Abstract Submitted
for the MAR15 Meeting of
The American Physical Society

The nature of long-ranged forces between pinned particles in a jammed system JUAN-JOSE LIETOR-SANTOS, JUSTIN BURTON, Emory University — We explore the interaction between of two fixed-position particles immersed in a binary, two-dimensional jammed system of disks at T=0. In our simulations, the two pinned particles develop an interaction along their alignment direction. At short distances, their interaction can be described by a mean-force potential derived from the particle-particle correlation function, g(r), and thus have a repulsive and attractive nature which depends on separation. However, there is an additional repulsive force that dominates at large particle separation or when the ambient jammed disks are much smaller than the pinned particles. We will show that the nature of this repulsive force stems from fluctuations near the jamming transition, in analogy with other fluctuation-induced forces, such as the thermal Casimir effect. We expect these results will be relevant to other studies of pinned particles near the glass transition [1]. The dependence of the long-ranged force on packing fraction, particle separation, and the size ratio of pinned to free particles will be discussed.

[1] C. Cammarota and G. Biroli. PNAS 109, 8850-8855, (2012).

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Date submitted: 14 Nov 2014 Electronic form version 1.4