Abstract Submitted
for the MAR12 Meeting of
The American Physical Society

The hard-disk melting transition ETIENNE BERNARD, Condensed Matter Theory, Massachusetts Institute of Technology, WERNER KRAUTH, Laboratoire de Physique Statistique, Ecole Normale Superieure, France — Melting in two spatial dimensions, as realized in thin films or at interfaces, represents one of the most fascinating phase transitions in nature, but it remains poorly understood. Even for the fundamental hard-disk model, the melting mechanism has not been agreed upon after 50 years of studies. A recent Monte Carlo algorithm [1] allows us to thermalize systems large enough to access the thermodynamic regime. I will show that melting in hard disks proceeds in two steps with a liquid phase, a hexatic phase, and a solid. The hexatic-solid transition is continuous while, surprisingly, the liquid-hexatic transition is of first order [2]. This melting scenario solves one of the fundamental statistical-physics models, which is at the root of a large body of theoretical, computational, and experimental research. 1. Bernard, E. P.; Krauth, W. & Wilson, D. B. *Phys. Rev. E.,* **2009**, 80, 056704 2. Bernard, E. P. & Krauth, W. *Phys. Rev. Lett.,* **2011**, 107, 155704

Etienne Bernard
Condensed Matter Theory, Massachusetts Institute of Technology

Date submitted: 10 Nov 2011 Electronic form version 1.4