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Symmetry-enriched Bose-Einstein condensates in a spin-orbit-coupled bilayer system[1] JIA-MING CHENG, University of Science and Technology of China — We consider fate of Bose-Einstein condensation with time-reversal symmetry and inversion symmetry in a spin-orbit-coupled bilayer system. When these two symmetry operators commute, all single particle bands are exactly two-fold degenerate in momentum space. Scattering in the two-fold degenerate rings can relax spin-momentum locking effect resulting from spin-orbit coupling, thus we can realize spin polarized plane wave phase even when inter-particle interaction dominates. When these two operators anti-commute, the lowest two bands may have the same minimal energy, which have totally different spin structures. As a result, competition between different condensates in these two energetically degenerate rings can give rise to interesting stripe phases with atoms condensed at two or four colinear momenta. We find that crossover between these two cases is accompanied by excited band condensation when interference energy can overcome the increased single particle energy in excited band. This effect is not based on strong interaction, thus can be realized even with moderate interaction strength.

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