Abstract Submitted
for the DFD09 Meeting of
The American Physical Society

Energy dissipation and clustering in granular streams SCOTT WAITUKAITIS, JOHN ROYER, HELGE GRUETJEN, HEINRICH JAEGER, James Frank Institute, University of Chicago — The presence of weak cohesive forces between macroscopic grains can lead to the break up of a free falling granular stream, similar to the surface-tension-driven break up of a liquid stream[1]. This sensitivity to minute forces suggests that these free falling streams could serve as a tool to probe the interactions between grains. In order to investigate the connection between the stream dynamics and the grain-grain interactions, we perform molecular dynamics simulations of a granular stream freely falling out of a hopper varying the cohesion and inelasticity of the grains. We find that in the absence of cohesive forces the stream breaks apart into isolated grains, in contrast to the clustering observed in simulations of inelastic granular gases. For sufficiently high cohesive forces we reproduce the break up of stream into droplets, while with lower cohesive forces the stream breaks up into smaller clusters consisting of only a few grains. Measuring the change in contact number and decay of velocity fluctuations with depth, we characterize the different regions of the force-inelasticity phase space.

[1]Royer, J. R. et al. Nature **459** 1110 - 1113 (2009).

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Date submitted: 07 Aug 2009 Electronic form version 1.4