**Exploring Tunable Fe-chalcogenide Heterostructures for Enhanced Superconductivity**

Lian Li

Department of Physics and Astronomy, West Virginia University

Fe-based superconductors share a common building block of a square lattice of Fe tetrahedrally coordinated to As or Fe ions, where the Tc is controlled by the edge-shared FeAs(Fe)4 tetrahedron. Fe-chalcogenide films epitaxially grown on perovskite substrates offer a versatile platform for tuning the Se-Fe-Se tetrahedron towards achieving higher Tc. In this talk, I will present our studies of epitaxial single-layer Fe-chalcogenide films on SrTiO3 substrate, where we modify the Se-Fe-Se angle via UV light, chemical pressure, and substrate termination (SrO vs. TiO2). From comprehensive studies using *in-situ* STM/ARPES, *ex-situ* TEM imaging and x-ray scattering, and DFT/DMFT calculations, we show a strong correlation between the enhanced Tc and the Se-Fe-Se angle in these single-layer films. I will also highlight our observation of Tomonaga-Luttinger liquid behavior in the topological edge channels in multilayer FeSe films and its tunability by chemical pressure. These findings indicate that epitaxial Fe-chalcogenide heterostructures are a highly tunable quantum system and shed light on the pairing symmetry and topological properties of Fe-chalcogenide superconductors.