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# Data-driven machine learning algorithms for the calibration of space-charge distortion fluctuations in the ALICE TPC

*Thursday, 12 May 2022 14:50 (15 minutes)*

The Time Projection Chamber (TPC) of the ALICE experiment at CERN LHC was upgraded for Run 3 and Run 4. Readout chambers based on Gas Electron Multiplier (GEM) technology and a new readout scheme allow continuous data acquisition at the highest interaction rates expected in Pb-Pb collisions. In the absence of a gating grid system, a significant amount of ions generated in the multiplication region are expected to enter the TPC drift volume and distort the uniform electric field. The fluctuation of the ion space-charge density leads to a corresponding fluctuation of the space-point distortions. In order to achieve the intrinsic resolution of the detector system of O(100 μm), the distortions of O(5 cm) need to be corrected in time intervals of the order of 10 ms.

To account for unknown detector parameters such as ion drift velocity or local ion transparency, data-driven methods are considered. A combination of a physical model approximation and machine learning techniques will be used to correct for distortion fluctuation. The results of preliminary studies are shown and the prospects for further development and optimization are also discussed.

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