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Charge transport across tunable superlattice barriers in graphene
SUDIPTA DUBEY, AJAY BHAT, VIBHOR SINGH, PRITESH PARIKH, TANUJ PRAKASH, ABHILASH SEBASTIAN, PADMALEKHA K.G., Tata Institute of Fundamental Research, Mumbai, India, KRISHNENDU SENGUPTA, Indian Association for the Cultivation of Sciences, Kolkata, India, VIKRAM TRIPATHI, RAJDEEP SENSARMA, MANDAR DESHMUKH, Tata Institute of Fundamental Research, Mumbai, India — We create an artificial superlattice structure in graphene using an array of top gate and a bottom gate. A superlattice potential modifies the band structure of graphene, so that extra Dirac points appear in the dispersion periodically as a function of the superlattice barrier height. Tuning the amplitude of the barrier thus gives us control over number of Dirac points generated. We have performed measurements on this superlattice structure. Oscillations in resistance are observed when the charge carrier induced by top gate and back gate are of opposite sign. In this region, the number of oscillations increases with increasing gate voltage. Measurements as a function of temperature show that these oscillations persist even at 70 K. The behaviour of these oscillations in presence of magnetic field is also observed. At low magnetic field we see weak localisation behaviour. At high magnetic field, the superlattice is a small perturbation and quantum Hall effect of pristine graphene is restored.

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