

# Probing the magnetic states of centrosymmetric magnetic materials by magnetic force microscopy

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Recently, skyrmions have drawn much attention for physics and applied science since they provide a venue for domain manipulation with an ultra low current density. Skyrmions, originally, were found at the non-centrosymmetric crystals, such as MnSi and FeGe, originating from competition between ferromagnetic exchange and Dzyaloshinskii-Moriya interactions. However, a couple of recent results show skyrmion behavior in highly anisotropic magnetic materials with inversion symmetry, which opens a wide span of practical applications.

In this talk we will show skyrmion-like domains in centrosymmetric crystals, probed by magnetic force microscopy. We employ a home-built MFM operating at ultra-low, He-3 temperatures within a vector magnet with 2-2-9 T maximum fields in  $x$ - $y$ - $z$  direction. We highlight the evolution of tree-like domains into skyrmion-like bubbles with a variety of fields and temperature in the bilayer LSMO and CeRu<sub>2</sub>Ga<sub>2</sub>B single crystals.