Abstract Submitted
for the MAR15 Meeting of
The American Physical Society

Maxwell Construction for a Nonequilibrium Steady-State Phase Separation in Granular Matter MARCO G. MAZZA, JAMES CLEWETT, Max Planck Institute for Dynamics and Self-Organization, JACK WADE, ROGER BOWLEY, University of Nottingham, STEPHAN HERMINGHAUS, Max Planck Institute for Dynamics and Self-Organization, MICHAEL SWIFT, University of Nottingham — Experiments and computer simulations are carried out to investigate phase separation in a granular gas under external vibration in a large sample cell. The densities of the dilute and the dense phase are found to follow a lever rule, suggesting an equation of state. We show that this equation of state, which exhibits a non-monotonic pressure-volume characteristic, $P(v)$, can be obtained from simulations of a small cell. A Maxwell construction is found to predict both the coexisting pressure and binodal densities remarkably well, despite the fact that $P(v)$ is not an isotherm. Although the system is far from equilibrium and energy conservation is strongly violated, we can derive this finding from an energy minimization argument of uctuating currents.

Marco G. Mazza
Max Planck Institute for Dynamics and Self-Organization

Date submitted: 13 Nov 2014 Electronic form version 1.4