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The SHERPA experiment

Tuesday 3 June 2025 16:00 (2 hours)

The SHERPA ("Slow High-efficiency Extraction from Ring Positron Accelerator") project aim is to develop an efficient technique to slowly extract positron spills of O(ms) length, with excellent beam energy spread and emittance, from one of the accelerator rings composing the DAΦNE accelerator complex at the Frascati National Laboratory of INFN. SHERPA proposes to use coherent processes in bent crystals*to kick out positrons from the ring, a cheaper and less complex alternative. Realizing this for sub-GeV energies is challenging, however would provide the world's first positron beam obtained with crystal extraction. This technology can be applied in general for both negative and positive leptons and can be used for several accelerating machine aspects in the next future, contributing to a general improvement in the particle accelerator field. An overview of the whole experiment, describing in particular the crystal extraction principle, the accelerator optics simulations, the crystal prototype and the crystal characterization apparatus will be presented. The first promising experimental results*** will also be reported, together with new future applications.

Footnotes

- M. Biryukov et al, Crystal channeling and its application at high-energy accelerators, Springer Science Business Media, 2013 17. ** M. Garattini et al., Phys. Rev Accel. Beams 25 (2022) 033501. *** M. Garattini et al., arXiv:2409.13526 (2024).

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