

**Probing Electronic Structure in Novel Engineered
Quantum States of Matter**
-- *in-situ* ARPES studies of epitaxial novel oxides thin films

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In this talk, I will mainly introduce how to utilize *in-situ* angle-resolved photoemission spectroscopy (ARPES) to study novel electron systems fabricated/engineered by oxide molecular beam epitaxy (OMBE) technique. Particularly, I will report the first high-resolution ARPES studies on the epitaxial pseudocubic-structured SrRuO₃ thin films. The long-standing quasi-particle excitations in SrRuO₃ are revealed, which show strong coupling with some low energy bosonic modes. Our measurements demonstrate that it is the strong electron-boson coupling but not the Coulomb interaction proposed previously that is primarily responsible for the large effective masses observed in this material. Moreover, I will present the systematic study of the dead-layer behavior in La_{0.67}Sr_{0.33}MnO₃ thin films. The evolution of electric and magnetic properties as a function of thickness shows a remarkable resemblance to the phase diagram as a function of doping for bulk materials, providing compelling evidences of the hole-depletion in near interface layers that causes dead-layer. Detailed electronic and surface structure studies indicate that the hole-depletion is due to the intrinsic oxygen vacancy formation.

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