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Neutron scattering studies on semiconducting $\mathbf{Rb_{0.8}Fe_{1.5}S_2}$ MENG WANG, PATRICK VALDIVIA, ROBERT BIRGENEAU, University of California, Berkeley, WEI TIAN, SONGXUE CHI, Oak Ridge National Laboratory, PENGCHENG DAI, Rice University, EDITH BOURRET-COURCHESNE, Lawrence Berkeley National Laboratory — We report neutron scattering and transport measurements on semiconducting $Rb_{0.8}Fe_{1.5}S_2$, a compound isostructural and isoelectronic to the well-studied $A_{0.8}Fe_ySe_2$(A = K, Rb, Cs, Tl/K) superconducting systems. Both resistivity and dc susceptibility measurements reveal a magnetic phase transition at T = 275 K. Neutron diffraction studies show that the 275 K transition originates from a phase with rhombic iron vacancy order which exhibits an in-plane stripe antiferromagnetic ordering below 275 K. Based on the close similarities of the in-plane antiferromagnetic structures, moments sizes, and ordering temperatures in semiconducting $Rb_{0.8}Fe_{1.5}S_2$ and $K_{0.81}Fe_{1.58}Se_2$, we argue that the in-plane antiferromagnetic order arises from strong coupling between local moments. The spin waves of the stripe AF order will also be presented.

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