

PARALLEL SIMULATION OF COULOMB COLLISIONS FOR HIGH-ENERGY ELECTRON COOLING SYSTEMS

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Abstract

High-energy electron cooling requires co-propagation of relativistic electrons over many meters with the recirculating bunches of an ion collider ring. The expected increase of ion beam luminosity makes such systems a key component for proposed efforts like the RHIC luminosity upgrade* and the FAIR project. Correctly simulating the dynamical friction of heavy ions, during brief interactions with low-density electron populations, in the presence of arbitrary electric and magnetic fields, requires a molecular dynamics approach that resolves close Coulomb collisions. Effective use of clusters and supercomputers is required to make such computations practical. Previous work will be reviewed. Recent algorithmic developments and future plans will be emphasized.

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