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"Cllective modes of twisted van der Waals materials”

Rotationally misalignment profoundly modifies electronic and lattice properties of van der Waals materials. If the twist angle between adjacent layers is small, a periodic network of dislocations (solitons) delineating large commensurate domains appears.These solitons have a surprisingly strong influence on collective modes of the system, plasmons and phonon-polaritons. For example, a twisted bilayer graphene can act as a photonic crystal for two- and one-dimensional plasmons. Solitons in a twisted boron nitride can induce spectral shift and splitting of phonon-polaritons. I will review recent nano-optical experiments that probed these phenomena and their theoretical modeling.

[1] G. X. Ni et al., Soliton superlattices in twisted hexagonal boron nitride, Nature Comm. 10, 4360 (2019).
[2] S. S. Sunku et al., Photonic crystals for nano-light in moire graphene superlattices. Science 362, 1153-1156 (2018).
[3] B.-Y. Jiang et al., Plasmon reflections by topological electronic boundaries in bilayer graphene. Nano Lett, 17, 7080-7085 (2017).