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Simulated beam performance of the TWOCRYST proof of principle experiment at the LHC

Monday 2 June 2025 16:00 (2 hours)

TWOCRYST is a machine test designed to demonstrate the feasibility of an in-vacuum fixed-target experiment for the first direct measurement of the magnetic and electric dipole moments of short-lived charm baryons. This setup exploits crystal channeling using two bent crystals. The first one is similar to the existing crystals used in the LHC for beam collimation, deflecting the beam halo particles from the proton beam onto a target. The second one - a 7 cm silicon crystal - induces spin precession in the secondary particles produced in the target. 2D detectors in movable Roman pots will track the distribution of these channeled particles. A new silicon pixel detector and a fiber tracker (formerly used by the LHC ATLAS-ALFA experiment) are planned for installation in the LHC along with the two crystals in early 2025. Xsuite simulations have been performed to reproduce the multi-turn beam dynamics of the channeled beam halo and the particle distribution expected at the detectors. The LHC configurations required for the planned measurements have also been simulated, with the results used to specify the required detector performance in preparation for benchmarking against real data.

Footnotes

Paper preparation format

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