Abstract Submitted
for the MAR10 Meeting of
The American Physical Society

The Jamming Transition and Crossover to Clogging for Disks with Quenched Disorder CHARLES REICHHARDT, CYNTHIA J. OLSON REICHHARDT, Los Alamos National Laboratory, EVAN GROOPMAN, ZOHAR NUSSINOV, Washington University — In the jamming phase diagram proposed by Liu and Nagel [1], a transition occurs from a flowing liquid-like state to a rigid shear-resisting state as a function of increasing density, decreasing shear, or decreasing temperature. Here we show that quenched disorder in the form of fixed grains serves as a new axis to the jamming phase diagram for a system of bidisperse two-dimensional disks. By analyzing the flow of disks driven with constant force through the system, we find that the jamming density decreases with increasing density of fixed disks, and we also observe the same type of jamming behavior associated with point J. At a sufficiently large density of fixed disks, the jamming behavior is replaced by a clogging behavior characterized by the formation of a giant void that spans the system. At the clogging transition, disks outside of the void region reach the density associated with jamming at point J. [1] A. Liu and S. Nagel, Nature 396, 21 (1998).

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Date submitted: 18 Nov 2009 Electronic form version 1.4