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LArIAT in 10 Minutes

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The Liquid Argon Time Projection Chamber (LArTPC) represents one of the most advanced experimental technologies for physics at the Intensity Frontier due to its full 3D-imaging, excellent particle identification (PID), and precise calorimetric energy reconstruction. By deploying LArTPCs in a dedicated calibration test beamline at Fermilab, the LArIAT program aims to experimentally calibrate this technology in a controlled environment. LArIAT has also implemented a new design for LAr scintillation light collection which provides a spatially uniform collection efficiency, improving calorimetric energy resolution. With Run-I complete and Run-II in progress, LArIAT is already providing physics results, including the first measurement of the pion-Ar cross section. Run-II data should provide several times more statistics than Run-I, making the following possible: analyses of exclusive channels for pion interactions in argon, improvements in electromagnetic shower reconstruction for electron-gamma separation, methods of muon sign determination in the absence of a magnetic field via capture or decay, and studies of various nuclear effects, such as kaon-Ar interactions. The LArIAT exploration of the capabilities of LArTPCs to inform these topics also serves neutrino oscillation physics and proton decay searches of the SBN and LBN programs.

Primary author: Mr PULLIAM, Gregory (Syracuse University)

Presenter: Mr PULLIAM, Gregory (Syracuse University)

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