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Absence of nematic ordering transition in a diamond lattice: Application to FeSc2S4[1] CHANDAN SETTY, ZHIDONG LEONG, SHUYI ZHANG, PHILIP PHILLIPS, University of Illinois at Urbana Champaign, UIUC TEAM — Recent neutron scattering observations by Plumb et al [1] reveal that the ground state of FeSc2S4 is magnetic with two distinct Fe environments, instead of a quantum spin liquid as had been previously thought. Starting with the relevant O(N)-symmetric vector model of FeSc2S4, we study how the discrete (Z2) and continuous rotational symmetries are successively broken, yielding nematic and ordered phases. At high temperatures, we find that the nematic order parameter falls as T^{-\gamma}(\gamma>0), and therefore, FeSc2S4 is highly susceptible to the breaking of Ising symmetries, and explains the two distinct Fe environments that is present even at high temperatures, as seen by Mossbauer and far infrared optical spectroscopy. [1] K. Plumb, J. Morey, J. Rodriguez-Rivera, H. Wu, A. Podlesnyak, T. McQueen, and C. Broholm, arXiv preprint arXiv:1603.08033 (2016)

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