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Anomalous $E-$type Antiferromagnetism in the ground state of Mn-substituted $Sr_3Ru_2O_7$[1] DALGIS MESA, Dept. of Physics, Louisiana State University, Baton Rouge, LA 70802, FENG YE, SONGXUE CHI, JAIME A. FERNANDEZ-BACA, V.O. GARLEA, Neutron Scattering Science Division, Oak Ridge National Laboratory, Oak Ridge, TN 37831, BIAO HU, RONGYING JIN, E.W. PLUMMER, JIANDI ZHANG, Dept. of Physics, Louisiana State University, Baton Rouge, LA 70802 — The bi-layer perovskite, $Sr_3Ru_2O_7$, has sparked a lot of interest because of the quantum critical behavior—related to a metamagnetic (magnetic field-tuned) phase transition. One of the key issues is related to the magnetism in the system. Here we report an investigation of the effects on magnetism resulting from chemical substitution in this compound. Our neutron scattering investigation reveals an unusual $E-$type antiferromagnetic (AFM) structure induced by Mn-substitution in the ground state of $Sr_3(Ru_{1-x}Mn_x)_2O_7$ ($x = 0.16$). The AFM structure exhibits a long-range order in ab-plane but almost only a single bilayer-thickness correlation along the c-direction, thus characterizing the system as a quasi-two-dimensional antiferromagnet while the AFM order parameter shows almost three-dimensional-like scaling character as T approaches T_N (~ 82 K). The magnetic moments are aligned along the c-axis with an upper limit of ~ 0.70 μ_B/Ru site. The induced AFM order most likely results from the enhancement of super-exchange interactions rather than from structural distortions or from freezing of electronic instabilities due to the nesting character of Fermi surface in the parent compound.

Dalgis Mesa
Dept. of Physics, Louisiana State University, Baton Rouge, LA 70802

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