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Structural and Magnetic Transitions in $Ca_{10}(Fe_{1.996}Pt_{0.004}As_2)_5(Pt_3As_8)$ studied by neutron and x-ray diffraction[1] AASHISH SAPKOTA, ANDREAS KREYSSIG, GREGORY TUCKER, MEHMET RAMAZANOGLU, Iowa State University (ames lab), DOUGLAS ROBINSON, Argonne National Laboratory, NI NI, University of California, Los Angeles, ALAN GOLDMAN, ROBERT MCQUEENEY, Iowa State University (ames lab) — $Ca_{10}(Fe_{1.996}Pt_{0.004}As_2)_5(Pt_3As_8)$ compound is a member of the Fe-based high-temperature superconductor family. Recent work showed that instead of being tetragonal as most of the pnictide superconductors are, this compound exhibits only a pseudo-tetragonal structure. We studied the structure and magnetic properties of $Ca_{10}(Fe_{1.996}Pt_{0.004}As_2)_5(Pt_3As_8)$ single crystal by x-ray and neutron diffraction at the station 6-ID-D, Advanced Photon Source, Argonne, and at the instrument HB-1A, High-Flux Isotope Reactor, Oak Ridge, respectively. We found a lattice distortion from pseudo-tetragonal to pseudo-orthorhombic below $T_s = 110$ K and stripe-like antiferromagnetic order below $T_N = 96$ K. Both phase transitions are 2^{nd} order in nature. Though the structure is pseudo-tetragonal with a complex superstructure rather than being common tetragonal, the magnetic order and lattice distortion are similar to most other pnictide superconductors demonstrating these ordering phenomena extremely robust against deviations from simple structure motifs and against chemical disorder.

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