

Peer Review

Review of: "Multidimensional Soliton Systems: an Update"

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In a previous review by the same Author ["Multidimensional Soliton Systems." Adv Phys X. 9(1), 2024, doi: 10.1080/23746149.2023.2301592], the formation of stable multidimensional solitons in optics and in Bose–Einstein condensates (BECs) had been illustrated in an exhaustive manner: experiments and theory concerning 2D and 3D vortex solitons with angular momentum, optical light bullets in the anomalous dispersion regime, Townes solitons, vortex tori and rings, matter-wave semi-vortex and mixed modes solitons stabilized by spin-orbit coupling (SOC), 2D vortex quantum droplets (QD), and 3D symmetric vortex QDs in BECs had been reported.

In this manuscript, the Author provides interesting updates concerning nonlinear optics and BECs, discussing recent experiments on multiple quasi-2D and 3D QDs in BECs, toroidal optical pulses, optical multidimensional solitons with effective fractional diffraction and quadratic nonlinearity, dipolar BECs forming stable anisotropic vortex solitons in the presence of magnetic fields, and BECs forming stable soliton-like QDs supported by a toroidal trapping potential.

The study of multidimensional solitons in media with fractional diffractions appears particularly stimulating for the study of a new class of optical solitons.

The inclusion of new research directions such as supersolid gap solitons in BECs with an optical ring cavity would further increase the novelty of the work.

The work demonstrates the Author's extensive expertise on the subject and provides up-to-date references. It is extremely valuable for researchers in the field of nonlinear optics and quantum physics, with particular relevance to Bose–Einstein condensates of matter waves.

Declarations

Potential competing interests: No potential competing interests to declare.