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Benefits of MeV-scale reconstruction capabilities in large liquid argon time projection chambers WHITMAUR CASTIGLIONI, WILL FOREMAN, BRYCE LITTLEJOHN, MATTHEW MALAKER, Illinois Institute of Technology, IVAN LEPETIC, ANDREW MASTBAUM, Rutgers University — Using truth-level Monte Carlo simulations of particle interactions in a large volume of liquid argon, we demonstrate physics capabilities enabled by reconstruction of topologically compact and isolated low-energy features, or 'blips,' in large liquid argon time projection chamber (LArTPC) events. These features are mostly produced by electron products of photon interactions depositing ionization energy. The blip identification capability of the LArTPC is enabled by its unique combination of size, position resolution precision, and low energy thresholds. We show that consideration of reconstructed blips in LArTPC physics analyses can result in substantial improvements in calorimetry for neutrino and new physics interactions and for final-state particles ranging in energy from the MeV to the GeV scale. Blip activity analysis is also shown to enable discrimination between interaction channels and final-state particle types. In addition to demonstrating these gains in calorimetry and discrimination, some limitations of blip reconstruction capabilities and physics outcomes are also discussed.

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