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The onset of superfluidity of hardcore bosons in disordered ladders JUAN CARRASQUILLA, FEDERICO BECCA, MICHELE FABRIZIO, International School for Advanced Studies, Trieste — The effect of disorder on the zero-temperature phase diagram of a two-leg ladder of hardcore bosons is investigated using quantum Monte Carlo simulations. We first review some aspects of the clean system which are relevant for the understanding of the disordered case. In the disordered case, an intervening Bose-glass phase between the frozen Mott insulator with zero (or one) bosons per site and the superfluid phase is found. We also investigate the effect of disorder exactly at half filling, where for small values of disorder, there is a commensurate phase with a gap to all excitations, which is eventually destroyed for larger values of disorder. We argue that this phase is always surrounded by the so-called Bose glass and a direct transition from the superfluid is found only in the clean system. Finally, a phase diagram based on our numerical evidence is suggested.

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