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Vibration spectrum of a two-soliton molecule in dipolar Bose-Einstein condensates

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PHYSICS LETTERS A

Volume: 379 Issue: 32-33 Pages: 1828-1832

DOI: 10.1016/j.physleta.2015.05.020

Published: SEP 11 2015

[View Journal Impact](#)

Abstract

We study the vibration of soliton molecules in dipolar Bose-Einstein condensates by variational approach and numerical simulations of the nonlocal Gross-Pitaevskii equation. We employ the periodic variation of the strength of dipolar atomic interactions to excite oscillations of solitons near their equilibrium positions. When the parametric perturbation is sufficiently strong the molecule breaks up into individual solitons, like the dissociation of ordinary molecules. The waveform of the molecule and resonance frequency, predicted by the developed model, are confirmed by numerical simulations of the governing equation. (C) 2015 Elsevier B.V. All rights reserved.

Keywords

Author Keywords: [Soliton](#); [Dipolar interaction](#); [Bound state](#); [Vibration spectrum](#)

KeyWords Plus: FESHBACH RESONANCES; SOLITONS; SYSTEMS

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Funding

Funding Agency	Grant Number
International Islamic University Malaysia	FRGS 13-092-0333

[View funding text](#)

Publisher

ELSEVIER SCIENCE BV, PO BOX 211, 1000 AE AMSTERDAM, NETHERLANDS

Categories / Classification

Research Areas: Physics

Web of Science Categories: Physics, Multidisciplinary

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Umarov, B. A. [Scattering of a two-soliton molecule by Gaussian potentials in dipolar Bose-Einstein condensates](#). JOURNAL OF PHYSICS B-ATOMIC MOLECULAR AND OPTICAL PHYSICS, JUN 28 2016.

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Document Information

Document Type: Article

Language: English

Accession Number: WOS:000356194800006

ISSN: 0375-9601

eISSN: 1873-2429

Journal Information

Impact Factor: [Journal Citation Reports](#)

Other Information

IDS Number: CK4LH

Cited References in Web of Science Core Collection: 38

Times Cited in Web of Science Core Collection: 4

