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Lattice distortion and magnetic quantum phase transition in CeFeAs1-xPxO C.R. DELA CRUZ, NSSD, ORNL, W.Z. HU, S. LI, IOP,CAS, Q. HUANG, M. GREEN, J. LYNN, NCNR, G.F. CHEN, N.L. WANG, IOP, CAS, H. MOOK, NSSD, ORNL, Q. SI, Rice University, P. DAI[1], Univ. of Tenn. — A feature of the parent compounds of the Fe-based superconductors is the structural distortion that occurs in the vicinity of the onset of long range magnetic order of the Fe-spins. In the RFeAsO(R=rare earth) family, the magneto-structural transition is suppressed in favor of superconductivity upon doping charge carriers into the system, which alters the system electronically and crystallographically as well. To understand the lattice effect on the suppression of the AFM ground state itself, it is important to isoelectronically tune the crystal lattice structure without the influence on charge carrier doping and superconductivity. Here we use neutron powder diffraction to show that replacing the larger arsenic with smaller phosphorus in CeFeAs1-xPxO simultaneously suppresses the AFM order and orthorhombic distortion near x = 0.4, providing evidence for a magnetic quantum phase transition. Furthermore, we find that the pnictogen height in these iron arsenides is an important controlling parameter for their electronic and magnetic properties, and may play an important role in electron pairing and superconductivity.

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