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Propagation of tracks using accurate model of ALICE detector magnet system for event visualisation

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Phenomenon of bending the trajectory of charged particles in a magnetic field is used as part of the particle tracking and identification system of the ALICE detector at CERN. The detector contains two electromagnets - a large solenoid which generates a magnetic field for the barrel tracking detectors of strength 0.5 Tesla, and a dipole magnet for the Muon Arm Spectrometer which generates a magnetic field of strength 0.7 Tesla. During the calibration of the detector the magnetic field characteristics were measured by the scientific team. The measurement points were then fitted using Chebyshev polynomials to create a field model. This accurate model is applied extensively in the particle trajectory reconstruction. To store the particle data efficiently, only the first detected position of the particle, its type, and the momentum vector is preserved in storage. The particle trajectory, if needed, can be recreated by simulating its propagation in the detector's magnetic field. In the case of track visualisation software however a simpilfied, uniform 0.5 Tesla magnetic field has been used for this purpose so far. For this reason the visualised tracks are not an accurate representation of what was originally detected, especially in the case of particles that interact mostly with the magnetic field generated by the (completly omited in the simplified model) dipole magnet, such as muons.
In our previous publication we have studied how the accurate model could be implemented as a shader program for execution on a GPU, allowing its use in interactive magnetic field visualisations. In this work we explore the benefits of using the accurate model (in the form of our shader program) as a part of a propagation simulation for visualisation of tracks with improved fidelity.

Authors: NOWAKOWSKI, Piotr (Warsaw University of Technology (PL)); GRACZYKOWSKI, Lukasz Kamil (Warsaw University of Technology (PL)); ROKITA, Przemyslaw (Warsaw University of Technology (PL))

Presenter: NOWAKOWSKI, Piotr (Warsaw University of Technology (PL))

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