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Quantum phase transition in the interacting two-dimensional boson systems with Rashba spin-orbital coupling CONGJUN WU, JIANDA WU, Univ of California - San Diego — The two-dimensional free bosons condensate at zero momentum at zero temperature. After turning on the Rashba spin-orbital coupling, the system displays a ring condensation in momentum space with highly degenerate quantum ground states [1]. It is pointed out that, after a mean-field treatment, the ring condensation will disappear when turning on and tuning the Zeeman coupling to a critical value, leading to a novel quantum phase transition in the system [2]. It is of great theoretical and experimental interests for the role the interaction plays in the system. Here we further explore the system via a relatively full treatment of the interaction. We find the presence of the interaction on one hand modifies the mean-field results, and on the other hand also drives the system undergoing quantum phase transition, leading to a new novel phase of “boson metal.”

[1] C. Wu, I. Mondragon-Shem, and X. F. Zhou, *Chin. Phys. Lett.* **28**, 097102 (2011).

[2] H. C. Po and Q. Zhou, arXiv:1408.6421.

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