

Abstract Submitted
for the MAR11 Meeting of
The American Physical Society

Phase transitions of spin-orbit coupled Bose-Einstein Condensate in an external trap potential XIANGFA ZHOU, The Department of Physics, University of Science and Technology of China, IAN MONDRAGON-SHEM, The Department of Physics, Cornell University, CONGJUN WU, The Department of Physics, Univeristy of California, San Diego — Recently, the experimental realization of artificial magnetic fields using laser beams in a Rb87 Bose-Einstein condensate provides a valuable opportunity to investigate the rich physics of atomic gases in the presence of external Abelian and Non-Abelian gauge fields. We investigate the ground state properties of two-component BECs with Rashba spin-orbit coupling in the presence of external trapping potential. In the presence of density-density interaction between particles, the competitions among interaction, spin-orbit coupling and trap potential results in phase transitions of the ground states from a spiral spin-density wave state to a skyrmion type spin texture with rotational symmetry. We numerically solve the Gross-Pitaevskii equation and plot the phase diagram. The corresponding physics with asymmetrical Rashba coupling is also discussed.

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Date submitted: 18 Nov 2010

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