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**Melting transition of Lennard-Jones particles in two dimensions** KEOLA WIERSCHEM, Nanyang Technological University, EFSTRATIOS MANOUSAKIS, Florida State University and University of Athens — The melting transition of Lennard-Jones particles in two dimensions is investigated along a single isochore using classical Monte Carlo methods. A finite-size scaling analysis is conducted for the second moments of the translational and bond-orientational order parameters, and their critical exponents are determined. The behavior of these exponents is consistent with the predictions of the two-stage Kosterlitz-Thouless-Halperin-Nelson-Young (KTHNY) theory of melting in two dimensions. The translational and bond-orientational correlation lengths are also studied, with evidence of a divergence in the bond-orientational correlation length while the translational correlation length remains finite. This provides further support for the KTHNY melting scenario, although we cannot rule out possible phase co-existence due to a first order phase transition.

Keola Wierschem  
Nanyang Technological University

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