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The Many-Body Correlation of Bose-Fermi Mixture in the Ring Trap RYOSUKE SHIBATO, Department of Physics, Tokyo Metropolitan University, TAKUSHI NISHIMURA, Division of Advanced Sciences, Ochanomizu University — Since the realization of Bose-Einstein Condensation in alkali atoms in 1995, studies on cold atomic gases have greatly advanced. The cold atoms are precisely controlled by electromagnetism and optics, and flexible to design quantum systems. In 2001, A. Görlitz's group has realized the Bose-Einstein condensates in the quasi-one-dimensional system [1]. One have now obtained the ideal system to study the one-dimensional many-body physics experimentally. The purpose of our study is to clarify the effect of quantum many-body correlation beyond the mean-field approximation. To accomplish this purpose, we first prepare the bosons and fermions in the ring trap [2]. We prepare the initial state in the trap with the small distortion and obtained that both kinds of particles tend to be localized. After taking off this distortion, we solved the time-dependent Schrödinger equation. We derived the energy spectrum, density profile, and studied pair-correlation effect. Our results predict that the many-body correlation emerges, which has never been observed experimentally up to now.

[1] A. Görlitz et al., Phys. Rev. Lett. 87, 130402 (2001)

[2] O. Morizot et al., Phys. Rev. A. 74, 023617 (2006)

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