Abstract Submitted
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Hard-Disk Equation of State: First-Order Liquid-Hexatic Transition in Two Dimensions with Three Simulation Methods[1] MICHAEL ENGEL, JOSHUA A. ANDERSON, University of Michigan, MASAHARU ISOBE, Nagoya Institute of Technology, ETIENNE P. BERNARD, Massachusetts Institute of Technology, WERNER KRAUTH, École Normale Supérieure, SHARON C. GLOTZER, University of Michigan — We report large-scale computer simulations of the hard-disk system at high densities in the region of the melting transition [1]. Our simulations reproduce the equation of state, previously obtained using the event-chain Monte Carlo algorithm, with a massively parallel implementation of the local Monte Carlo method [2] and with event-driven molecular dynamics. We analyze the relative performance of these simulation methods to sample configuration space and approach equilibrium. Phase coexistence is visualized for individual configurations via the local orientations, and positional correlation functions are computed. Our results confirm the first-order nature of the liquid-hexatic phase transition in hard disks.

[1] J.A. Anderson, M. Engel, S.C. Glotzer, M. Isobe, E.P. Bernard, W. Krauth, arXiv:1211.1645.
[2] J.A. Anderson, E. Jankowski, T.L. Grubb, M. Engel, S.C. Glotzer, arXiv:1211.1646.

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