UNL Department of Physics and Astronomy presents:

Designing Electron Correlation in van der Waals Heterostructures

PRESENTED BY

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ABSTRACT

The study of physical phenomena at the nanoscale has been a subject of intense research, with many new discoveries emerging in dimensions ranging from several to one hundred nanometers.

Recently, moiré patterns in two-dimensional (2D) materials have been found to offer near-perfect nanometer-scale electronic superlattices, which led to discoveries of exciting quantum phenomena in a variety of moiré heterostructures. In this

colloquium, I will discuss my work using the moiré superlattice as a building block to develop

correlated systems. Specifically, I have observed a correlated interlayer exciton insulator in a

double-layer heterostructure, which consists of a Mott insulator and a band insulator. Furthermore, I have engineered the correlated insulator in bilayer graphene using a remote Coulomb superlattice. This technique is applicable to any 2D materials hosting a 2D electron gas, offering a new route for in-situ control of correlated quantum phenomena in a wide range of 2D systems.