



Contribution ID : 223

Type : **Oral talk**

Graph Attention Neural Network for Clustering Particle Tracks by Events in the SPD experiment

Thursday, 29 October 2026 10:00 (15)

A Graph Attention Neural Network (GANN) for particle track clustering by events in time slices obtained at the Spin Physics Detector (SPD) of the Nuclotron-based Ion Collider fAcility (NICA) is presented. A novel approach is applied to time slice processing at high particle multiplicity and pile-up. The model is trained using a hierarchical approach and evaluated on time slices generated by the Monte Carlo technique according to the SPD experiment configuration as close as possible at the moment. The model architecture includes a graph encoder and an edge classifier, both of which use the message-passing principle and iteratively structured approach. The GANN exhibits high performance in track clustering by events for the SPD simulation, achieving 90% accuracy and 90% precision and recall.

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Session Classification : Artificial Intelligence in particle physics and astrophysics

Track Classification : Artificial Intelligence in particle physics and astrophysics