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FCC-ee IR optics solutions

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The part of the ongoing study of the future circular collider (FCC) is an electron positron machine with center of mass energy from 90 to 350 GeV. Crab waist collision scheme and small (1 mm) vertical beta function at the interaction point (IP) provide superior luminosity. At the top energy, radiation in the field of the opposite bunch (beamstrahlung) limits the beam lifetime and therefore achievable luminosity. Beamstrahlung influence depends on momentum acceptance of the lattice, the value of 2% provides acceptable lifetime. The small value of vertical beta function enhances effects of nonlinear chromaticity. Synchrotron radiation at top energy creates high background in vicinity of the interaction point. The work describes two crossing angle and one head-on optical solutions, discusses pros and cons of the variants.

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