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Positron production for FCC-ee

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The high-luminosity circular collider FCC-ee will need a low-emittance positron beam with high enough intensity to shorten the injection time. In particular, operation at the Z-pole demands a positron bunch intensity of 2.14e10 particles at injection into the collider rings. The baseline design for positron production relies on a conventional source, where a 2.86 GeV electron beam impinges on a 15 mm thick tungsten target. The positrons are captured using an Adiabatic Matching Device (AMD), followed by a capture linac embedded in a DC solenoidal magnetic field, accelerating the positron beam to approximately 170 MeV. A chicane is employed to separate positrons from electrons after the capture linac, while solenoidal focusing continues up to positron energy of 930 MeV. Subsequently, the positron beam is transported through a matching section into a quadrupole-focused section and accelerated to the Damping Ring (DR) injection energy of 2.86 GeV. An energy compression system (ECS) is used upstream of the DR to maximize the number of positrons captured within the DR longitudinal acceptance. This contribution will present the current status of the FCC-ee positron source design, including the main challenges and a roadmap for future developments.

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