The one-particle wave function of the Bose–Einstein condensate and nonstationary Gross-Pitaevskii equation

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On the base of the self-consistent Hartree–Fock approximation it is obtained the nonstationary equation for the one-particle wave function describing the Bose–Einstein condensate in a rarefied gas of spin-zero bosons. A rarefied gas of bosons is exposed to the static external field, which ensures its finite ground state. In contrast to the Gross-Pitaevskii equation the derived equation allows one to correctly determine the ground state energy in the stationary case [1, 2].

[1] Bobrov V B, Zagorodny A G and Trigger S A 2018 *Low Temp. Phys.* **44** 1211
[2] Bobrov V B, Trigger S A and Zagorodny A G 2021 *Low Temp. Phys.* **47** 347