Simulation of trajectories of runaway electrons for support diagnostics at the COMPASS tokamak

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The Cherenkov detector is one of the few runaway electron diagnostics, which do not rely on a detection of secondary radiation caused by an impact of high energetic particles on the limiter or the first wall of the tokamak. The capability of a direct observation of runaway electrons together with a possibility of setting energy thresholds for incoming particles makes the Cherenkov detector a useful diagnostics tool for an investigation of runaway electrons dynamics. In the past years experiments focused on observation of runaway electrons by the Cherenkov-type detector were performed at the COMPASS tokamak. One of features of the Cherenkov detector is a measurement in the well defined location of the tokamak with high temporal resolution. Due to safety reasons, the Cherenkov detector is placed in the shadow of the low field side protection limiter in most discharges performed on the COMPASS tokamak. The open question is whether runaway electrons can reach the detection head of the Cherenkov detector or are preferably lost at the protection limiter. The aim of this work is a simulation of trajectories of escaping runaway electrons and finding the location of their impact in order to determine possible parameters of runaway electrons, which can be detected by the Cherenkov detector. For these purposes, the pushers for tracking of relativistic particles were implemented in the Python environment and particles are tracked in the reconstructed axisymmetric magnetic field of the COMPASS tokamak (calculated by the EFIT code).

References

[1] Panek R. *et al.* 2016 *Plas. Phys. Contr. Fusion* **58** 014015

[2] Mlynar J. *et al.* invited, this conference