

Controllable Persistent Atom Current of Bose-Einstein Condensates in an Optical Lattice Ring

ZHENG Gong-Ping and LIANG Jiu-Qing

Institute of Theoretical Physics and Department of Physics, Shanxi University, Taiyuan 030006, China

(Received: 2004-10-8; Revised:)

Abstract: In this paper the macroscopic quantum state of Bose-Einstein condensates in optical lattices is studied by solving the periodic Gross-Pitaevskii equation in one-dimensional geometry. It is shown that an exact solution seen to be a travelling wave of excited macroscopic quantum states results in a persistent atom current, which can be controlled by adjusting of the barrier height of the optical periodic potential. A critical condition to generate the travelling wave is demonstrated and we moreover propose a practical experiment to realize the persistent atom current in a toroidal atom waveguide.

PACS: 03.75.Lm, 03.75.Kk, 03.75.-b

Key words: Bose-Einstein condensate, persistent atom current

[\[Full text: PDF\]](#)

Close