

August 11-14th at the Crowne Plaza Hotel in downtown Knoxville, TN



Contribution ID: 120

Type: Invited Talk

## Observation of Heeger's Susceptibility Divergence near the CDW Transition in $\text{ErTe}_3$ with Momentum-Resolved EELS

A charge density wave (CDW) is a phase of matter characterized by a periodic modulation of valence electron density coupled to a lattice distortion. In 1979, Alan Heeger predicted that the CDW transition should be accompanied by a divergence in the dynamic charge susceptibility, but this effect has never been observed experimentally. In this talk I will present momentum-resolved inelastic electron scattering (EELS) measurements of the charge susceptibility in the canonical CDW material  $\text{ErTe}_3$  with meV energy resolution. The valence band electronic excitations exhibit relaxational dynamics that are described well by a diffusion model, with the diffusivity peaking just below the critical temperature. Additionally, I will show, for the first time, a divergence in the real part of in the static limit ( $\chi''$ )—a long-predicted hallmark of CDWs. Unexpectedly, this divergence occurs as with only a weak thermodynamic signature at the transition temperature. Our study necessitates a reexamination of the traditional description of CDW formation in quantum materials.

\*D. Chaudhuri, et al., arXiv:2411.14746 (to appear in PNAS)

### Topical Area

Hard matter: quantum, electronic, semiconducting materials

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