UNL Department of Physics and Astronomy presents:

Many-body Ground States and Collective Excitations In a Tunable 2D System.

PRESENTED BY

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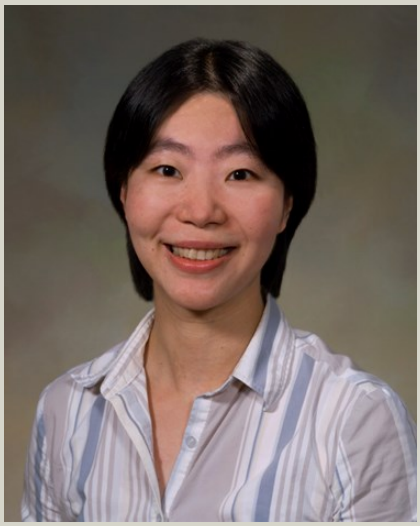

THURSDAY

APRIL 6

4:00 PM

IN JH 136

Refreshments will be served in the JH 1st Floor Vending Area at 3:30

ABSTRACT

The Landau levels of a two-dimensional electron system support a plethora of fascinating many-body ground states and collective low-energy excitations, thanks to enhanced electron-electron interactions and the characteristics of the LL wave functions. The n=1 LL is particularly fascinating as it hosts even-denominator fractional quantum Hall states and other exotic topological orders that are potentially useful in topological quantum computation. In this talk, I will describe a few recent experiments of ours in Bernal-stacked bilayer graphene, which is a remarkably tunable platform for exploring emergent phenomena. I will show our observations of a new even-denominator fractional quantum Hall state at filling factor 5/2 and its spontaneous valley isospin polarization and discuss the particle-hole symmetry breaking of a family of even-denominator fractional quantum Hall states in bilayer graphene. In the second half of the talk, I will describe an experiment probing the momentum dispersion of gapless spin wave excitations of a quantum Hall easy-plane canted-antiferromagnet using transport techniques and a Fabry-Perot resonant cavity. This strongly correlated magnetic state forms at the charge neutrality point of bilayer graphene purely through Coulomb interactions and may support spin superfluidity.

References:

1. K. Huang, H. Fu, Danielle Reifsnyder Hickey, Nasim Alem, Xi Lin, K. Watanabe, T. Taniguchi, J. Zhu, "Valley Isospin Controlled Fractional Quantum Hall States in Bilayer Graphene", Physical Review X 12, 031019 (2022).

2. H. Fu, K. Huang, K. Watanabe, T. Taniguchi, and J. Zhu, “Gapless Spin Wave Transport through a Quantum Canted Antiferromagnet”, Physical Review X 11, 021012 (2021)