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Near-field study in graphene/hBN moiré superlattices. GUANGXIN NI, University of California, San Diego, HAOMIN WANG, Shanghai Institute of Microsystem and Information Technology, JHIH-SHENG WU, ZHE FEI, MICHAEL GOLDFLAM, FRITZ KEILMANN, University of California, San Diego, BARBAROS ZYILMAZ, ANTONIO CASTRO NETO, National University of Singapore, XIAOMING XIE, Shanghai Institute of Microsystem and Information Technology, MICHAEL FOGLER, DIMITRI BASOV, University of California, San Diego — Moiré patterns are periodic superlattice structures that appear when two crystals with a minor lattice mismatch are superimposed. A prominent recent example is that of monolayer graphene placed on a crystal of hexagonal boron nitride (hBN). As a result of the moiré pattern superlattice created by this stacking, the electronic band structure of graphene is radically altered, acquiring satellite sub-Dirac cones at the superlattice zone boundaries. To probe dynamical response of the moiré graphene, we use infrared (IR) nano-imaging to explore propagation of surface plasmons, collective oscillations of electrons coupled to IR light. We show that interband transitions associated with the superlattice minibands in concert with free electrons in the Dirac bands produce two additive contributions to composite IR plasmons in graphene moiré superstructures. This novel form of collective modes is likely to be generic to other forms of moiré-forming superlattices, including van der Waals heterostructures.

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