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“Imaging the cascade of symmetry-broken electronic states in kagome superconductors”.

The kagome lattice of transition metal atoms provides an exciting platform to study the interplay of electronic correlations and band topology. Recently discovered non-magnetic kagome metals $AV_3Sb_5$ ($A$=K, Rb, Cs) set off an avalanche of theoretical and experimental work as rare superconductors in the kagome structure. In this talk, I will present our experiments on $AV_3Sb_5$ where we uncovered a cascade of symmetry-broken electronic states emerging as a function of temperature. Using variable-temperature spectroscopic imaging scanning tunneling microscopy, we revealed a series of density waves, with different morphologies and dimensionality, all co-existing with superconductivity. Moreover, we observe distinct signatures of rotation symmetry breaking in the electronic structure, demonstrating the tendency of this family of kagome metals towards unidirectionality. Lastly, I will present our recent work revealing electronic nematicity in a new non-magnetic Ti-based kagome metal, CsTi$_3$Bi$_5$. Our experiments establish a complex landscape of electronic states that can co-exist on a kagome lattice, and provide intriguing parallels to high-$T_c$ superconductors and twisted bilayer graphene.