

Abstract Submitted
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Commensurate-incommensurate magnetic phase transition in the Fe-doped ruthenate bilayer $\text{Ca}_3\text{Ru}_2\text{O}_7$ XIANGLIN KE, M. ZHU, Michigan State University, W. TIAN, T. HONG, Oak Ridge National Laboratory, J. PENG, Z.Q. MAO, Tulane University — Neutron diffraction studies have revealed an uncommon commensurate-incommensurate magnetic phase transition with decreasing temperature in the ($\sim 5\%$) Fe-doped bilayer ruthenate $\text{Ca}_3(\text{Ru,Fe})_2\text{O}_7$. An incommensurate phase formed of a cycloidal spiral spin structure coexists with a commensurate one below the phase transition at 42 K and persists down to the lowest temperature, accompanied by higher-order magnetic satellite peaks which indicate the formation of a magnetic soliton lattice. We ascribe these findings to the competing magnetic interactions in $\text{Ca}_3\text{Ru}_2\text{O}_7$. This study demonstrates an effective approach to tune novel magnetic and electronic properties of this complex system via 3d magnetic transition-metal substitution.

[1] X. Ke et al, Phys. Rev. B. **89**. 220407 (R) (2014).

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