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Collision Dynamics of Levitated Granular Clusters JUSTIN BURTON, PETER LU, SIDNEY NAGEL, University of Chicago — In a granular gas, inelastic collisions cause an initially homogeneous density of particles to evolve into discrete clusters consisting of many particles [1,2]. Further evolution of the system results from the collisions of particles within the clusters and from collisions between the separate clusters. In all of these regimes, however, experimental data is nearly non-existent due to the difficulty of creating a free gas of particles in a terrestrial environment. Here we report experiments of ~ 200 particles moving on a two-dimensional, 90×90 cm, anodized aluminum plate. Our particles are composed of solid CO_2 disks with diameter ~ 1.0 cm. When placed on a heated flat surface, the disks float on a cushion of sublimated gas, so that they move essentially without friction. The experiment is filmed from above so that particle velocities can be tracked. Our analysis from the collision of two clusters of particles reveals a sharp decrease in the total kinetic energy, which is weakly dependent on the restitution coefficient, and different velocity distributions parallel and perpendicular to the direction of impact.

- [1] I. Goldhirsch and G. Zanetti, Phys. Rev. Lett. 70, 1619 (1993).
[2] S. McNamara and W.R. Young. Phys. Rev. E 50, R28 (1994).

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