Beam Polarization Distributions for RHIC[1]

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In order to calculate the distribution of the beam polarization in a circular accelerator, the invariant spin field has to be calculated. The invariant spin field in a high energy accelerator can vary substantially across the beam. This decreases the amount of polarization provided to experiments and makes the polarization dependent on the position in phase space. One method to calculate the invariant spin field is stroboscopic averaging [1], based on multi-turn tracking and averaging of the spin viewed stroboscopically from turn to turn at one position in the ring. The invariant spin field has also been studied using a method called adiabatic anti-damping [2], which is very similar to the method presented here.

In our study the motion of particle and spin is adiabatically excited with coherent betatron oscillations using an AC dipole to investigate the invariant spin field in the Brookhaven Relativistic Heavy Ion Collider (RHIC) [3].

References

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[2] M. Vogt et al., Proc. of EPAC 98, 1362 (1998).

[3] A. Lehrach et al., DESY-Proc-1999-03, 210 (1999).