复旦大学物理系 Colloquium

Time: 13:30, Tuesday, 2022.9.27

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Visualization of Correlated Physics in 2D Moiré Superlattices -- from flat band to electron crystallization

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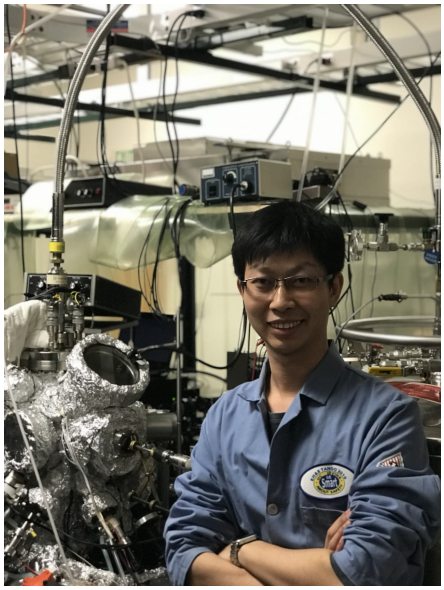
Abstract: Ultra-thin field effect transistor made from van der Waals heterostructures of atomically thin transition metal dichalcogenides provide an exciting new platform to design and fabricate novel electronic and optical devices. Through the precise control of the stacking order and the twist angle between two adjacent layers, the moiré superlattice can lead to tunable narrow electronic minibands, where long-range Coulomb interactions play a critical role in determining strongly correlated electron states. This has led to the observation of the Mott insulating state at Half filling, as well as the generalized Wigner crystal states at fractional fillings. However, the direct microscopic understanding of these emerging quantum phases has long been hindered by many experimental challenges. In this talk, I will present a series of technical advancements in scanning tunneling microscopy which allow us to directly visualize the correlated phases in the closely aligned WS_2/WSe_2 moiré superlattices.



Biography: Dr. Shaowei Li is an assistant professor at University of California, San Diego. He received B.S. in Physics from Nankai University in 2010 and Ph.D. in physics from University of California, Irvine in 2017. Before joining UC San Diego, he was a postdoc scholar at Northwestern University and later a Heising Simons Junior Fellow at UC Berkeley. His research focuses on probing the fundamental properties of low dimensional systems with scanning tunneling microscopy and spectroscopy. Dr. Li is the recipient of a series of academic awards including Hellman Fellowship, AVS NSTD Early Career Award, OCPA Outstanding Dissertation Award, ACS Physical Chemistry Young Investigator Award, and APS FWS Margaret Burbidge Award.