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Magnetic Superstructure and Metal-Insulator Transition in Mn-Substituted $Sr_3Ru_2O_7$ M.A. HOSSAIN, UBC and SIMES, Stanford, Z.H. ZHU, UBC, B. BOHNENBUCK, MPI, Stuttgart, Y.-D. CHUANG, Berkeley Lab, Y. YOSHIDA, AIST, Z. HUSSAIN, Berkeley Lab, B. KEIMER, MPI, Stuttgart, I.S. ELFIMOV, G.A. SAWATZKY, A. DAMASCELLI, UBC — We present a temperature-dependent resonant elastic soft x-ray scattering (REXS) study of the metal-insulator transition in $Sr_3(Ru_{1-x}Mn_x)_2O_7$, performed at both Ru and Mn L-edges. Resonant magnetic superstructure reflections together with ab-initio density functional theory calculations identify the ground state as a spin checkerboard with blocks of 4 spins up and 4 spins down. Based on modelling of the REXS intensity from randomly distributed Mn impurities, we establish the inhomogeneous nature of the metal-insulator transition, with an effective percolation threshold corresponding to an anomalously low $x \sim 0.05$ Mn substitution. Perhaps more important, our results suggest that the same checkerboard instability might be present already in the parent compound $Sr_3Ru_2O_7$. In collaboration with: A.G. Cruz Gonzalez, J.D. Denlinger (Berkeley) I. Zegkinoglou, M.W. Haverkort (MPI) J. Geck, D.G. Hawthorn (UBC) R. Mathieu, Y. Tokura, S. Satow, H. Takagi (Tokyo) H.-H. Wu and C. Schussler-Langeheine (Cologne).

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