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Regression CNNs for Kinematic Reconstruction in DUNE BEN JARGOWSKY, University of California, Irvine, DUNE COLLABORATION — Accurate estimation of neutrino energy is necessary to make a measurement of the oscillation parameters in long-baseline neutrino experiments. The Deep Underground Neutrino Experiment (DUNE) has developed energy estimators using regression Convolutional Neural Networks (CNNs) for both e charged current and charged current events, which take 3 images of the event, one for each wire plane, and output one number for the estimated energy. These CNN based energy estimators have improved performance compared to the traditional methods, and also have performance which is more consistent over the spectrum of true neutrino energy. CNNs have also been successfully trained to estimate the energy of the final-state charged lepton. Besides energy, CNNs have been trained to reconstruct the direction of the final-state lepton, using a 3D image of the event as input. The direction reconstructed by this method sees an overall improvement over the traditional method.

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