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Detangling Flat Bands via Fano Structures JOSHUA BODYFELT, SERGEJ FLACH, Massey Univ, DANIEL LEYKAM, ANTON DESYATNIKOV, Australian National University, PETER MATTHIES, Moscow Institute for Physics and Technology — Translationally invariant lattices with flat bands (FB) in the band structure possess irreducible compact localized flat band states (FBS). The number of unit cells involved in one irreducible FBS defines the FB class of the model. For class 1, we transform and detangle the FBS and dispersive states into a Fano lattice. Inverting the scheme, we end up with a continuum of FB models for any FB class. In the case of an on-site disorder potential, the symmetric part lifts the FB degeneracy, keeping compact localization of FBS. The antisymmetric part yields Fano-induced Cauchy tails for the potential felt by the dispersive states. As a result, weak disorder enforces different energy dependent localization length scales, and highly nontrivial mode profiles at the FB energy. Scattering by perturbed FBS can then be understood as Fano resonance.

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