Abstract Submitted
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Direct Measurement of Enhanced Particle Slowing from 1D Long-Range Collisions[1] FRANCOIS ANDEREGG, University of California, San Diego, PATRICK STEINBRUNNER, University of Greifswald, Germany, JACOB SARET, C. FRED DRISCOLL, University of California, San Diego — We will discuss the first direct measurements of enhanced parallel velocity slowing (and diffusion) rates due to 1D long-range collisions in Mg^+ ion plasmas. The un-neutralized magnetized ion plasmas are contained in near-thermal-equilibrium states in cylindrical Penning-Malmberg traps, with densities $n \sim 10^7 \mathrm{cm}^{-3}$ and temperatures $10^{-5} < T < 1\,\mathrm{eV}$. The electronic spin orientation of the Mg^+ ions is used to "tag" some test particles, which evolve collisionally the same as all other particles; and the test particle velocity distribution is then measured (non-destructively) versus time. Initial experiments at $T \sim 1\,\mathrm{eV}$created a colder Maxwellian distribution of test particles, which then relaxed to the background temperature. These preliminary measurements are in rough agreement with recent theory [1], which predicts an enhancement of about 2x over classical theory. Prior experiments on plasma wave damping in multi-species ion plasmas gave indirect measurements of this enhanced collisionality [2]. Relaxation rates over a wide range of temperatures will be pursued, as far into the correlated plasma regime as practicable. *1. D.H.E. Dubin, Phys. Plasmas* ***21****, 052108 (2014) 2. M. Affolter, F. Anderegg, D.H.E. Dubin and C.F. Driscoll, Phys. Rev. Lett* ***117****, 155001 (2016)*

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