Bose–Einstein condensation in random potentials

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Abstract

We study the perfect Bose-gas in the presence of a homogeneous ergodic random potential. It is proved that the Lifshitz tail behaviour of the one-particle spectrum reduces the critical dimensionality of the (generalized) Bose-Einstein Condensation to $d = 1$. To tackle the Off-Diagonal Long-Range Order we introduce the space average one-body reduced density matrix. For a one dimensional Poisson-type random potential we prove that randomness enhances the exponential decay of this matrix in domain free of the Bose–Einstein Condensation. The Mean-Field particle interaction does not change this picture.