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Benchmarking the FCC-ee positron source simulation tools using the SuperKEKB results

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For the Future Circular Collider (FCC-ee), particular attention is drawn to the crucial role of the positron source. Two positron production schemes are considered for the FCC-ee: conventional and crystal-based (hybrid), implying the use of channeling radiation in the oriented crystals. To design and optimize the positron production and capture by considering the positron injector parameters, including the electron drive beam and the final system acceptance, a start-to-end simulation toolkit should be developed.

This paper will present the first results of benchmarking the FCC-ee positron source simulation tools using the SuperKEKB positron source currently in operation. The model starts with the production of positrons and target studies in Geant4. Then, a new tracking code RF-Track is used for capturing and tracking the generated positrons through the capture section composed of the matching device and several accelerating structures embedded in the solenoid field to accelerate the positrons until ~120 MeV. Afterward, the positrons are further accelerated to the energy of the Damping Ring (1.1 GeV).

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Footnotes

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