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Modelling resonant depolarisation

Monday 2 June 2025 16:00 (2 hours)

For the FCC-ee collider it is planned to, in regular intervals (minutes), measure the average beam energy of the circulating electron and positron beams with a relative precision of 10^{-6} or better, using the method of resonant depolarisation with pre-polarized pilot bunches. In this article, we study basic systematic effects and ultimate uncertainties that may arise in this kind of measurement. To do so, we carry out simulations for a simple model representing an ideal situation, where an ensemble of particles with energy spread is subjected to synchrotron oscillations and to perfect spin motion. We assume an initial spin orientation in the vertical direction for all particles. The behavior of the spin is explored as an exciter frequency is swept slowly or rapidly, and in either direction,through the spin resonance.

Footnotes

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