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Charged Particle Track Reconstruction in CLAS12 using Artificial Intelligence

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The increasing complexity and data volume of Nuclear Physics experiments require significant computing resources to process data from experimental setups. The entire experimental data set has to be processed to extract sub-samples for physics analysis. The advancements in Artificial Intelligence and Machine Learning fields provide tools and procedures that can significantly enhance the throughput of data processing and significantly reduce the computational resources needed to process and categorize the experimental data in the raw data stream. In CLAS12 machine learning methods are developed to perform track reconstruction in real-time, allowing the identification of physics reactions from the raw data stream with the rates exceeding the data acquisition rates. In this paper, we present the Neural Network-driven track reconstruction that allows event classification and physics analysis in real time. We present a complete physics analysis of the data processed in the online.

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