O 19: Overview Talk Felix Baumberger

Time: Tuesday 9:30–10:15 Location: HE 101

Invited Talk O 19.1 Tue 9:30 HE 101

Quasiparticle dynamics and spin-orbital texture of 2D electron liquids at surfaces — •Felix Baumberger — Department of Quantum Matter Physics, University of Geneva, Switzerland — Swiss Light Source, Paul Scherrer Institute, Switzerland

Two-dimensional electron liquids (2DELs) at interfaces of transition metal oxides are foundational for the field of oxide electronics but proved notoriously hard to study spectroscopically. Here, we show that surface doping of $SrTiO_3$ and $KTaO_3$ can be used to replicate the electrostatic boundary conditions stabilizing the prototypical interface 2DELs in these oxides. Our angle resolved photoemission data on different $SrTiO_3$ and $KTaO_3$ surfaces provide direct evidence for subband formation of the *d*-electrons with a surface orientation dependent lifting of the orbital degeneracy induced by quantum confinement. Modeling the experimental electronic structure, we uncover a complex spin-orbital texture on the Fermi surface and show that it determines the large spin charge conversion effect in $SrTiO_3$. Tuning the 2DEL carrier density of $SrTiO_3(001)$ by controlling the oxygen vacancy concentration on the surface, we find a remarkably complex evolution of electron-phonon coupling from a coherent polaronic liquid at low carrier density to a more conventional metal with modest short range electron-phonon coupling at high density. These results support the notion that superconductivity at the $LaAlO_3$ / $SrTiO_3$ interface is phonon mediated.