



Contribution ID: 22

Type: (b) Poster abstract only (one author must be in person)

Diagnostics for the FCC-ee positron source test facility at PSI

Thursday 13 June 2024 18:53 (1 minute)

The P³ experiment is the positron source test facility for FCC-ee, which is presently under construction at the Paul Scherrer Institute in Switzerland. The proposed diagnostics setup will detect the charge, longitudinal profile, and energy spectrum of multispecies electron-positron beams in the nano-Coulomb and multi-MeV range. Additionally, the diagnostics must work under extremely challenging emittance and energy spread conditions. Three instrumentation setups are essential to achieve this: non-invasive longitudinal bunch profile monitors based on broadband pick-ups, Faraday cups, and energy-spectroscopic setups based on scintillator screens and fibers. These studies are based on computer simulations and experimental measurements carried out at the CERN's CLEAR facility.

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