Abstract Submitted
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Casimir forces in systems near jamming[1] JUSTIN BURTON, JUAN-JOSÉ LIÉTOR-SANTOS, Department of Physics, Emory University — Casimir forces arise when long-ranged fluctuations are geometrically confined between two surfaces. In most cases these fluctuations are quantum or thermal in nature, such as those near a classical critical point, yet this is not a requirement. The $T = 0$ jamming transition in frictionless, granular systems shares many properties with classical critical points, such as a diverging correlation length, although it has recently been identified as a unique example of a random first-order transition (RFOT). Here we show the existence of Casimir forces between two pinned particles immersed in systems near the frictionless jamming transition. We observe two components to the total force: a short-ranged, depletion force and a long-ranged, repulsive Casimir force. The Casimir force dominates when the pinned particles are much larger than the ambient jammed particles. In this case, we find that particles with the largest forces have the least number of contacts, and that these particles are clustered between the pinned particles, giving rise to a repulsive force which is independent of system preparation and inter-particle potential.

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