

Bright Solitons in Spin-Orbit Coupled Bose-Einstein Condensates

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Abstract:

We study bright solitons in a Bose-Einstein condensate with a spin-orbit coupling that has been realized experimentally. Both stationary bright solitons and moving bright solitons are found. The stationary bright solitons are the ground states and possess well-defined spin parity, a symmetry involving both spatial and spin degrees of freedom; these solitons are real-valued but not positive-definite and the number of their nodes depends on the strength of spin-orbit coupling. For the moving bright solitons, their shapes are found to change with velocity due to the lack of Galilean invariance in the system.

References:

1. Yong Xu, Yongping Zhang, and Biao Wu, arXiv:1211.0771 (to be published in PRA).