Coupling between an incommensurate antiferromagnetic structure and a soft ferromagnet in the archetype multiferroic BiFeO3 /cobalt system

Elzo, Marta

Moubah, Reda

Blouzon, Camille

Sacchi, Maurizio

Grenier, Stéphane

Belkhou, Rachid

Dhesi, Sarnjeet

Colson, Dorothée

Torres, Felipe

Kiwi, Miguel

Viret, Michel

Jaouen, Nicolas

Multiferroic materials are mostly antiferromagnets, often containing incommensurate magnetic arrangements stemming from the magnetoelectric interaction. Using soft x-ray resonant magnetic scattering, we show that these long-range structures induce a magnetization wriggle in cobalt layers deposited on top of BiFeO3 single crystals. This is understood using a simple interface exchange interactions model. It leads to the appearance of a magnetic anisotropy axis, which, in the particular BiFeO3/Co system, can be manipulated using an electric field. More generally, it is demonstrated here that through interfacial magnetic exchange, antiferromagnets can leave an imprint revealing some of their hidden properties, thus providing much richer effects than mere exchange bias.