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## Expanding the CERN ion injector chain capabilities: new beam dynamics simulation tools for future ion species

*Monday, 20 May 2024 16:00 (2 hours)*

The present ion physics program in the CERN accelerator complex is mainly based on lead (Pb<sup>82+</sup>) ion beams. Lighter ions have been considered both by the ALICE3 detector upgrade proposal at the Large Hadron Collider (LHC) – as a potential way to achieve higher integrated nucleon-nucleon luminosity compared to the present Pb beams – and also by the Super Proton Synchrotron (SPS) fixed-target experiment NA61/SHINE. However, there is little or no operational experience at CERN with ions species lighter than Pb. This calls for beam-brightness and intensity limitations studies to assess the performance capabilities of the CERN ion injector chain, which consists of LINAC3, the Low-Energy Ion Ring (LEIR), the Proton Synchrotron (PS) and the SPS. This paper presents tracking simulation resu

Its for the SPS, compared against recent Pb beam emittance and beam loss measurements at the long injection plateau. The simulation models include limiting beam dynamics effects such as space charge and intra-beam scattering (IBS), whose impact on the future ion injector chain performance is discussed. Beam dynamics simulation results for the planned O<sup>8+</sup> pilot physics run are also presented.

### Footnotes

### Funding Agency

### Paper preparation format

LaTeX

### Region represented

Europe

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