
Contribution ID: **682** Contribution code: **MOPM025** Type: **Poster Presentation**

# Advancing the feasibility study of the ALICE fixed-target experiment using crystal-assisted halo splitting with HL-LHC lead ion beams

*Monday 2 June 2025 16:00 (2 hours)*

The Large Hadron Collider (LHC) at CERN is the world's most powerful particle accelerator, capable of colliding proton and lead ion beams at energies up to 7 ZTeV. ALICE, one of the LHC's key experiments, is designed for studying heavy-ion collisions. A proposed fixed-target experiment within ALICE involves directing a portion of the beam halo, extracted using a bent crystal, onto an internal target positioned a few meters upstream of the detector. For proton beams, this configuration has already demonstrated effective particle flux delivery to the target while operating safely alongside standard beam-beam collisions. However, with lead ion beams, the beam halo comprises nuclei of varying charge, mass, and magnetic rigidity, posing additional operational challenges. This paper presents an analysis of the expected performance, based on multi-turn particle tracking simulations using a detailed LHC model.

## Footnotes

## Paper preparation format

LaTeX

## Region represented

Europe

## Funding Agency

This research was funded by the National Science Centre, Poland, project number: 2021/43/D/ST2/02761.

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**Session Classification:** Monday Poster Session

**Track Classification:** MC1 :Colliders and Related Accelerators: MC1.A01 Hadron Colliders