MS23-2-6 Investigation of chemical order in $Gd_{14}Au_xAl_{86-x}$ quasicrystal 1/1 approximants
#MS23-2-6

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Abstract
Quasicrystals (QCs) exhibit crystallographically forbidden symmetries and aperiodic long range atomic order. whereas approximants of quasicrystals (ACs) possess conventional periodic crystal structures with similar chemical composition and local atom arrangments as their related QCs. For the past 40 years, there has been considerable interest in finding new QCs and ACs, and investigating their physical properties. The effect of chemical composition on magnetic behaviour has been recently reported for ACs Gd14AuxAl86-x. [1]. In particular it was found that with increasing Au concentration magnetism changes from spin glass behaviour to FM to AFM. In order to better understand the underlying reasons for the observed magnetic properties, it was deemed necessary to determine the crystal structures in detail of Gd14AuxAl86-x. 1/1 ACs for a broader range of x. Therefore, high quality single crystals with different Au/Al ratio have been synthesized using the self-flux method. The phase purity of the samples have been confirmed by EDX and powder XRD techniques. The crystal structures were refined from single crystal XRD data. As a result, some atomic sites show strong chemical preference while others are resilient. The specifics of the chemical ordering phenomenon in Gd14AuxAl86-x 1/1 ACs will be discussed.

References
[1] A. Ishikawa et al., Composition-driven spin glass to ferromagnetic transition in the quasicrystal approximant Au-Al-Gd., Phys. Rev. B 93, 024416 (2016).