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Strong-coupling approach to nematicity in the cuprates PETER PHILIPP ORTH, University of Minnesota, BHILAHARI JEEVANESAN, JOERG SCHMALIAN, Karlsruhe Institute of Technology (KIT), RAFAEL FERNANDES, University of Minnesota — The underdoped cuprate superconductor $YBa_2Cu_3O_{7-\delta}$ is known to exhibit an electronic nematic phase in proximity to antiferromagnetism. While nematicity sets in at large temperatures of $T \approx 150$ K, static spin density wave order only emerges at much lower temperatures. The magnetic response shows a strong in-plane anisotropy, displaying incommensurate Bragg peaks along one of the crystalline directions and a commensurate peak along the other one. Such an anisotropy persists even in the absence of long-range magnetic order at higher temperatures, marking the onset of nematic order. Here we theoretically investigate this situation using a strong-coupling method that takes into account both the localized Cu spins and the holes doped into the oxygen orbitals. We derive an effective spin Hamiltonian and show that charge fluctuations promote an enhancement of the nematic susceptibility near the antiferromagnetic transition temperature.

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