Abstract Submitted
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Thermal equilibration from the long-range collisions in e^- / H^- magnetized NNP.[1] ANDREY KABANTSEV, C. FRED DRISCOLL, University of California, San Diego — We measure the particle slowing-down rate in a strongly magnetized ($r_{ce}, r_{cH} \ll \lambda_D$) weakly coupled e^-/H^-nonneutral plasma. The plasma consists of near-room-temperature electrons ($T_e \approx 0.03 - 0.1eV$) with an admixture (up to 20%) of negative hydrogen ion, H^-. Here, $n_e \sim 10^7/cm^3$, $n_{H^-} \sim 10^6/cm^3$. It was suggested recently [1] that for repulsive Coulomb interactions in the strongly magnetized regime, the slowing-down rate can be greatly enhanced by collisions with impact parameter ρ in the range $r_{cH} < \rho < \lambda_D$. We measure the thermal equilibration rate $\nu^{H/e}$ between the cold electrons and the bounce-dynamically heated negative ions, and have found the typical rate $\nu^{H/e} \approx 1/\,\mathrm{sec}$ which is a factor of 5 smaller than the enhanced rate of [1] estimated for the given above plasma parameters. Possible reasons for the observed discrepancy will be analyzed, including hidden effects like a radial mass-separation, non-uniform $T_e(r)$ profile, etc. This enhanced particle slowing-down rate contributes also to the collisional damping of plasma waves, and affects the cyclotron cooling rate for electrons. [1] D.H.E. Dubin, Phys. Plasmas 21, 052108 (2014).

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