

Abstract Submitted
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Hartree-Fock Theory of a Harmonically Trapped Dirty Bose-Einstein Condensate via the Replica Method T. KHELLIL, Department of Physics, Freie Universitat Berlin, Germany, A. PELSTER, Technische Universitat Kaiserslautern, Germany — A recent non-perturbative approach towards the dirty boson problem relies on the Hartree-Fock theory which is worked out on the basis of the replica method [1]. Here we extend this approach for a weakly interacting Bose-gas at finite temperature in a quenched delta-correlated disorder potential from the homogeneous case to an anisotropic harmonic confinement within the Thomas-Fermi approximation. In this way we obtain and solve coupled self-consistency equations, which relies on a decomposition of the particle density into the condensate density, the thermal density as well as the density of fragmented local Bose-Einstein condensates within the respective minima of the random potential landscape. Although we reproduce for weak disorder and at zero temperature the seminal results of Huang and Meng from a Bogoliubov theory [2,3] only qualitatively, we yield for strong enough disorder a quantum phase transition to a Bose-glass phase [4]. [1] R. Graham and A. Pelster, I. J. Bif. Chaos 19, 2745 (2009) [2] K. Huang, H.-F. Meng, Phys. Rev. Lett. 69, 644 (1992) [3] G.M. Falco, A. Pelster, and R. Graham, Phys. Rev. A 75, 063619 (2007) [4] P. Navez, A. Pelster, and R. Graham, App. Phys. B 86, 395 (2007)

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