

University of Miami, Physics Department Colloquium

Date: Wednesday, Jan 18, 2023
Time: 4:00 pm – 5:00 pm
Location: Wilder Auditorium – Rm 112, Knight Physics Building

Interacting Opto-Moiré Quantum Matter

Dr. Xi Wang

Department of Physics, University of Washington

Abstract

Transition metal dichalcogenide (TMD) heterobilayers with tunable periodic moiré potentials have emerged as a desirable platform for studying quantum many-body interactions. Strong excitonic responses in TMDs allow optical access to the wealth of correlated physics. In this presentation, I will discuss our recent studies of interactions between moiré excitons and charge carriers trapped in moiré potentials. New excitonic many-body ground states are discovered, which can be tuned by moiré carrier fillings and layer stacking. The integration of optical excitation further enriches the phase diagram of moiré quantum matter. We have observed that the spin-spin interactions between moiré trapped holes can be drastically tuned by optical excitation power, pointing to the excitons-mediated long-range exchange interaction between moiré trapped carriers. Our work provides the framework for understanding and engineering electronic and excitonic states in moiré quantum matters.