Fabry-Pérot Cavities Using Different Dispersions in Twisted Double Bilayer Graphene

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Abstract

The rich and electrostatically tunable phase diagram exhibited by moiré materials has made them a suitable platform for hosting single material multi-purpose devices. To engineer such devices, understanding electronic transport and localization across gate-defined interfaces is of fundamental importance. Little is known, however, about how the interplay between the band structure originating from the moiré lattice and electric potential gradients affects electronic confinement. Here, we electrostatically define a cavity across a twisted double bilayer graphene sample. We observe two kinds of Fabry-Pérot oscillations. The first, independent of charge polarity, stems from confinement of electrons between dispersive-band/flat-band interfaces. The second arises from p-n junctions between regions tuned to the flat band regime, giving a lower bound for the coherence length of electronic transport in such a strongly interacting regime.