PT symmetry with a system of three-level atoms

Chao Hang\textsuperscript{1}, Guoxiang Huang\textsuperscript{1}, and Vladimir V. Konotop\textsuperscript{2}

\textsuperscript{1} State Key Laboratory of Precision Spectroscopy and Department of Physics, East China Normal University, Shanghai 200062, China
\textsuperscript{2} Centro de Física Teórica e Computacional and Departamento de Física, Faculdade de Ciências, Universidade de Lisboa, Avenida Professor Gama Pinto 2, Lisboa 1649-003, Portugal

Abstract:

We show that a vapor of multilevel atoms driven by far-off resonant laser beams, with possibility of interference of two Raman resonances, is highly efficient for creating parity-time (PT) symmetric profiles of the probe-field refractive index, whose real part is symmetric and imaginary part is anti-symmetric in space. The spatial modulation of the probe-field susceptibility is achieved by proper combination of standing-wave strong control fields and of Stark shifts induced by far-off resonance laser fields. As particular examples we explore a mixture of isotopes of Rubidium atoms and design a PT-symmetric lattice and a parabolic refractive index with a linear imaginary part.

References: