

Title: “Fractional Chern insulators in magic angle twisted bilayer graphene”

Abstract: The discovery of the fractional quantum Hall (FQH) effect over 30 years precipitated a revolution in condensed matter physics by introducing such novel concepts as topological order, charge fractionalization and non-abelian statistics. More recently, intense theoretical efforts have been directed towards engineering fractional Chern insulators (FCIs), lattice analogues of FQH states occurring at zero or low magnetic fields. For FCIs, the required band topology is built in to the zero-field band structure, making them extremely promising not only for realizing non-abelian excitations but also high-temperature topological order at zero magnetic field. The recent experimental observation of correlated Chern insulators in magic-angle twisted bilayer graphene (MATBG) down to zero magnetic field raises the possibility of realizing FCIs in this system. In this talk, I will describe our recent local compressibility measurements with a scanning single electron transistor that allow us to unambiguously identify the existence of FCIs in MATBG. I will also discuss the critical role of quantum band geometry in stabilizing FCIs.