Condensed Matter Physics Seminar Series

Fermiology and electronic symmetry breaking in AV_3Sb_5 kagome metals

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AV_3Sb_5 compounds, which consist of layered vanadium antimonides with A = K, Rb, Cs, form a new family of kagome metals that display a remarkable range of strongly correlated electronic phases, such as superconductivity and charge-density-waves. Understanding how the unique electronic structure of the kagome lattice is related to these broken-symmetry phases is currently a topic of active debate and crucial for comprehending symmetry breaking in kagome metals. In this talk, I will present our recent ARPES studies of van Hove singularities (vHs) near the Fermi energy of AV_3Sb_5 compounds and their role in electronic symmetry breaking. The vHs are characterized by two sublattice flavors (p-type and m-type), with the m-type vHs (from V $3d_{xz}$ and $3d_{yz}$ orbitals) and the p-type vHs (from V $3d_{xy}$ and $3d_{x2-y2}$ orbitals) located very close to the Fermi level. The former band displays prominent Fermi surface nesting, whereas the latter exhibits the largest gap, suggesting a strong-coupling origin of charge order, likely resulting from electron-lattice coupling. I will also present more recent work focused on the ARPES signatures of band folding in AV_3Sb_5 and their connection to the microscopic texture of charge-density-waves, as well as the emergence of period-4 stripe order and pair-density-waves.

Riccardo Comin is an Associate Professor of Physics at MIT. He completed his undergraduate studies at the University of Trieste in Italy, where he also obtained a M.Sc. in Physics in 2009. Later, he pursued doctoral studies at the University of British Columbia, Canada, earning a PhD in 2013. From 2014 to 2016 he has been an NSERC postdoctoral fellow at the University of Toronto.

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Zoom: https://ucla.zoom.us/j/92576210045