

muon detection using deep learning, applied to CONNIE events

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The CONNIE experiment (Coherent Neutrino-Nucleus Interaction Experiment) is a collaboration from some countries in South America, EEUU and Switzerland . The data collected during the CONNIE experiment can be used to search for time variations of particles arriving at the detectors with periodic and stochastic nature. This experiment uses 12 high resistivity CCDs (Charge-Coupled Devices) placed in the vicinity of the Angra dos Reis nuclear reactor (Planta Almirante Alvaro Alberto, Rio de Janeiro, Brazil), with the purpose of detecting the antineutrinos generated in the reactor by measuring low-energy recoils from coherent elastic scattering (CEvNS). The sensors have recorded images of particles during the last 2 years in 3 hour expositions, where the majority of particles in the images are muon and beta particles that are considered as background. This work uses a deep learning algorithm to classify and detect muon particles in the images in order to remove them from the images for the purpose of neutrino studies, and also to build a time series that can be used as a stability monitor of the detection system.

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