Abstract Submitted
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Testing Kinetic Theory in a Driven Granular Gas Experiment for a Mechanically Fluidized Bed[1] G. W. BAXTER[2], Physics Department, Penn State Erie, The Behrend College, J. S. OLAFSEN, Department of Physics and Astronomy, University of Kansas — Robust Gaussian velocity statistics[*] and uncorrelated particle-particle velocities indicative of Molecular Chaos[**], are exhibited in a novel two-layer experiment in which a vertically shaken horizontal plate drives a layer of heavy coupled grains that, in turn, drive a layer of lighter monomer grains. While the experiment is clearly driven far from equilibrium, the dynamics are well-described by an analogy to equilibrium kinetic theory, providing a testbed for phenomena not easily observed in real molecular gases. Recent measurements have sought to test theoretical assertions concerning the relationship between pressure and temperature in granular gases as well as the conditions under which kinetic theory fails to describe inelastic hard sphere dynamics. The novel design also allows a variety of results from hard sphere molecular dynamics simulations to be tested in a real experiment including the relationships between temperature, pressure, and volume effects. [*] G. W. Baxter and J. S. Olafsen, Nature, 425, 680 (2003). [**] G. W. Baxter and J. S. Olafsen, submitted to Physical Review Letters.

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