Test of Long-Range Collisional Drag via Plasma Wave Damping[1]

C.F. DRISCOLL, M. AFFOLTER, F. ANDEREGG, University of California San Diego — In magnetized plasmas, where the cyclotron radius r_c is less than the Debye length λ_D, classical collision theory is incomplete, since it neglects long-range collisions with impact parameters ρ in the range $r_c < \rho < \lambda_D$. We present the first experimental confirmation of a new theory* predicting enhanced parallel velocity slowing due to these long-range collisions in magnetized plasmas. The experiments measure the damping rate of plasma waves in multi-species pure ion plasmas confined in a Penning-Malmberg trap. In certain regimes, this damping is dominated by interspecies collisional drag. The measured damping rates exceed classical predictions of collisional drag damping by as much as an order of magnitude, but agree with the new long-range collision theory. *D.H.E. Dubin, Phys. Plasmas **21**, 052108 (2014)

C.F. Driscoll
University of California San Diego

Date submitted: 13 Jul 2016   Electronic form version 1.4