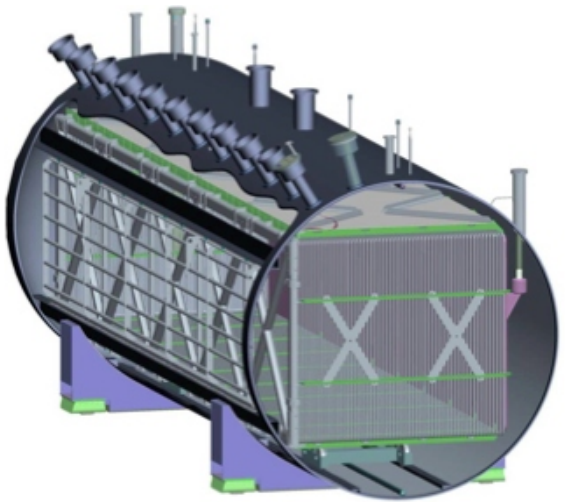
ILLINOIS INSTITUTE OF TECHNOLOGY

μBooNE

MicroBoone Update

Ryan Dorrill (IIT)

Proton PMG, All Experimenters Meeting
January 7th 2020



Current Status and Plans

- In December, MicroBooNE performed the first of its R&D studies since entering “safe mode” in March 2020
  - Detector systems and HV were successfully powered and used to take data
  - Remote shifts and operations are continuing for now
- Cryogenics system remains on and is monitored by the Neutrino Division Cryo team
- Regular weekly LArTF walk-throughs continue with run coordinators and ND technical support team
- The MicroBooNE cryogenics system at LArTF is being used to regenerate filters for ICEBERG and ICARUS
- Further proposals for the upcoming **R&D phase** are under final review by the MicroBooNE Technical Board
  - The initial emphasis is on studies which can be performed remotely, with minimal risk and personnel requirements, and with remote checklist shifts
  - The experiment is not requesting 24/7 neutrino beam. However, if beam is running for other experiments, we can make good use of it in our studies

R&D Phase is Beginning

MicroBooNE is considering a list of R&D Proposals:

- Xenon Doping of the MicroBooNE Detector (potentially relevant to DUNE's 4th module)
- Radon Doping of MicroBooNE for studies of low energy, MeV scale events
- **Study of Single Photo-Electron Rates as a function of High Voltage (HV)**
- Study of Single PE rates with reverse HV polarity
- Investigate HV Issues above 70kV (potentially relevant to protoDUNE 'streamer' events)
- Testing of the detector grounding scheme for the laser system (requested by DUNE)
- Study of Noise from Weiner Power Supply
- Self-triggering studies for DUNE

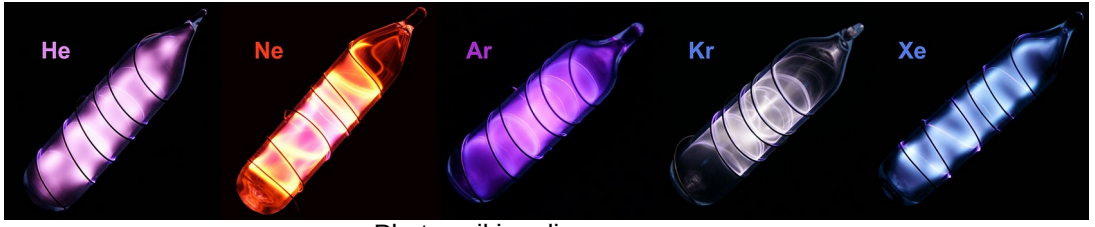
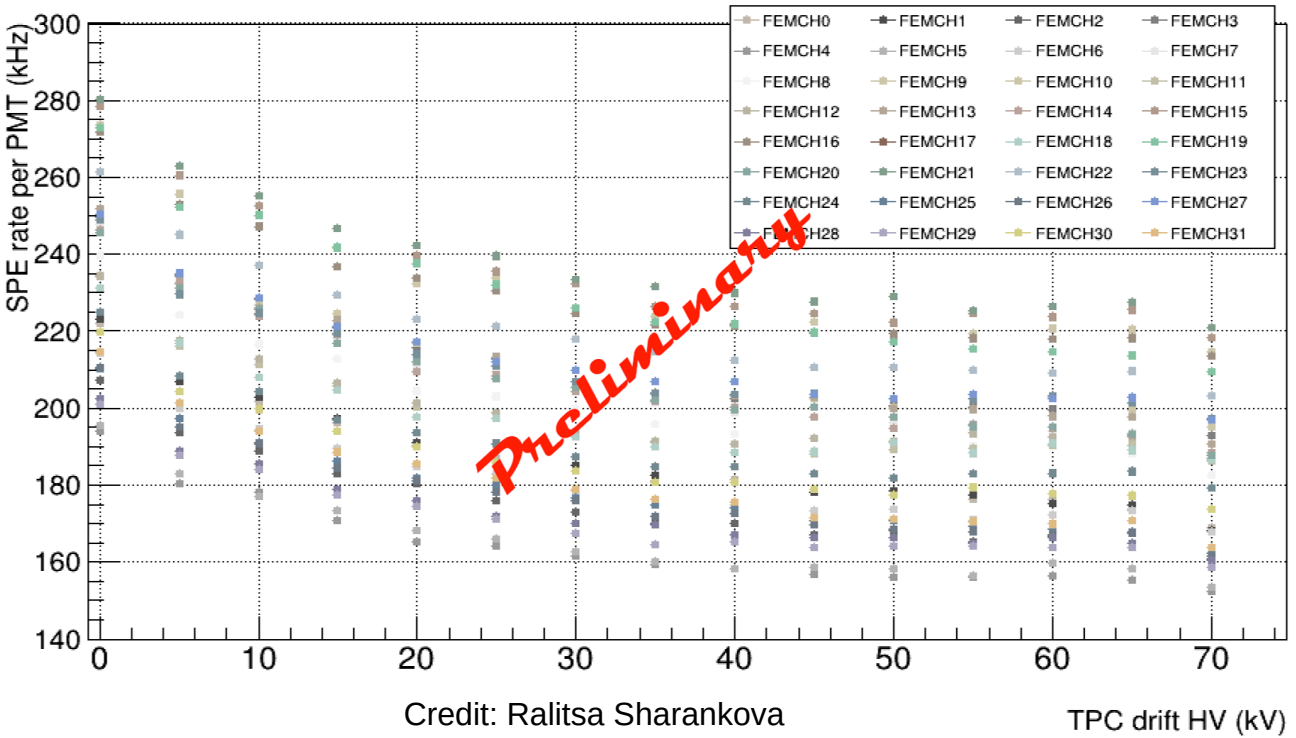


Photo: wikimedia commons

First R&D Study Completed Remotely

- **Study of Single Photo-Electron Rates as a function of High Voltage (HV)**
  - The detector was sucessfully turned on and took data after the long hiatus
  - Study performed with zero close-promixity work and no on-site access
  - Analysis is still ongoing



Credit: Ralitsa Sharankova

Data Processing

Data production continued over the holidays, including over 400,000 jobs last month

Publications

Recent Publications:

- *"Measurement of Differential Cross Sections for ν_μ-Ar Charged-Current Interactions with Protons and no Pions in the Final State with the MicroBooNE Detector"* was **accepted** to PRD.
  - https://arxiv.org/abs/2010.02390
- *"Measurement of Space Charge Effects in the MicroBooNE LAr TPC Using Cosmic Muons"* was **accepted** to JINST.
  - https://arxiv.org/abs/2008.09765
- *"Measurement of the Atmospheric Muon Rate with the MicroBooNE Liquid Argon TPC"* is on arXiv and submitted to JINST.
- *"Semantic Segmentation with a Sparse Convolutional Neural Network for Event Reconstruction in MicroBooNE"* is submitted to PRD and can be read on arxiv
- MicroBooNE had **fourteen publications** last year, and **19 public notes**
  - This was a **record year** for publications by MicroBooNE!