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Quantum oscillations as a probe of massive Dirac fermions SCOTT DIETRICH, CARLOS FORSYTHE, JESSE BALGLEY, CORY DEAN, Department of Physics, Columbia University — Significant band structure engineering has been recently accomplished by stacking monolayer and bilayer graphene onto hexagonal Boron Nitride (hBN). The slightly mismatched lattice constants and varying alignment angle of the two materials creates a tunable moiré superlattice potential and breaks the naturally occurring valley symmetry of graphene. These effects open a gap and distort the band dispersion near the charge neutrality point as well as at location of the moiré minibands. In this study, effective band mass as a function of density is extracted from Shubnikov-de Haas oscillations in devices with varying superlattice wavelengths. Our results demonstrate quantitative control of band mass in graphene devices, and could help clarify the possible role of the many-body physics in these systems.

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