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Improvements of the SPS slow extraction electrostatic septum

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The impact of high-flux protons on the inherent beam loss in the slow extraction from SPS towards the North Area has been recently discussed and potential improvements have been proposed. These solutions are mainly aiming to reduce the high component activation and related reduction of lifetime, as well as observed non straightness in the anode body. Recent studies have allowed to demonstrate feasibility of replacing the currently installed stainless steel tank, flanges, and anode body by lowZ materials. The design iteration and material choice has led to the fabrication of a reduced length prototype, demonstrating mechanical, electrical, as well as the vacuum related performance. The mass reduction of the anode body has been optimized using numerical simulation, considering mechanical and thermal constraints. The paper presents the development of the vacuum vessel, including numerical analysis. The results from the design and prototype tank fabrication will be compared to the existing system. Furthermore, the optimization of the anode body and potential fabrication based on additive manufacturing including 3d optical straightness metrology will be discussed.

Footnotes

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Europe

Primary author: LACKNER, Friedrich (European Organization for Nuclear Research)

Co-authors: PROST, Antoine (European Organization for Nuclear Research); BALHAN, Bruno (European Organization for Nuclear Research); PIROZZI, Fabrizio (European Organization for Nuclear Research); BORBURGH, Jan (European Organization for Nuclear Research); KAWA, Krzysztof (European Organization for Nuclear Research); JORAT, Louise Olivia (European Organization for Nuclear Research); FRASER, Matthew (European Organization for Nuclear Research); ROUDAUT, Noah (University of Technology of Belfort-Montbéliard)

Presenter: KAWA, Krzysztof (European Organization for Nuclear Research)

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