
Localization of bound states in quasi-periodic optical lattices

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Résumé

We discuss the formation of bound states made of two interacting atoms moving in a one dimensional quasi-periodic optical lattice. The underlying hamiltonian is the Aubry-André model with additional on-site interactions. We derive the quantum phase diagram for localization of both attractively and repulsively bound pairs. We calculate the pair binding energy and show analytically that its behavior as a function of the interaction strength depends crucially on the nature -extended, multifractal, localized- of the single-particle atomic states. Experimental implications of our results are discussed. Reference: G. Dufour and G. Orso, Phys. Rev. Lett. 109, 155306 (2012)

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