The moiré patterns generated by twisting van der Waals materials has given rise to a new
regime of physics in which electronic interactions and quantum geometry are at the
forefront. The unprecedented degree of tunability in these devices has led to the
experimental realization of a remarkably diverse set of physical phenomena, including the
recent first-ever observations of the fractional quantum anomalous Hall effect. While the
majority of studies have focused on two-layer materials, going to three or more layers
vastly increases the space of possibilities, which is just beginning to be explored.

I will discuss helical trilayer graphene (HTG), a deceptively simple structure consisting of
three graphene layers with identical twist angles relative to one another. This structure
results in a super-moiré pattern, emerging from the misalignment of the individual moiré
patterns between layers 1-2 and layers 2-3, which becomes apparent at very large
lengthscales. Despite this seeming complexity, I will show how a confluence of super-
moiré lattice relaxation, topological flat bands, and strong interactions saves the day,
making HTG a uniquely rich platform for realizing strongly correlated topological states
such as integer and fractional Chern insulators and for exploring their phase transitions.

References:
Y. H. Kwan, P. J. Ledwith, C. F. B. Lo, and TD, “Strong-coupling topological states and phase