



MicroBooNE update

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Proton PMG Meeting
July 9th, 2020

MicroBooNE operations

- MicroBooNE is in “safe mode” since March 21st
- "Safe mode" means that TPC and PMT high voltage, wire bias, DAQ, Cosmic Ray Tagger system are all turned down. MicroBooNE is not taking data but cryogenic systems still remain on
- Regular weekly LArTF walk-throughs by run-coordinators together with ND technical support team continues
- ND cryogenics team continues to monitor cryogenics operations at LArTF as normal
- ICEBERG's filter regeneration work using MicroBooNE's LAr from outside dewar started last week. No negative impact to MicroBooNE

MicroBooNE shifts

- MicroBooNE shift station at Wilson Hall (ROC-W) is not in use following COVID-19 advisory
- Shifts continue from home via laptops, thanks to incredibly supportive and helpful collaborators
- Shifter fills “safe mode” checklist once every 8 hours

MicroBooNE participation at NEUTRINO 2020 (June 22 - July 2)



- Two successful plenary talks
 - "Neutrino interaction measurement on Argon", Kirsty Duffy - Fermilab
 - "Searches for New Physics with MicroBooNE", Georgia Karagiorgi - Columbia University

MicroBooNE: 170 ton LArTPC
JINST 12 P02017 (2017)

- **3 planes** of wires (vertical, +60°, -60°) with **3mm spacing**
- **32 PMTs** collect light from flash at time of interaction
- Sits in **two neutrino beams** at Fermilab: BNB (on-axis, $\langle E_{\nu\mu} \rangle = 800$ MeV) and NuMI (off-axis, $\langle E_{\nu e} \rangle = 650$ MeV)
- Stable detector operation since 2015: **longest-running LArTPC to date**
- >95% DAQ uptime
- 1.52×10^{21} POT collected in total (analyses shown here use subsets, not full POT)
- From December 2017: data with **Cosmic Ray Tagger (CRT)**

Thank you to Fermilab Accelerator Division, Cryogenics team, and Operations team!

See also: "Searches for New Physics with MicroBooNE" by G. Karagiorgi, 2nd July

Labels in diagram: Top CRT plane (green and blue), Platform, Side CRT plane (pink, orange and blue), Side CRT plane (yellow and green), Cryostat (glassy), Bottom CRT plane (cyan and dark blue)

NEUTRINO 2020

Searches for New Physics with **μ BooNE**

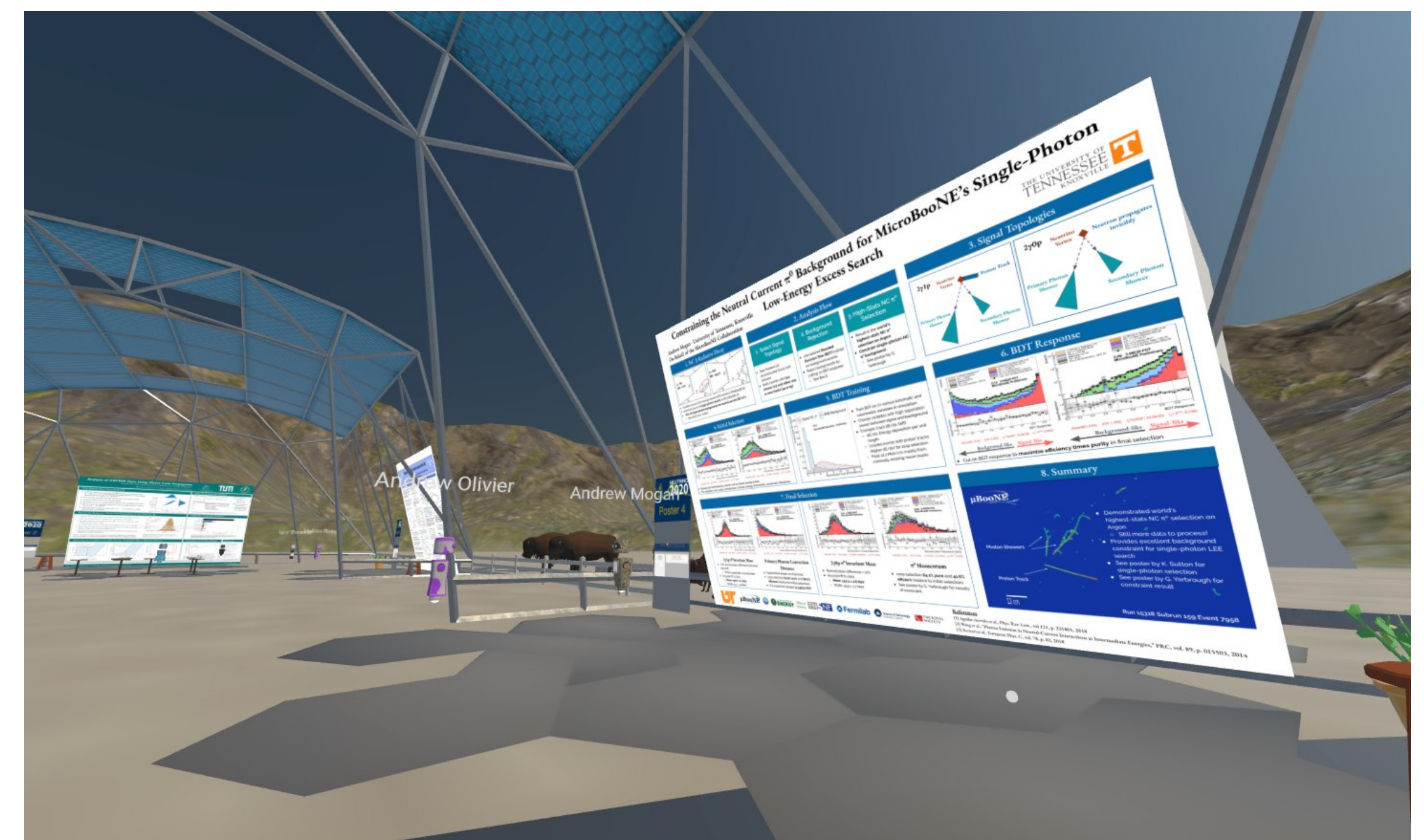
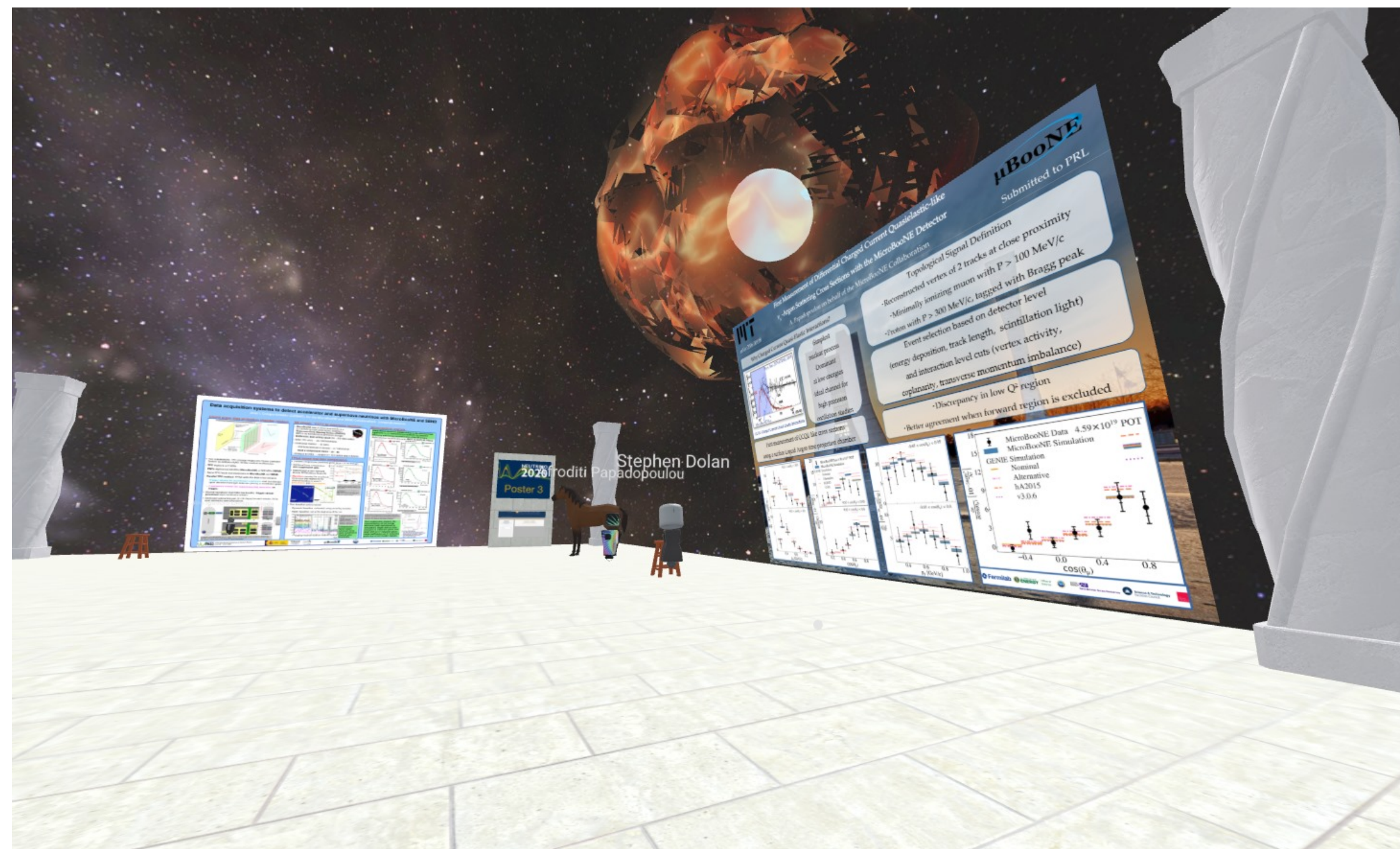
Georgia Karagiorgi, Columbia University
on behalf of the MicroBooNE Collaboration

COLUMBIA UNIVERSITY
IN THE CITY OF NEW YORK

MicroBooNE participation at NEUTRINO 2020 (June 22 - July 2)



- 31 posters presented by MicroBooNE's students and postdocs



Recent publications

6 papers in this year so far

- First Measurement of Differential Charged Current Quasi-Elastic-Like Muon Neutrino Argon Scattering Cross Sections with the MicroBooNE Detector, [arXiv:2006.00108](https://arxiv.org/abs/2006.00108), submitted to PRL
- Vertex-Finding and Reconstruction of Contained Two-track Neutrino Events in the MicroBooNE Detector, [arXiv:2002.09375](https://arxiv.org/abs/2002.09375), submitted to JINST
- Search for heavy neutral leptons decaying into muon-pion pairs in the MicroBooNE detector, [arXiv:1911.10545](https://arxiv.org/abs/1911.10545), [Phys. Rev. D101, 052001 \(2020\)](https://doi.org/10.1103/PhysRevD.101.052001)
- Reconstruction and Measurement of O(100) MeV Electromagnetic Activity from $\pi^0 \rightarrow \gamma\gamma$ Decays in the MicroBooNE LAr TPC, [arXiv:1910.02166](https://arxiv.org/abs/1910.02166), [JINST 15, P02007 \(2020\)](https://doi.org/10.1088/1742-6596/15/02/P02007)
- A Method to Determine the Electric Field of Liquid Argon Time Projection Chambers Using a UV Laser System and its Application in MicroBooNE, [arXiv:1910.01430](https://arxiv.org/abs/1910.01430), submitted to JINST
- Calibration of the Charge and Energy Response of the MicroBooNE Liquid Argon Time Projection Chamber Using Muons and Protons, [arXiv:1907.11736](https://arxiv.org/abs/1907.11736), [JINST 15, P03022 \(2020\)](https://doi.org/10.1088/1742-6596/15/03/P03022)

8 new public notes in last month

- The MicroBooNE Single-Photon Low-Energy Excess Search, MICROBOONE-NOTE-1087-PUB, 7/2/20
- Search for Electron Neutrinos in Multiple Topologies with the MicroBooNE Experiment, MICROBOONE-NOTE-1085-PUB, 6/23/20
- Cosmic Ray Background Rejection with Wire-Cell LArTPC Event Reconstruction in MicroBooNE, MICROBOONE-NOTE-1084-PUB, 6/23/20
- Neutrino Event Selection in the MicroBooNE LArTPC using Wire-Cell 3-D Imaging, Clustering and Charge-Light Matching, MICROBOONE-NOTE-1083-PUB, 6/23/20
- Novel Approach for Evaluating Detector Systematics in the MicroBooNE LArTPC, MICROBOONE-NOTE-1075-PUB, 6/23/20
- Neutrino Interaction Model and Uncertainties for MicroBooNE Analyses, MICROBOONE-NOTE-1074-PUB, 6/23/20
- Selection of charged-current neutrino-induced K^+ production interactions in MicroBooNE, MICROBOONE-NOTE-1071-PUB 6/23/20
- Measurement of Low-Q2 Protons from Neutral Current Events in Argon with MicroBooNE, MICROBOONE-NOTE-1067-PUB, 6/23/20

<https://microboone.fnal.gov/public-notes/>