[QMS2020 invited talk]

Correlated metal-insulator transition in an ultra-clean oxide

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The breakdown of the metallic Fermi-liquid paradigm in strongly interacting electron systems produces exotic correlated ground states such as superconductivity, magnetism, and charge density waves. The difficulty in predicting and probing these phases fuels experimental ambition for increasingly clean and accessible platforms. In this presentation, I will introduce ultra-high mobility MgZnO/ZnO heterostructures as a new vehicle to access the strongly correlated transport regime of two-dimensional electron systems. In addition to robust quantum Hall features, the fingerprints of strong correlations may be tracked as interactions are amplified in field-effect transistor devices; a sharp enhancement of the spin susceptibility of carriers, along with a metal-insulator transition in the longitudinal resistance temperature dependence, and strong non-linearity in the device current-voltage characteristics at ultra-low temperature (T<10mK). These results present the system as a clean and tunable candidate for future studies of Wigner crystallization and the viability of itinerant Stoner ferromagnetism in two-dimensions.