

Self-Polarization Tests at Bates

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The contribution from the “Kinetic polarizing” term in the Derbenev-Kondratenko formula could lead to a significant reduction of the equilibrium polarization level of electrons in the EIC electron ring where spin rotators are presented to provide longitudinal polarization at the interaction point. Experimental verification of the theoretical predictions of this effect is very important to the design of the EIC electron ring.

The kinetic polarization is dominant in self-polarization at the Bates South Hall ring which using a Siberian snake to keep the beam polarization direction in horizontal plane except inside the Snake, and longitudinal at the internal target. This kinetic polarizing mechanism can be greatly enhanced by installing special polarizing wigglers in proper locations to obtain higher equilibrium polarization level and shorter spin relaxation time.

A kinetic polarization test plan at Bates South Hall ring has been developed for the EIC design research. The tests will be carried out in 1.1 to 1.5 GeV energy range. The expected self-polarization will be higher than thirty percent and reverses sign when crossing the 1.32 GeV “magic” energy. The polarization time will vary from half an hour to a few minutes. Therefore the KP theory can be tested in detail.

Technical details and a realistic schedule of the plan are presented.