Structure of Short Range Magnetic Order in the half-doped layered perovskite $La_{1.5}Sr_{0.5}CoO_4$ A.T. SAVICI, I. ZALIZNYAK, G. GU, J. TRANQUADA, Department of Physics, Brookhaven National Laboratory, Upton, NY 11973-5000, R. ERWIN, National Institute of Standards and Technology, Gaithersburg, Maryland 20899 — We have investigated the short range magnetic ordering in $La_{1.5}Sr_{0.5}CoO_4$ by elastic neutron scattering. The magnetic scattering is diffuse, with broad peaks characteristic of short range correlations. Such scattering is often described by replacing the delta-functions in the Bragg scattering cross- section by the corresponding multi-dimensional Lorentzians. However, this approach is not quite satisfactory. First, because it extends the small-q Orstein-Zernike approximation beyond the region of its validity and second, because the multi-dimensional Lorentzians cannot be properly normalized. On the other hand, in the case of a disorder introduced by the linear topological defects such as magnetic disclinations, the scattering is described by a simple expression in the form of the factorized "lattice Lorentzians" (I. A. Zaliznyak, S.-H. Lee, in Y. Zhu (Ed.), Modern Techniques for Characterizing Magnetic Materials, Kluwer Academic, New York (2005)).We compare our data with both expressions and show that it is inconsistent with a system of linear magnetic disclinations.

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