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Physical Review A - Atomic, Molecular, and Optical Physics
Volume 90, Issue 6, 29 December 2014, Article number 063637

Compacton matter waves in binary Bose gases under strong nonlinear management (Article)

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Abstract

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The existence of compacton matter waves in binary mixtures of quasi-one-dimensional Bose-Einstein condensates in deep optical lattices, and in the presence of nonlinearity management, is demonstrated. For this, we derive an averaged vector discrete nonlinear Schrödinger equation (DNLSE) and show that compacton solutions of different types can exist as stable excitations. Stability properties are studied by linear analysis and by direct numerical integrations of the DNLSE system and their dependence on the inter- and intraspecies scattering lengths investigated. We show that under proper management conditions, compactons can be very robust excitations that can emerge spontaneously from generic initial conditions. A possible experimental setting for compacton observation is also discussed. © 2014 American Physical Society.

Indexed keywords

Engineering controlled terms:

[Bose-Einstein condensation](#) [Nonlinear equations](#) [Optical lattices](#) [Stability](#) [Statistical mechanics](#)

[Dinger equation](#)

[Initial conditions](#)

[Linear analysis](#)

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[Quasi-one dimensional](#)

[Scattering length](#)

[Stability properties](#)

Engineering main heading:

[Binary mixtures](#)

ISSN: 10502947
CODEN: PLRAA
Source Type: Journal
Original language: English

DOI: 10.1103/PhysRevA.90.063637
Document Type: Article
Publisher: American Physical Society

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Simulation

[Compactons of binary bose gases in optical lattices with inter-species scattering length management](#)

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