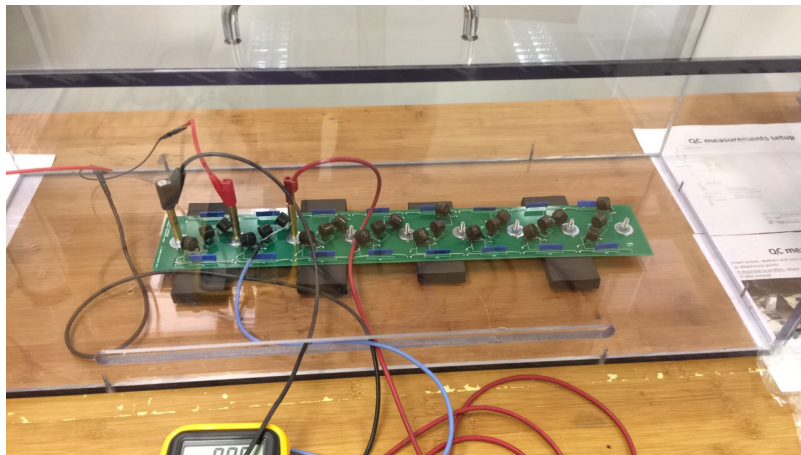
The ProtoDUNE TPC



The ProtoDUNE Field Cage



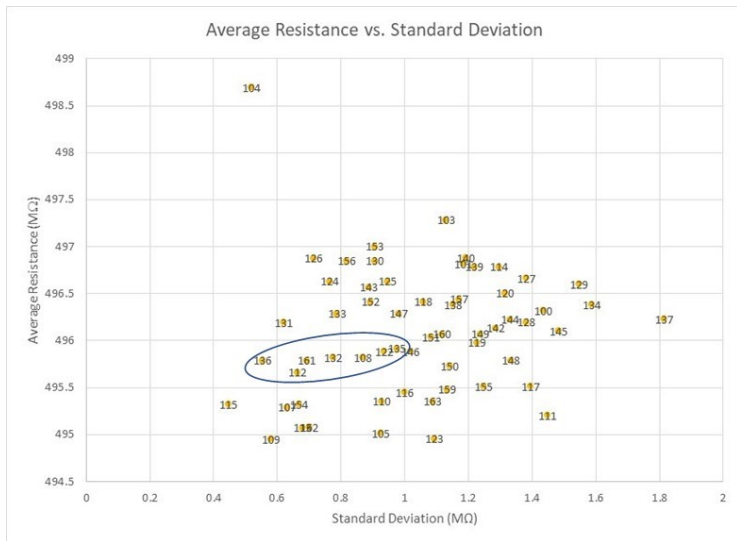
Testing Resistor Boards



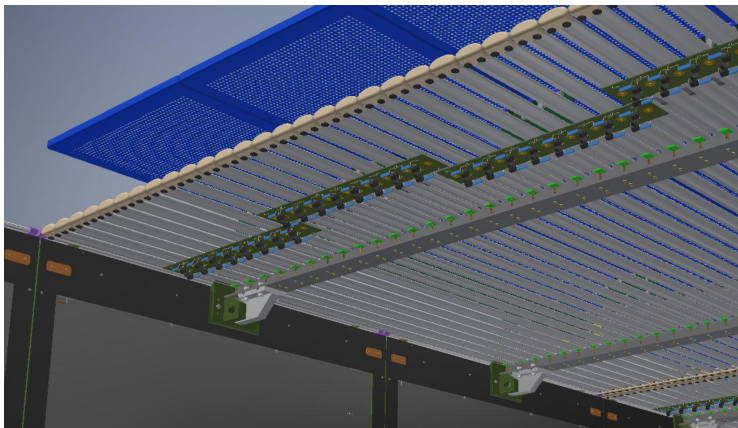
Testing Resistor Boards



Testing Resistor Boards



The ProtoDUNE Field Cage



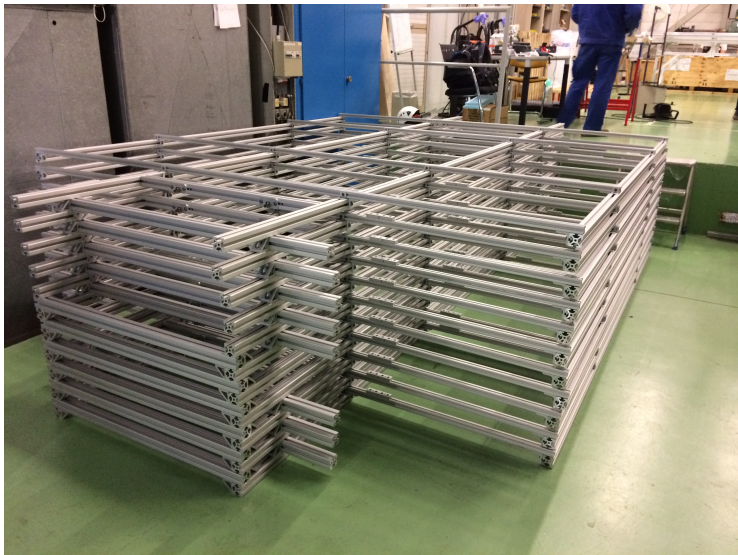
Assembling Carts and Frames



Assembling Carts and Frames



Assembling Carts and Frames



Assembling Field Cage Module



Assembling Field Cage Module



Travel and Culture



Travel and Culture



Summary

- ▶ Neutrino physics requires calorimeters with large fiducial volume and high energy resolution
- ▶ LArTPCs are a sufficient technology to solve these physics problems
- ▶ The field cage is a crucial detector component to a LArTPC
- ▶ I worked on installing the ProtoDUNE detectors
- ▶ If provided more time I would have worked more on installing the anode (wire) planes and building the field cage
- ▶ Travel and cultural experiences were a lot of fun!
- ▶ This work was supported by the NSF

Any Questions?

