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Beam Optics for FCC-ee Collider Ring (15' + 5')

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Design of beam optics will be presented for the FCC-ee double-ring collider. The main characteristics are 45 to 175 GeV beam energy, 100 km circumference with two IPs/ring, 30 mrad crossing angle at the IP, crab-waist scheme with local chromaticity correction system, and "tapering" of the magnets along with the local beam energy. An asymmetric layout near the interaction region suppresses the critical energy of synchrotron radiation toward the detector at the IP less than 100 keV, while keeping the geometry as close as to the FCC-hh beam line. A sufficient transverse/longitudinal dynamic aperture is obtained for $\beta^* = (0.5 \text{ m}, 1 \text{ mm})$ to assure the lifetime with beamstrahlung and top-up injection. The synchrotron radiation in all magnets, the IP solenoid and its compensation, nonlinearity of the final quadrupoles are taken into account.

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