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Pulse Shape Discrimination using convolutional Neural Network (CNN) for the SoLiD experiment

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SoLiD is a short baseline neutrino experiment at the BR2 reactor in Mol. It is searching for sterile neutrino oscillations and make precisions measurements of the neutrino energy spectrum from a highly enriched Uranium reactor core. The signature of neutrino reactions due to inverse beta decay is a coincidence of an electromagnetic energy deposition followed by the nuclear capture of a neutron (NS). A significant background to this signature is the BiPo-214 decay (a beta- followed by an alpha-decay). This presentation will discuss different ways to identify and discriminate against this background based on the waveform of the NS. A traditional pulse shape discrimination method yields 80% signal efficiency while rejecting 80% of the background. Additionally, a 1-dimensional convolutional neural network was developed improving the performance by a factor of 3-4. This presentation will introduce the general setup and report on the methods and their performance.

Collaboration name

SoLiD

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