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Investigation of the stability range of the skyrmion phase in doped Cu_2OSeO_3

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A skyrmion is a topological stable particle-like object comparable to spin vortex at the nanometre scale. It consists of an about 50 nm large spin rotation which order in a 2 dimensional, typically hexagonal superstructure perpendicular to an applied external magnetic field. Its dynamics has links to flux line vortices as in high temperature superconductors. Cu_2OSeO_3 is a unique case of a multiferroic materials where the skyrmion dynamics could be controlled through the application of an external electric field. The direct control of the skyrmion dynamics through a non-dissipative method would offer technological benefits and unique possibilities for testing fundamental theories also related to the Higgs Boson whose theoretical description has similarities to skyrmions. Important for technological applications would be a stability range of the skyrmion phase up to room temperature. While room temperature skyrmion materials exist, Cu_2OSeO_3 orders magnetically below 60 K. Our combined small angle neutron scattering, SQUID magnetization measurements, and electron microscopy investigations did provide direct evidence that the stability range of the skyrmion phase can be extended in Te-doped Cu_2OSeO_3. This did provide valuable information on the formation mechanism of the skyrmions and their scaling behavior.

Speakers Gender

Male

Travel Funding

No

Level of Expertise

Expert

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