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**Diffusive Transport Properties Across Coupling Regimes**

G. DHARUMAN, MSU, M.S. MURILLO, LANL, J. VERBONCOEUR, A. CHRISTLIEB, MSU — Transport properties are poorly known across coupling regimes, therefore understanding them is of importance for theoretical and practical reasons. A useful tool is an ultracold plasma system because of the experimental capability to tune the system to attain Coulomb coupling  $\Gamma$  ranging from 0.1 to 1 to 10 with the screening parameter  $\kappa$  ranging from 0 to 4 to 8, spanning the regions of the phase diagram from weak to moderate to strongly coupled and screened systems. Strong coupling is possible if Disorder Induced Heating is mitigated which requires a correlated initial ion state [1]. Of particular interest is Rydberg blockaded gas of ultracold atoms where the local blockade effect results in correlations. Predictions of higher coupling in ultracold plasma created from a Rydberg blockaded gas have been reported [2]. In this work we examine the diffusive transport properties of ultracold plasma system using molecular dynamics simulations for experimentally realizable values of  $\Gamma$  and  $\kappa$  as discussed above.

[1] M. S. Murillo, Phys. Rev. Lett. 87 (2001).

[2] G. Bannasch et. al, Phys. Rev. Lett. 110 (2013).

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