Title:	Neutral pion reconstruction using machine learning in the experiment at 〈Ev〉 6 GeV
Authors:	Jena, Satyajit (/jspui/browse?type=author&value=Jena%2C+Satyajit)
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Abstract:	This paper presents a novel neutral-pion reconstruction that takes advantage of the machine learning technique of semantic segmentation using MINERvA data collected between 2013–2017, with an average neutrino energy of 6 GeV. Semantic segmentation improves the purity of neutral pion reconstruction from two γs from 70.7 ± 0.9% to 89.3 ± 0.7% and improves the efficiency of the reconstruction by approximately 40%. We demonstrate our method in a charged current neutral pion production analysis where a single neutral pion is reconstructed. This technique is applicable to modern tracking calorimeters, such as the new generation of liquid-argon time projection chambers, exposed to neutrino beams with 〈Ev〉 between 1–10 GeV. In such experiments it can facilitate the identification of ionization hits which are associated with electromagnetic showers, thereby enabling improved reconstruction of charged-current veevents arising from νμ → νe appearance
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