

RICE QUANTUM GROUP MEETING SEMINAR SERIES



Date: September 30, 2022, Friday

Time: 4PM - 5PM

Venue: SST 300

Research Group: Prof. Ming Yi's Group

Presenter: [Yichen Zhang](#)

Title: [Kramers Nodal Lines and Weyl Fermions in SmAlSi](#)

Abstract:

In condensed matter physics, quantum materials can exhibit exotic quasi-particles that have no analogues in free space due to the crystalline symmetries. Kramers nodal lines (KNLs) have recently been proposed theoretically as a special type of Weyl line degeneracy that connects time reversal invariant momenta, are robust to spin orbit coupling (SOC), and are inherent to all non-centrosymmetric achiral crystal structures. Through lattice symmetry breaking, they can be regarded as the parent phase of Kramers Weyl semimetals via topological phase tuning, leading to unusual spin, magneto-electric, and optical properties. Here we identify experimentally the existence of novel KNLs in SmAlSi, a non-centrosymmetric metal that develops incommensurate spin density wave order at low temperatures. Using angle-resolved photoemission spectroscopy, density functional theory calculations, and magneto-transport methods, we provide evidence for the symmetry-protected KNLs, as well as Weyl fermions under the broken inversion symmetry in the paramagnetic phase of SmAlSi. We discuss the nesting possibilities regarding the emergent magnetic orders in SmAlSi. More generally, we establish SmAlSi and the large family of isostructural analogs as a rich material platform for tuning topological phases and exploring correlated topology.

Short Bio:

Yichen Zhang is a 4th year Ph.D. student in Prof. Ming Yi's group at Rice University. His research work mainly focuses on using angle-resolved photoemission spectroscopy to study quantum materials that exhibit nontrivial electronic topology, as well as correlated phases regarding the charge, spin degrees of freedom, etc. Prior to working in condensed matter experiments, Yichen Zhang obtained his B.S. degree in physics at Nanjing University working on the theory side of topology in condensed matter physics.

Note: Snacks and Coffee will be served during the event.