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The PSI Positron Production Project

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P-cubed, currently in development at PSI, is the proposed proof-of-principle experiment for the FCC-ee positron source. Capture and transport of the secondary positron beam from the production target to the damping ring are a key challenge for FCC-ee, due to large emittance and energy spread. The use of novel matching and focusing methods has been studied, such as high temperature superconducting (HTS) solenoids, where recent simulations show considerably higher positron yield with respect to the state of the art.
To exploit this potential, the goal of P-cubed is to test an innovative technological approach and validate a high-yield positron source for FCC-ee. The experiment is to be hosted at SwissFEL, where a 6 GeV electron beam and a tungsten target can be used to generate the positron distribution. Such beam will be captured through an arrangement of a HTS solenoid-based Adiabatic Matching Device, two standing-wave cavities in S-band and four solenoids surrounding such structures. Thus, several technological alternatives are discussed and the baseline design for the experiment is proposed.

Primary author: VALLIS, Nicolas (PSI/EPFL)

Co-authors: AUCHMANN, Bernhard (PSI/CERN); CRAIEVICH, Paolo (PSI); DUDA, Michal (PSI); KOSSE, Jaap (PSI); ZENNARO, Riccardo (PSI)

Presenter: VALLIS, Nicolas (PSI/EPFL)

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