Abstract Submitted
for the DPP17 Meeting of
The American Physical Society

Long-Range Collisions : Overview and Open Questions[1] C. FRED DRISCOLL, UCSD — Wide-ranging theory and experiments at UCSD have broadly characterized the enhanced transport of particles, momentum, and energy from "long-range" collisions. These are drift-kinetic collisions with impact parameters in the range $r_c<\rho<\lambda_D$, distinguished from "classical" velocity-scattering collisions with $\rho<r_c$. These long-range interactions are dominant in non-neutral plasmas, and can enhance the electron channel heat transport and particle transport in neutral plasmas. Some observed characteristics are: (-a-) Cross-field thermal diffusivity is *independent* of magnetic field, and is observed up to 10ˆ6 times classical in electron plasmas at B=12.kG. (-b-) Cross-field particle diffusion and viscosity are strongly enhanced, but *reduced by plasma drift-flow shear,* with B-scalings dependent on the shear and on the axial plasma length. Viscosity up to 10ˆ8 times classical is observed in short electron plasmas. (-c-) Individual particle slowing rates are substantially enhanced at low emperatures, exhibiting the novel effects of "velocity caging" and multiple simultaneous collisions. Recent experiments observe 10x enhanced collisional plasma wave damping in cold ion plasmas.[2] (-d-) Open questions remain concerning the transition from the 3D drift-kinetic regime to the 2D drift-only regime, especially with regard to the subtleties of shear viscosity. [2] M.Affolter et al, Phys.Rev.Lett **117**, 155001 (2016) and other references at NNP.ucsd.edu .

[1]Supported by NSF/DOE Partnership grants PHY1414570 and DE-SC0002451, and by DE-SC0008693

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Date submitted: 06 Jul 2017 Electronic form version 1.4