Contribution ID: **1242** Contribution code: **THPB018** Type: **Poster Presentation**

Conceptual design and optimization of a liquid lead circuit as beamstrahlung absorber for the CERN's FCC

Thursday 5 June 2025 15:30 (2 hours)

Beamstrahlung radiation represents a new challenge at CERN's lepton Future Circular Collider (FCC-ee), specifically for electron-positron collisions. At each interaction point, its unprecedented beam intensities give rise to two photon beams with a power of several hundred kW each. Liquid lead, known for its high density and Z and relatively low melting point, is proposed as a beam dump material to safely dispose of this power. Achieving the necessary effective interaction thickness of 10 to 20 cm presents challenges in optimizing both mass flow rates and the geometric configuration of the lead. This study employs the Monte Carlo code FLUKA to simulate energy deposition and thermal simulations to investigate multiphase flow dynamics within an open-channel configuration. Various slope designs for a free-flowing liquid lead stream within an argon-filled vessel are explored to prevent oxidation. By optimizing the slope and shape of the lead flow, this work seeks to enhance energy absorption and thermal management, improving the effectiveness of liquid lead in high-power beam dump applications.

Footnotes

Paper preparation format

LaTeX

Region represented

Europe

Funding Agency

Author: CANDIDO, Silvio (European Organization for Nuclear Research)

Co-authors: FRASCA, Alessandro (European Organization for Nuclear Research); PERILLO MARCONE, Antonio (European Organization for Nuclear Research); CARRELLI, Carlo (ENEA Brasimone); LERNER, Giuseppe (European Organization for Nuclear Research); CALVIANI, Marco (European Organization for Nuclear Research); TARANTINO, Mariano (ENEA Brasimone); SEIDENBINDER, Regis (European Organization for Nuclear Research); FRANQUEIRA XIMENES, Rui (European Organization for Nuclear Research)

Presenter: CANDIDO, Silvio (European Organization for Nuclear Research)

Session Classification: Thursday Poster Session

Track Classification: MC7: Accelerator Technology and Sustainability: MC7.T20 Targetry and Dumps