Determining Optimal Running Conditions for TinyTPC Detector
Rebecca Gonzalez
Advisors: Joseph Zennamo & Fernanda Psihas

Introduction/Background:
Liquid argon time projection chambers are particle detectors used to measure charge and light from particle interactions. The Deep Underground Neutrino Experiment (DUNE) will utilize such detector to study neutrino interactions. Currently, LArTPCs effectively collect ionization charge, but not scintillation light; converting light to charge with the addition of dopants would enhance scintillation signal.

Experimental Overview:
TinyTPC is LArTPC with a pixelated readout (LArPix) that we will use to demonstrate the effects of photosensitive dopants for improved energy resolution at lower MeV scale.

TinyTPC consists of a HV and LV system. Initially tested in a test vessel and then moved into a cryostat, Blanche, for data taking at the Proton Assembly Building (PAB).

Once placed in blanche, the tinyTPC is running for 3 weeks with radioactive source Th-228 and:
- LAr
- LAr + isobutylene
- LAr + Xe
- LAr + isobutylene + Xe

Test Performed on HV:
- Verified system's resistance of 500MΩ
- Measured step resistances of 25MΩ
- Probed the field cage for continuity
- LN2 fill with N2 flush ramping voltage to 5kV
- LAr fill with N2 flush ramping voltage to 5kV

The new flange is able to hold 5kV in the test set up although not yet when in the cryostat.

Doping Runs:
We are currently taking data using the optimal configuration and new HV flange. Our preliminary analysis shows an increase in charge collected.

Next Steps:
TinyTPC team

I am currently simulating HV breakdown in a new HV test stand to further test the flange, HV and Ar breakdown in order to increase HV held.

Acknowledgements:
This manuscript has been authored by Fermi Research Alliance, LLC under Contract No. DE-AC02-07CH11359 with the U.S. Department of Energy, Office of Science, Office of High Energy Physics. I would also like to thank the URA-UWIS internship program. A huge thank you to my advisors Joseph Zennamo and Fernanda Psihas, and to all the TinyTPC team.