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Solitons in atomic condensates, with optical lattices and field-induced dipole moments (Conference Paper)

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Abstract

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We report some investigations on the existence of matter-wave solitons when considering cross-combined optical lattices (OL) in three dimensions (3D), where we have a nonlinear OL in one of the directions, which is perpendicular to a two-dimensional (2D) plane with linear OLs in either one or both directions. This study can be useful to manage 3D solitons through spatial modulations of the scattering length in one of the OL directions. Another independent study is reported, by considering bright solitons manifested in a bosonic condensate gas carrying collinear dipole moments, which induces an external polarizing field with strength periodically modulated along one of the coordinates. This leads to an effective nonlocal nonlinear lattice, with solitonic solutions. Their dynamics and mobility can be investigated by an effective one-dimensional (1D) model. Interactions between solitons are also reported within this 1D model. In all the cases, we consider full numerical and variational approaches. © Published under licence by IOP Publishing Ltd.

Indexed keywords

Engineering controlled terms: Crystal lattices, Dipole moment, Nonlinear optics, Optical lattices, Optical materials

- Atomic condensates
- Matter wave solitons
- Nonlinear lattices
- One-dimensional (1D) models
- Solitonic solutions
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- Two Dimensional (2 D)
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