Abstract Submitted
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**Electromagnetic phenomena in granular flows in the laboratory and dusty plasmas in geophysics and astrophysics**[1] DANIEL LATHROP, University of Maryland, College Park, SKYLAR EISKOWITZ, Dept. of Mech. Eng., The Cooper Union for the Advancement of Science and Art, NY, NY and the University of Maryland, College Park, RUBEN ROJAS, Department of Physics, Institute for Research in Electronics and Applied Physics, University of Maryland, College Park, Maryland — In clouds of suspended particles, collisions electrify particles and the clouds produce electric potential differences over large scales. This is seen in the atmosphere as lightning in thunderstorms, thundersnow, dust storms, and volcanic ash plumes, but it is a general phenomena in granular systems. The electrification process is not well understood. To investigate the relative importance of particle material properties and collective phenomena in granular and atmospheric electrification, we used several tabletop experiments that excite particle-laden flows. Various electromagnetic phenomena ensue. Measured electric fields result from capacitive and direct charge transfer to electrodes. These results suggest that while particle properties do matter (as previous investigations have shown), macroscopic electrification of granular flows is somewhat material independent and large-scale collective phenomena play a major role. As well, our results on charge separation and Hall effects suggest a very different view of the dynamics of clouds, planetary rings, and cold accretion disks in proto-planetary systems.

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