

Solitary Excitations of Dipolar Bosons in Optical Lattice under Magnetic Fields

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Abstract: We obtain the multisolitary solutions of the extended Bose-Hubbard model which describes dipolar Bose-Einstein condensates in optical lattices under time-dependent magnetic fields, and indicate that the nonlinearity is due to both on-site short-range interactions and also (long-range) dipole-dipole interactions which can act between neighboring sites. The discrete breathers as nonlinear excitations are always oscillatory in time and can also be spatially localized, while the oscillatory frequencies are determined by an external field. We show that these excitations will be observable and discuss how the parameters can be tuned in future experiments.

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