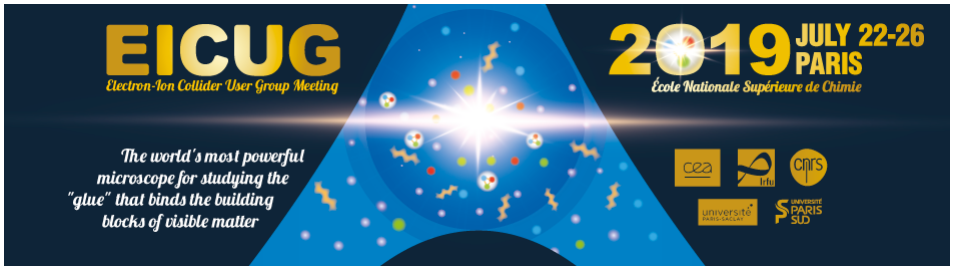

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Relativistic Magnetized Electron Cooling Simulations for JLEIC

Relativistic magnetized electron cooling is essential for achieving the ion beam luminosity requirements of proposed electron-ion collider (EIC) designs. Because the cooling system will have to operate in previously untested parameter regimes, accurate computation of magnetized dynamic friction is required at the design stage. In particular, one has to include all relevant physics that might increase the cooling time, such as short interaction time in the cooler, space charge forces, field errors and complicated phase space distributions of imperfectly magnetized electron beams. We will present recent work on a new semi-analytic treatment of momentum transfer from an ion to a distribution of magnetized electrons, and discuss its application to calculation of dynamic friction in the parameter regime relevant to the JLEIC design. We will present in addition results of cooling simulations performed with the JLab's JSPEC electron cooling code using RadiaSoft's Sirepo browser-based GUI.

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