

SUPERSYMMETRY REPRESENTATION
OF BOSE–EINSTEIN CONDENSATION
OF FERMION PAIRS

A.I. Olemskoi^{1,2}, I.A. Shuda²

¹Institute of Applied Physics,
Nat. Acad. of Sci. of Ukraine
(58, *Petropavlovskaya Str.*, 40030 *Sumy, Ukraine*;
e-mail: alex@ufn.ru),

²Sumy State University
(2, *Rimskii-Korsakov Str.*, 40007 *Sumy, Ukraine*)

S u m m a r y

We consider supersymmetry field theory with supercomponents being the square root of the Bose-condensate density, the amplitude of its fluctuations, and Grassmannian fields related to the density of Fermi particles. The fermion number is conserved in degenerated Fermi–Bose mixtures with unbroken supersymmetry when the system is invariant with respect to the inversion of the time arrow. We show that the supersymmetry breaking allows one to obtain field equations describing time–space dependences for real Bose–Fermi mixtures. The solution of these equations reveals that the cooled system with homogeneously distributed fermions arrives spontaneously at strong inhomogeneous fluctuations at a critical temperature, while, with the following temperature decrease, an inhomogeneously distributed Bose-condensate appears at a lower temperature dependent on the fermion density.