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Dimensional Crossover of Antiferromagnetism in Half-Doped $\mathbf{La_{0.5}Sr_{1.5}MnO_4}$ KUO-SHENG CHAO, National Chiao-Tung Univ., Taiwan, J. OKAMOTO, D. J. HUANG, National Synchrotron Radiation Research Center, Taiwan, C. Y. MOU, National Tsing Hua Univ., Taiwan, H. -J. LIN, C. -H. HSU, National Synchrotron Radiation Research Center, Taiwan, Y. KANEKO, R. MATHIEU, Spin SuperStructure Project, Japan, Y. TOKURA, Univ. of Tokyo, Japan, C. T. CHEN, National Synchrotron Radiation Research Center, Taiwan — Like cuprates which exhibits high-temperature superconductivity, half-doped single-layered manganites such as $La_{0.5}Sr_{1.5}MnO_4$ have distinct features of the MnO_2 plane in the perovskite structure. In addition to charge-orbital order, of particular interest is the antiferromagnetism in half-doped manganites with the so called CE-type antiferromagnetic (AF) structure, which is essentially composed of ferromagnetic zigzag chains antiferromagnetically coupled to one-another. In this talk, we will report critical behavior and dimensional crossover of AF order in $La_{0.5}Sr_{1.5}MnO_4$, based on measurements of resonant soft-x-ray magnetic scattering. A 2D incommensurate AF order exists at temperatures above the Neel temperature T_N. As the temperature cools across T_N, the interlayer exchange coupling prevails and the 2D incommensurability collapses to stabilize the 3D AF order. The measurements unravel spin correlations in the classical renormalized region for a non- standard (CE-type) antiferromagnet.

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