

Event identification in the NEXT experiment using CNNs

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NEXT (Neutrino Experiment with a Xenon TPC) is a neutrinoless double-beta decay experiment that is currently operating a 5 kg-scale demonstrator at the Canfranc Underground Laboratory (LSC). In order to detect such rare events an optimal background identification is necessary.

As neutrinoless double-beta events will have a fixed energy, background events can be rejected via energy selection, but for the events that fall in the energy window of the expected signal the two types of events differ only in the topological signature that the particle leaves inside the chamber - i.e., the shape of the track. Since the latter is a special case of 3D Computer Vision applications, the Convolutional Neural Network (CNN) can be used to classify signal vs background.

In this talk I will demonstrate how such networks can be trained and applied in a proof-of-concept analysis where the electron positron pair annihilation, having similar topological signature as double electrons from the double-beta decay, is used to mimic the signal.

Presenter: Dr KEKIC, Marija (IFIC)

Session Classification: Talks