MS19-05 | Structure and Magnetic Phases in the $Cs_2CuCl_{4-x}Br_x$ Mixed System

van Well, Natalija (University Bayreuth, Bayreuth, GER); Eisele, Claudio (Laboratory of Crystallography, University of Bayreuth, Bayreuth, GER); Ramakrishnan, Sitaram (Laboratory of Crystallography, University of Bayreuth, Bayreuth, GER); Shang, Tian (Laboratory for Multiscale materials experiments, Paul Scherrer Institute, Villigen, GER); Medarde, Marisa (Laboratory for Multiscale materials experiments, Paul Scherrer Institute, Villigen, CH); Cervellino, Antonio (Swiss Ligth Source (SLS), Paul Scherrer Institute, Villigen, CH); Skoulatos, Markos (Heinz Maier-Leibnitz Zentrum (MLZ), Technische Universität München, Garching bei München, GER); Georgii, Robert (Heinz Maier-Leibnitz Zentrum (MLZ), Technische Universität München, Garching bei München, GER); Pedersen, Björn (Heinz Maier-Leibnitz Zentrum (MLZ), Technische Universität München, Garching bei München, GER); van Smaalen, Sander (Laboratory of Crystallography, University of Bayreuth, Bayreuth, GER)

The $Cs_2CuCl_{4-x}Br_x$ mixed system is very rich in structural and magnetic phases, which can be separated by their tetrahedral/octahedral Cu^{2+} environment. For the tetrahedral one, neutron diffraction investigation of the magnetic phase diagram of $Cs_2CuCl_{4-x}Br_x$ provides detailed information about the influence of a specific Br concentration on the magnetic structure [1]. For the octahedral one, the compounds are typical quasi 2-D antiferromagnets. The realisation of the new tetragonal phase of Cs_2CuCl_4 is possible using specific crystal growth conditions at a temperature below 281K. For the structure investigation, synchrotron powder diffraction was used. The susceptibility measurements of it show similar magnetic behaviour like the tetragonal $Cs_2CuCl_{2.9}Br_{1.1}$, $Cs_2CuCl_{2.5}Br_{1.5}$ and $Cs_2CuCl_{2.2}Br_{1.8}$ and present consistent results for typical quasi 2-D antiferromagnets [2].The structure analysis down to 4K for $Cs_2CuCl_{2.2}Br_{1.8}$ shows no phase transition and the tetragonal symmetry *I*4/mmm, being the same at room temperature. However, the new neutron single crystal diffraction investigation presents a very small orthorhombic distortion (subgroup relationship). Several magnetic reflections corresponding to the propagation vector k = (*0, 0, 0*) are observed for this compound below the magnetic phase transition at T_N = 11.3K confirming its antiferromagnetic nature.

[1] Natalija van Well et al., Annalen der Physik, 530,1800270 (2018)
[2] P.T. Cong et al., IEEE Transactions on Magnetics 50, 2700204 (2014)