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Incommensurate Spin Wave Structures in FeP and FeAs EFRAIN E. RODRIGUEZ, Naitonal Institute of Standards and Tech., MARK A. GREEN, National Institute of Standards and Tech., PAWEL ZAJDEL, University of Silesia, SHANTA R. SAHAR, KEVIN KIRSHENBAUM, NICHOLAS P. BUTCH, JOHN-PIERRE PAGLIONE, University of Maryland, College Park — Determining the magnetic ground states in ternary and quaternary iron pnictides is relevant towards understanding the superconductivity displayed in some phases. We investigate the magnetic structure and properties of the simple binary phosphide and arsenide of iron in order to better understand the properties of iron pnictides. The crystal structure of FeP and FeAs is orthorhombic and related to the hexagonal NiAs-type structure. Both FeP and FeAs order magnetically below 300 K and their magnetic structures reported in the past literature consist of simple spirals incommensurate with the chemical lattice and moments directed transverse to the propagation vector of the spin wave. With neutron powder diffraction data, we explore other spin wave structures with representational analysis of its crystal symmetry. We further compare the different models with transport and magnetic susceptibility measurements on single crystalline samples. Overall, we study the constraints posed from both the nature of the magnetic phase transitions and their crystal symmetries to find the spin structures that best describe the magnetic ground states of FeP and FeAs.

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