

Charge Current Quasi-Elastic Neutral Hyperon Production with ArgoNeuT

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ArgoNeuT is a small scale (170 liter) Liquid Argon Time Projection Chamber (LArTPC) which collected data at Fermi National Accelerator Laboratory in Batavia, Illinois (2009-2010). ArgoNeuT was located 100 meters underground, upstream of the MINOS near detector, exposed to the on-axis NUMI neutrino beamline. It is an R&D project paving the way for bigger LArTPCs such as MicroBooNE and multi-kiloton scale devices. The detector takes neutrino interactions in the 0.1 to 10 GeV range, providing the first ever low energy neutrino interactions data within a LArTPC. ArgoNeuT provides bubble-chamber-quality images with high quality particle identification through dE/dx that results in excellent background rejection and high sensitivity for detecting rare event types. As an example, ArgoNeuT can observe the CKM-suppressed analog to quasi-elastic scattering where a neutral strange particle is produced instead of a nucleon in the final state. Its ability to 'see' the detached vertex of a neutral hyperon decay, makes it stand out among other experiments. There are very few studies on neutral hyperon production via charge current quasi-elastic (CCQE) neutrino interaction. Among other measurements, ArgoNeuT will allow for a study comparing CCQE neutral hyperon production and CCQE neutron production at low energy.

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