ON NONLINEAR LOCALIZED FLATBAND MODES IN DIFFERENT BEC SETUPS

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Particularity of certain tight binding Hamiltonians is existence of dispersionless spectral bands where owing to quenched kinetic energy term (vanishing the wave group velocity) the wave transport is suppressed [1]. However, this is strongly sensitive to any perturbation which can cause qualitative change of wave transport properties by setting a new dominant energy scale for dispersionless (flat band) states. The generality of periodic media governed by Schrodinger-like equations allows flat bands (FB) to be explored in diverse settings from Hubbard models to Bose-Einstein condensates (BEC) and photonics [2]. Here we give brief overview of our investigation of the BEC in the FB systems formed from bipartite diamond chain as a generic structure. The main goal in this context is to clarify existence and properties of the localized modes, particularly those related with compactons [2] in the condensates assuming a very deep background lattice. Here we present discoveries related to the nonlinear localized modes in spinor diamond chain, whose components are linearly mixed by spin-orbit coupling [3] and briefly comment a very first findings in the setup which could be tuned by the proper gauge potential to three FBs equipment [4].

References

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