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Quantum Criticality in FeSc_2S_4 DANIEL ISH, University of California - Santa Barbara, LEON BALENTS, Kavli Institute for Theoretical Physics — Despite possessing a local spin 2 moment on the iron site and a Curie-Weiss temperature of 45K , the A site spinel FeSc_2S_4 does not magnetically order down to 50mK . Previous theoretical work by Chen and Balents advanced an explanation for this observation in the form of the “ J_2 - λ ” model which places FeSc_2S_4 close to a quantum critical point on the disordered side of a quantum phase transition between a Néel ordered phase and a “Spin-Orbital Liquid” in which spins and orbitals are entangled, quenching the magnetization. We present new theoretical studies of the optical properties of the J_2 - λ model, including a computation of the dispersion relation for the quasiparticle excitations and the form of the collective response to electric field. We argue that the latter directly probes a low energy excitation continuum characteristic of quantum criticality, and that our results reinforce the consistency of this model with experiment.

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