

# Condensed Matter Physics Seminar Series

## Atomic-scale imaging of symmetry-broken electronic phases in kagome superconductors

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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 imaged 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 on a new non-magnetic Ti-based kagome metal,  $CsTi_3Bi_5$ , where we reveal signatures of electronic nematicity. Our experiments reveal 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.

**Ilija Zeljkovic** is an Associate Professor of Physics at Boston College. He obtained a Ph.D. in Physics from Harvard University in 2013. Following a two-year post-doctoral appointment with Prof. Vidya Madhavan, he started as an Assistant Professor of Physics at Boston College in 2015. His current research focuses on MBE synthesis and nanoscale characterization of quantum materials, including correlated electron systems and topological materials. He is the recipient of the NSF CAREER Award (2017), ARO Young Investigator Award (2017), DARPA Young Faculty Award (2017) and DOE Early Career Award (2019).



**Friday, January 20th at 1:00 PM**

**Zoom:** <https://ucla.zoom.us/j/92576210045>