MS26-05 | Three Dimensional Local Atomic Configurations of Decagonal AlNiCo Quasicrystal Studied by X-Ray Fluorescence Holography

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Decagonal quasicrystal are characterised by a periodic stacking of quasiperiodic planes [1]. In this study, we apply the x-ray fluorescence holography (XFH) technique [2] to explore atomic configurations in two different decagonal quasicrystal with respective compositions equal to $Al_{73}Co_{15}Ni_{12}$ (Co-rich) and $Al_{72}Co_{9}Ni_{19}$ (Ni-rich). The measurements have been carried out on large single grain samples, above the Ni and Co edge. The XFH experiment allowed the reconstruction of the average 3D local environment around Co and Ni atoms.

This study is particularly interesting since the two quasicrystals do present significant differences: whereas the Co-rich decagonal phase displays a large amount of x-ray diffuse scattering even on the half integer layers, the Ni-rich one has a limited amount of diffuse scattering.

The results are compared with current atomic model using the tiling decoration proposed in [3].

[1] Janssen, T., Chapuis, G. & de Boissieu, M. (2007, second edition 2018). *Aperiodic Crystals. From modulated phases to quasicrystals*. Oxford: Oxford University Press.
[2] K. Hayashi et al., J. Phys.: Condens. Matter **24**, (2012) 093201
[3] M. Mihalkovic, M. Widom and C.L. Henley, Phil. Mag. **91** (2010) 2557-66