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Pair production and γ ray emission in collisions of e^+e^-beams. FABRIZIO DEL GAUDIO, THOMAS GRISMAYER, RICARDO FONSECA, GoLP/IPFN, Instituto Superior Tcnico, Lisbon, Portugal, WARREN MORI, University of California, Los Angeles, California, USA, LUIS SILVA, GoLP/IPFN, Instituto Superior Tcnico, Lisbon, Portugal — The fast development in Plasma Wakefield Acceleration suggests that high quality relativistic electron/positron beams, having tens of GeV in energy and densities up to 10cm^{-3}, can be delivered by tabletop devices in the near future. With these parameters, the collective electromagnetic field of one beam compares to the Schwinger field in the boosted frame of the oncoming beam, thus the quantum regime is approached where particles are capable to emit hard photons apt to decay in electron positron pairs. Under certain conditions, additionally to quantum effects, the disruption effect takes place altering the beams density profile more or less severely. Estimates regarding beams energy loss and the number of pairs generated in such collisions were addressed by P. Chen with simplified beam geometry. We present a model for the low disruption regime, with realistic beams parameters, that predicts the average radiation intensity, its spectrum and the number of pairs created during the beam-beam interaction. Our model agrees with fully consistent PIC simulations done with the QED module of OSIRIS 3.0. The results obtained qualify this setup as possible γ ray source and show that relevant number of pairs, higher than previous estimates, is produced at these beam energies and densities.

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