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A Novel Spin-Light Polarimeter for the Electron Ion Collider[1]
PRAJWAL MOHANMURTHY, DIPANGKAR DUTTA, Mississippi State University — High precision polarimetry is a pre-requisite for the suite of precision experiments being planned for the proposed Electron Ion Collider. A novel polarimeter based on the asymmetry in the spacial distribution of the spin light component of synchrotron radiation will make for a fine addition to the existing-conventional Møller and Compton polarimeters. The spin light polarimeter consists of a set of wiggler magnet along the beam that generate synchrotron radiation. The spacial distribution of synchrotron radiation will be measured by an ionization chamber. The up-down (below and above the wiggle) spacial asymmetry in the transverse plain is used to quantify the polarization of the beam. As a part of the design process, the fringe fields of the wiggler magnet was simulated using a 2-D magnetic field simulation toolkit called Poisson Superfish, which is maintained by Los Alamos National Laboratory. The effects of the fringe field was found to be negligible. Lastly, a full fledged GEANT-4 simulation was built to study the response of the ionization chamber. The results from all the simulations carried out, the preliminary design parameters of the polarimeter and its impact will be discussed.

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