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Signatures of Kosterlitz-Thouless behavior in the superfluid density of anisotropic layered superconductors LARA BENFATTO, Centro Fermi and University of Rome "La Sapienza", CLAUDIO CASTELLANI, University of Rome "La Sapienza", THIERRY GIAMARCHI, University of Geneva — In quasi-two-dimensional (2D) systems, as thin films of ^{4}He or of superconductors, the superfluid transition is expected to be driven by phase fluctuations, according to the Kosterlitz and Thouless (KT) theory. However, signatures of KT vortex-antivortex phase fluctuations should be observable, at some energy scale T_d, also in strongly anisotropic layered superconductors, where quasi-2D behavior arises due to a small Josephson coupling between neighboring planes. While in the 2D case T_d is uniquely identified by the KT temperature T_{KT} where the universal jump of the superfluid density is observed, in the layered case such universality is lost. Here we show this effect by means of a renormalization-group analysis of a layered version of the sine-Gordon model, appropriate to describe the occurrence of KT physics in layered superconductors. We find that in the presence of a finite interlayer coupling T_d is controlled by the vortex-core energy, and can be significantly larger than the 2D scale T_{KT}. When applied to the superfluid-density behavior in cuprate superconductors these results allows us to determine a non-trivial behavior of the vortex-core energy in these systems. L.Benfatto, C.Castellani and T.Giamarchi, Phys. Rev. Lett. 98, 117008 (2007)

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