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Localization in a Quasi-Periodic One Dimensional System JOHN BIDDLE, University of Maryland, College Park, DONALD PRIOUR, University of Missouri, Kansas City, SANKAR DAS SARMA, University of Maryland, College Park — We study mobility edges and Anderson-like localization in a disorder-free, one-dimensional quasi-periodic system. In particular, we study a bichromatic sinusoidal lattice potential where a primary periodic lattice is perturbed by a secondary lattice with a period that is incommensurate with that of the primary lattice. This interesting potential admits both extended and localized states without the presence of disorder. We examine the transitions between extended and localized states by numerically solving the Schrodinger equation over a broad spatial domain, and the Lyapunov exponents are obtained from the localized eigenstates. From calculations based on the single-particle eigenstates, we report how mobility edges will be manifest in cold atom experiments in bichromatic incommensurate optical lattices.

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