Plasmon modes of topological-state networks in twisted bilayer graphene

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We study surface plasmons in minimally twisted bilayer graphene that develops a triangular network of partial dislocations (or AB-BA domain walls) hosting one-dimensional electronic states. We formulate a theoretical model describing propagation of plasmons along one-dimensional links and their scattering at the nodes of such a network. The plasmon scattering matrix at each node depends on a current-splitting matrix and the Coulomb interaction strength, and approaches a universal result for strong interactions. The plasmonic spectrum of the network is composed of multiple bands quasi-periodic in frequency. We discuss optical nano-imaging experiments that can verify our predictions.