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Neutral Pion Reconstruction for NuMI at ME in MINERνA

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Many analyses in neutrino experiments require the reconstruction of neutral pions, particularly neutrino oscillation experiments measuring ν_e appearance, where π^0 production is a background. Neutral pions are identified in the MINERνA detector by identifying the gammas that result from the neutral pion decay. The gamma candidates are energy depositions which are not associated with charged pions, protons or muons. The reconstruction that was developed in the simpler environment of the NuMI Low Energy beam is not satisfactory for the more complicated environment of the Medium Energy beam. By changing the MINERνA neutral pion reconstruction to consider only energy depositions with a well reconstructed direction and position and a set of cuts on energy, distance to the interaction vertex and dEdX, we have significantly improved the neutral pion reconstruction in the Medium Energy dataset.

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