Chiral networks in twisted graphene bilayers under interlayer bias

Pablo San-Jose, **Elsa Prada**

Universidad Autónoma de Madrid
Departamento de Física de la Materia Condensada
Facultad de Ciencias, Módulo 03, 517
C/ Francisco Tomás y Valiente 7, 28049 Madrid (Spain)

A twisted graphene bilayer exhibits a triangular Moiré pattern in the local stacking, that smoothly alternates between the three basic types AA', AB' and BA'. Under an interlayer bias U, the latter two types develop a spectral gap, characterised by opposite valley Chern numbers. We show that for large enough Moiré periods and bias (angles smaller than ~ 0.2 degrees at U ~ 90 meV) these regions become depleted electronically, and topologically protected chiral modes appear at their boundaries. This gives rise to a delocalised chiral network of the Chalker-Coddington type, composed of valley current vortices. Simultaneously, a discrete set of localised states at resonant energies develop. Clear signatures of this exotic electronic state are predicted to arise in the spectrum and the optical conductivity.