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Emergent electronic and magnetic state in $Ca_3Ru_2O_7$ induced by Ti doping XIANGLIN KE, Oak Ridge National Laboratory, J. PENG, Tulane University, D.J. SINGH, T. HONG, W. TIAN, C.R. DELA CRUZ, Oak Ridge National Laboratory, Z.Q. MAO, Tulane University — We report an emergent electronic and magnetic state in the bilayer ruthenate $Ca_3Ru_2O_7$ upon doping with a small concentration of Ti on the Ru sites. In contrast to a quasi-two-dimensional metallic state in $Ca_3Ru_2O_7$, which has an antiferromagnetic state formed by ferromagnetic bilayers stacked antiferromagnetically along the c-axis [1,2], we find an insulating state with a "G"-type nearest neighbor antiferromagnetic order in $Ca_3(Ru_{1-x}Ti_x)_2O_7$ for $x >= 0.03$ [3]. The close proximity of these two distinct electronic and magnetic states demonstrates unique competing magnetic interactions in $Ca_3Ru_2O_7$, which provides a rare opportunity to investigate the interplay between correlated metal physics and Mott physics. Work supported by U.S. DOE.

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[2] X. Ke *et al.*, Phys. Rev. B **84**, 014422 (2011).
[3] X. Ke *et al.*, Phys. Rev. B **84**, 201102 (R) (2011).

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