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8 Beam-Beam Effects on Polarization

The effect of beam-beam interactions on the polarization will have to be studied in simulations. To first-order, the beam-beam effect is a focusing force that affects spin-transparency. At HERA it was observed that the optimum polarization at strong beam-beam required slightly different optimization of the machine but was recoverable to a large extent [56, 57]. Beam-beam in SuperKEKB will be stronger, but only by a modest factor, not by an order of magnitude as the luminosity is increased by extremely small $\beta*$, not by an extremely large beam-beam parameter. We note that the beam-beam effects experienced by the electrons in HERA was not particularly small, due to the strong proton bunches, and was one of the factors limiting the luminosity [58]. At SuperKEKB, with short beam lifetime and constant injection of freshly polarized electrons, a high equilibrium polarization is a realistic expectation.