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Molecular Dynamics Simulations of Magnetized Dusty Plasmas C. A. ROMERO-TALAMAS, E. M. BATES, W. J. BIRMINGHAM, W. F. RIVERA, University of Maryland, Baltimore County, R. P. SMITH, Capitol Technology University, M. LACARRA, University of Maryland, College Park — Molecular Dynamics (MD) simulations of dusty plasma particles under various B and E x B configurations, where E and B are electric and magnetic fields, are presented. The numerical algorithm solves Poissons equation dynamically throughout the simulation to account for time-changing conditions such as inter-particle distance and time-dependent functions of ion temperature, and E and B fields. Simulations are run in 2D and 3D, and the results are being used to explore dust crystallization, quenching, and heating under intense B fields and high E x B drift velocities. The MD code is used to explore scenarios for E x B experiments planned with dust immersed in argon plasmas resulting from a combination of RF and DC glow discharges with the B-field produced by a Bitter-type electromagnet under development called ALPHA (Adjustable Long Pulse High-Field Apparatus) capable of sustaining fields up to 10 T from seconds to minutes. Particle tracking and stereoscopic reconstruction algorithms to be used on experimental data are also being tested with MD simulated particle position and velocity for ensembles that range from tens to hundreds of particles. The hardware and diagnostic setup planned for the experiments are also presented.

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