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Asymptotically Exact Scenario of Strong-Disorder Criticality in One-Dimensional Superfluids LODE POLLET, LMU Munich, NIKOLAY PROKOF'EV, BORIS SVISTUNOV, University of Massachusetts, Amherst — We present a controlled rare-weak-link theory of the superfluid-to-Bose/Mott glass transition in one-dimensional disordered systems. The transition has Kosterlitz-Thouless critical properties but may occur at an arbitrary large value of the Luttinger parameter K. In contrast to the scenario by Altman *et al.* [Phys. Rev. B **81**, 174528 (2010)], the hydrodynamic description is valid under the correlation radius and defines criticality via the renormalization of microscopically weak links, along the lines of Kane and Fisher [Phys. Rev. Lett. **68**, 1220 (1992)]. The hallmark of the theory is the relation $K^{(c)} = 1/\zeta$ between the critical value of the Luttinger parameter at macroscopic scales and the microscopic (irrenormalizable) exponent ζ describing the scaling $\propto 1/N^{1-\zeta}$ for the strength of the weakest link among the $N/L \gg 1$ disorder realizations in a system of fixed mesoscopic size L.

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