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Deep neural network applications for particle tracking at the BM@N and SPD experiments

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Particle tracking is an essential part of any high-energy physics experiment. Well-known tracking algorithms based on the Kalman filter are not scaling well with the amounts of data being produced in modern experiments. In our work we present a particle tracking approach based on deep neural networks for the BM@N experiment and future SPD experiment. We have already applied similar approaches for BM@N Run 6 and BES-III Monte-Carlo simulation data, which are relatively simpler and produce less data during the experiment. This work is the next step in our ongoing study of tracking with the help of machine learning — revised algorithms (combination of Recurrent Neural Network (RNN) and Graph Neural Network (GNN) for the BM@N Run 7 Monte-Carlo simulation data, and GNN for the preliminary SPD Monte-Carlo simulation data) are presented. Encouraging results in terms of track efficiency and processing speed for both experiments are demonstrated.

Agreement to place

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