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Application of neural networks in rapid estimation of the impact parameter of high-energy collisions from data obtained from microchannel plates detector.

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In this work, we present the results of series of computational experiments studying the neural network approach to event-by-event estimation of the impact parameter in heavy ion collisions. The configurations of detectors on microchannel plates, were simulated as a source of collision data for the computational algorithm. Originally, such detector systems were proposed in [1]. Computational experiments were carried out on the data of ^{197}Au+^{197}Au collisions generated by QGSM and EPOS models at energies $\sqrt{s_{NN}} = 11$ GeV and $\sqrt{s_{NN}} = 11.5$ GeV.

In the scope of this work, we present the advantages of the neural network approach in evaluation of the impact parameter. Moreover, we show that the developed algorithm is capable to provide sufficiently good and fast results on a single event, and that in our exercises the algorithm was able to successfully identify more than 90% of events with an impact parameter less than 5 fm or even 1 fm, and can be valuable as the fast trigger. In addition we will discuss the encountered problems, such as the variations in data obtained from different theoretical models, and further directions and prospects for research.

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[1] A. A. Baldin, G. A. Feofilov, P. Har'yuzov, F.F.Valiev, Fast beam–beam collisions monitor for experiments at NICA, NIMA, 958, 162154, 2019, Reported at the VCI2019, DOI:10.1016/j.nima.2019.04.10

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