Title:
“Development of the AI-assisted track reconstruction algorithms for ALERT's particle identification.”

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Abstract:
“The addition of the planned A Low Energy Recoil Tracker (ALERT) to the already operating CLAS12 spectrometer will enable a broad scientific program to study the fundamental structure of light nuclei, such as ^{2}H and ^{4}He. This program consists of a series of exclusive and semi-inclusive measurements focusing, among others, on the exploration of the nuclear Generalized Parton Distributions (GPDs), EMC effects, as well as the nature and origin of nuclear effects. The coherent and incoherent Deep Virtual Compton Scattering and tagged Deep Inelastic Scattering processes require the detection of the recoiling spectator system with a large kinematic coverage. The ALERT detector comprising a low gain stereo drift chamber and a scintillator array provides track reconstruction and time of flight measurements to detect low energy recoil nuclear fragments. The reliable separation of ^{4}He, ^{3}He, ^{3}H, deuterons and protons in a high rate environment is one of the most critical performance aspects of ALERT. Implementation of new artificial intelligent (AI) track reconstruction methods are proved to be beneficial for experiments conducted at high instantaneous luminosities. The improved tracking accuracy and overall particle identification that can be achieved with modern machine learning techniques is crucial for these experiments. The status of this AI-assisted ALERT tracking development will be presented.”

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