

Massachusetts Institute of Technology
Department of Physics

Condensed Matter Theory Seminar

"Spin-valley density wave in moiré materials"

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Abstract: We introduce and study a minimum two-orbital Hubbard model on a triangular lattice, which captures the key features of both the trilayer ABC-stacked graphene-boron nitride heterostructure and twisted transition metal dichalcogenides in a broad parameter range. Our model comprises first- and second-nearest neighbor hoppings with valley-contrasting flux that accounts for trigonal warping in the band structure. For the strong-coupling regime with one electron per site, we derive a spin-orbital exchange Hamiltonian and find the semiclassical ground state to be a spin-valley density wave.

We show that a relatively small second-neighbor exchange interaction is sufficient to stabilize the ordered state against quantum fluctuations. Effects of spin- and valley Zeeman fields as well as thermal fluctuations are also examined.

2:00pm
Monday, May 20, 2019
Duboc Room (4-331)