Enhanced physical properties in aperiodic modulated structures

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I will present two experimental studies of scientific cases studied by our group where aperiodic modulated structures are promoting enhanced physical properties. The first case is charge density wave systems (here the materials are monophosphate tungsten bronzes) where the modulated structure arriving from a soft phonon mode is also associated with a Fermi surface reconstruction. As a consequence, I will show that the remaining small pockets of carriers can exhibit strongly enhanced thermal and quantum effects for these quasi 2D systems [1]. The second case is when non collinear magnetic order promotes the magnetoelectric effect [2]. The case of study is here a ferrimagnetic spinel with kagome layers and complex magnetic order of the spiral form, that has been tackled by neutron scattering at large and small angles (fig.2), and laboratory measurements.

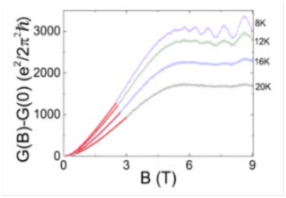

Fig.1 : Prominent quantum oscillations in tunsgten monophosphate bronzes

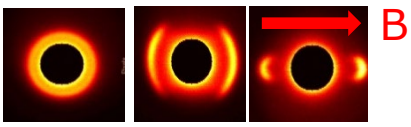

Fig. 2 : Field induced ordering of a long range incommensurate spiral as seen by Small Angle Neutron Scattering in Co_5TeO_8

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[1] K. Kolincio et al , Phys. Rev. B 94 (2016), and *in preparation*

[2] e.g Y. Tokura, S. Seki; Advanced materials 22, 14 (2010)

S. Podchezertsev et al, *in preparation.*