Spin matching in electron storage rings

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Abstract

The level of spin polarization available to an experiment in an electron storage ring can be limited by depolarization caused by synchrotron radiation. Depolarization increases strongly with energy and can be especially strong if the ring is misaligned or has spin rotators to provide longitudinal polarization at interaction points. However, the depolarization can be reduced by "linear spin matching", i.e. by a careful choice of the optics in sections of the ring. Spin matching is conveniently carried out in terms of the 8×8 spin-orbit transfer matrices of the SLIM formalism. This approach emphasizes the locality of the required "spin transparency", is convenient for diagnosis and allows computer algebra to be used. The method will be explained and examples given.

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