Contribution ID: **271** Type: **Focus session invited talk**

Group theory method for extracting order parameters from scanning tunneling microscopy data

Monday 1 December 2025 14:00 (30 minutes)

Scanning tunneling microscopy (STM) is a powerful local probe of correlated electronic states. We introduce a group-theoretical framework for STM analysis that decomposes images into components corresponding to irreducible representations of the local density of states, providing a real-space map of symmetry properties. This decomposition enables the direct detection of spatial symmetry-breaking patterns; an ongoing challenge in the field. In the process, we uncover a selection rule, "Bragg peak extinctions,"which renders certain symmetry channels invisible to standard STM analysis, and we show how to circumvent this limitation. We also discuss practical considerations such as piezomagnetic drift and point to future applications, including quasiparticle interference.

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Session Classification: Focus Session - From edge states to emergent phases

Track Classification: Focus sessions: From Edge States to Emergent Phases: Advances in Topological and Strongly Correlated Materials