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Computing spin-polarization in electron storage rings by a Galerkin method for integrating the Bloch equation of the polarization density

Wednesday 4 June 2025 16:00 (2 hours)

Here we report on one of our approaches to this problem where we model the evolution of the polarization density of an electron bunch by the so-called Bloch equation. The Bloch equation captures key effects like the radiative depolarization effect, the Sokolov-Ternov effect, the Baier-Katkov effect, the kinetic polarization effect and the intrabeam scattering effect. The Bloch equation is a PDE which we aim to integrate numerically using a Galerkin method which was proposed in O. Beznosov's 2020 UNM dissertation* and is being studied in the ensuing years by K. Heinemann. The algorithm and results of a simple model will be presented.

Footnotes

- O. Beznosov, PhD Dissertation, Department of Mathematics and Statistics, University of New Mexico, December 2020.

Paper preparation format

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