

Abstract Submitted
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Raman spectroscopy study of spin-orbital liquid candidate FeSc₂S₄¹ STREIT CUNNINGHAM, K.W. PLUMB, Department of Physics and Astronomy, Johns Hopkins University, Baltimore, Maryland, USA, J.R. MOREY, T.M. MCQUEEN, Department of Chemistry, Johns Hopkins University, Baltimore, Maryland, USA, S. KOOHPAYEH, C.L. BROHOLM, NATALIA DRICHKO, Department of Physics and Astronomy, Johns Hopkins University, Baltimore, Maryland, USA — The A-site cubic spinel FeSc₂S₄, containing Fe²⁺ ions in a tetrahedral S₄ environment, represents a rare candidate of a spin-orbital liquid, where spin and orbital order remain suppressed down to the lowest measurable temperature [1]. We studied phonon spectrum and orbital excitations in FeSc₂S₄ by Raman spectroscopy on single crystals. At temperatures below 100K we observe widening of sulfur 330 cm⁻¹ T_{2g} and 365 cm⁻¹ A_{1g} phonon modes with an additional weak mode emerging at 400 cm⁻¹. These changes can indicate weak lattice distortions associated with the sulfur sites. Below 100K we also observe orbital excitations at frequencies of approximately 2000 cm⁻¹. We discuss the result in terms of a competition of spin-orbital liquid and a magnetically ordered state. [1] L. Mittelstadt et al., Phys. Rev. B 91 125112 (2015).

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