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Commensurate and incommensurate magnetic order in CaFe₄As₃ YUSUKE NAMBU, Department of Physics and Astronomy, Johns Hopkins University, LIANG ZHAO, EMILIA MOROSAN, Department of Physics and Astronomy, Rice University, KYOO KIM, GABRIEL KOTLIAR, Department of Physics, Rutgers University, COLLIN BROHOLM, Department of Physics and Astronomy, Johns Hopkins University — Magnetic order in newly discovered orthorhombic CaFe₄As₃ was examined through neutron diffraction on powder and single crystalline samples. The structure can be described as interleaving FeAs strips extending along the b axis. Longitudinally polarized magnetic order with an incommensurate propagation vector $0.37b^* < q_0 < 0.39b^*$ develops below a 2nd order phase transition at $T_{\rm N}=89.6~{\rm K}$ with critical exponent $\beta=0.365(6)$. At $T_{\rm 2}=25.6~{\rm K}$ there is a 1st order phase transition below which $q_0 = 0.375(2)b^*$ appears locked to a commensurate value and a transverse component develops. As opposed to the 122 systems, no structural modifications were found at the magnetic transitions. Ab initio LDA+U and dynamic mean field theory calculations indicate that Fermi surface nesting may drive the magnetic instabilities.

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