

Abstract Submitted  
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**A new self-consistent perturbation expansion for Bose-Einstein condensates satisfying conservation laws and Goldstone's theorem**<sup>1</sup> TAKAFUMI KITA, Department of Physics, Hokkaido University, Sapporo, Japan — Quantum-field-theoretic descriptions of Bose-Einstein condensates (BEC) have suffered from the lack of self-consistent approximation schemes satisfying Goldstone's theorem and dynamical conservation laws simultaneously. I will report on a new perturbation expansion of the kind developed recently and its predictions on the single-particle and two-particle excitations of BEC. It is shown that the single-particle Bogoliubov excitations are generally different from the two-particle density fluctuations in contradiction to the conclusion of previous studies. I will elucidate some properties of the two distinct modes in connection with Goldstone's theorem on spontaneously broken symmetries. References: T. Kita, Phys. Rev. B80, 214502 (2009); Phys. Rev. B81, 214513 (2010).

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