

Abstract Submitted
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Compact localized states and flatband generators in one dimension¹ WULAYIMU MAIMAITI, PCS IBS and UST, Daejeon, South Korea, ALEXEI ANDREANOV, HEE CHUL PARK, PCS IBS, Daejeon, South Korea, OLEG GENDELMAN, Technion, Haifa, Israel, SERGEJ FLACH, PCS IBS, Daejeon, South Korea — Flat bands (FB) are strictly dispersionless bands in the Bloch spectrum of a periodic lattice Hamiltonian, recently observed in a variety of photonic and dissipative condensate networks. We classify FB networks through the properties of compact localized states (CLS) which are exact FB eigenstates and occupy U unit cells. We obtain necessary and sufficient conditions for a network to be of FB class U . These conditions are turned into a simple local FB testing routine which avoids Bloch based band structure calculations. The tester in turn is used to introduce a novel FB generator based on local algebraic network properties. We obtain the complete FB family of two-band networks in one dimension with nearest unit cell interaction, for which $U \leq 2$. We find that the CLS set is generically linearly independent and spans the complete FB Hilbert space. With the CLS structure we obtain the Bloch polarization vectors of the FB.

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