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Neutron scattering investigation of the magnetic correlations in Sr_2CoO_3Cl and $Sr_3Co_2O_5Cl_2$ CHRISTOPHER KNEE, Department of Applied Physics, Chalmers University of Technology and Gothenburg University, SE-41296, Gothenburg, Sweden, MARIANNE FIELD, ROBERT HUGHES, MARK WELLER, School of Chemistry, University of Southampton, Southampton SO171BJ, United Kingdom, ALEXANDER ZHUKOV, PETER DE GROOT, School of Physics and Astronomy, University of Southampton, Southampton SO171BJ, United Kingdom — The magnetic interactions in the layered cobalt (III) oxychlorides, Sr_2CoO_3Cl and $Sr_3Co_2O_5Cl_2$, have been studied using constant wavelength neutron powder diffraction and inelastic time-of-flight neutron scattering. The materials crystallize with Ruddlesden-Popper structures and contain layers of CoO_5 pyramids that form CoO_2 sheets in the *ab*-plane separated along *c* by SrCl rocksalt layers. The phases display contrasting magnetic properties despite the probable presence of high spin Co^{3+} (S = 2) in both compounds. Sr_2CoO_3Cl undergoes a transition to long range 3D antiferromagnetic (AFM) order at a T_N = 330 K, preceded by strong diffuse scattering from 2D spin coherence. $Sr_3Co_2O_5Cl_2$ does not exhibit the expected long range ordered AFM ground state, and instead the spin correlation is limited to short range 2D interactions. The material's magnetism is rationalized based on competing FM and AFM coupling.

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