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Spin precession as a method for beam energy measurement

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The ability to know the beam energy extremely precisely is a fundamental asset for any storage ring lepton collider such as the FCC-ee. Since the energy is fundamentally related to the spin tune, measuring the spin precession frequency determines the energy; the method requires that the beams be polarized. We present here first simulations for a simplified lepton storage ring with 100 m circumference, which allows to understand in depth this phenomenon and address some of the possible systematic uncertainties. Furthermore, we discuss two methods for measuring the spin tune, namely by either a Fast Fourier Transformation or by a more direct technique which allows to measure the spin tune from only a few turns. The second option is then used to obtain an estimate of the beam energy over numerous revolutions.

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