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Helimagnets by disorder: its role in the high- T_S spiral magnet YBaCuFeO_5

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Most of the spiral magnetoelectric multiferroics investigated in recent years are geometrically or exchange frustrated magnets with low magnetic transition temperatures. The exceptional stability of the spiral magnetic order (at T_S) in the layered structure of YBaCuFeO_5 [1,2] involves a non-conventional mechanism (“spiral order by disorder”) theoretically developed by Scaramucci et al. [3]. Using neutrons we have investigated the impact of tuning frustration through B-site disorder (n_d) on the magnetic spiral phase in the reference compound YBaCuFeO_5 [4]. The influence of disorder (and only disorder) on the magnetic phase diagram is studied on a quantitative basis. The interplay between disorder, stability and the detailed features of the incommensurate spiral magnetic orders has been investigated in samples of identical composition, spanning a wide range of n_d values. Three different regimes are distinguished in the YBaCuFeO_5 phase diagram versus disorder, which set limits to T_S and the cycloidal component of the helicoidal order [4,5]. This layered structure appears as a very efficient realization of the new avenue to supply functional helimagnets at normal working temperatures.

[1] M. Morin et al. Nat. Commun. 7, 13758 (2016).

[2] T. Shang et al., Sci. Adv. 4, eaau6386 (2018).

[3] A. Scaramucci et al., Phys. Rev. Research. 2, 013273 (2020); Phys. Rev. X 8, 011005 (2018).

[4] A. Romaguera et al., Phys. Rev. Research (2022) (accepted, in press).

[5] X. Zhang et al., Acta Mater. 206, 116608 (2021); J. Magn. Magn. Mater. 551, 169165 (2022).

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