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The impossibility of exactly flat non-trivial Chern bands in strictly local periodic tight binding models LI CHEN, TAHEREH MAZAHERI, ALEXANDER SEIDEL, XIANG TANG, Washington University in St. Louis — We investigate the possibility of exactly flat non-trivial Chern bands in tight binding models with local (strictly short-ranged) hopping parameters. We demonstrate that while any two of three criteria can be simultaneously realized (exactly flat band, non-zero Chern number, local hopping), it is not possible to simultaneously satisfy all three. We discuss both the case of a single flat band, for which we give a rather elementary proof, as well as the case of multiple degenerate flat bands. In the latter case, our result follows by making use of K-theory.

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