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Revisiting the magnetic structure of R1/3Sr2/3FeO3 (R = La, Pr, Nd) by neutron powder and single crystal diffraction combined with spherical polarimetry

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We present our study of a magnetic structure in R1/3Sr2/3FeO3 (R = La, Pr, Nd) system, which is interesting because it has a metal-insulator (MI) transition concomitantly with the magnetic ordering. In our previous paper [1] we have shown that the neutron powder diffraction data can be equally well fitted by two different magnetic space groups, namely a canted helical model P3_221 and a collinear arrangement of the Fe-spins C2/c. The latter model supports the charge ordering, implying that it is responsible for MI-transition. We have performed neutron single-crystal diffraction and neutron spherical polarimetry experiments on La1/3Sr2/3FeO3 single crystals grown by floating zone method, in order to distinguish between the two magnetic models, we proposed. Our single crystal diffraction and spherical polarimetry experiments were able to resolve the above issue, giving the definitive preference to C2/c [2]. This work was supported by SNF project 200021_157009, Fei Li has successfully defended his PhD thesis [3].
[1]. F.Li et al., PHYSICAL REVIEW B 97, 174417 (2018)
[2]. F.Li et al., to be published
[3]. Fei Li: Crystal and magnetic structure of R1/3Sr2/3FeO3 (R = La, Pr and Nd), © 2019, doi: 10.3929/ethz-b-000349023

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