

# Flat Bands in Flatlands

Jeanie (Chun Ning) Lau

*1 Department of Physics, The Ohio State University, Columbus, OH 43221*

In a flat band system, the charge carriers' energy-momentum relation is very weakly dispersive. The resultant large density of states and the dominance of Coulomb potential energy relative to the kinetic energy often favor the formation of strongly correlated electron states, such as ferromagnetism, nematicity, antiferromagnetism, superconductivity, and charge density waves. The advent of two-dimensional (2D) materials and their heterostructures has ushered in a new era for exploring, tuning and engineering of flat band system. Here I will present our results on transport measurements of high quality few-layer 2D material devices, including quantum Hall states in 2D semiconductors such as phosphorene and InSe, robust long distance spin transport through the antiferromagnetic state in graphene, and helical edge states in few-layer graphene.