

Exploring the Physics of Two-Dimensional Magnets with Sensitive Imaging

Overview

Researchers at Cornell University have imaged light scattered from a two-dimensional, ferromagnetic material using the ProEM-512 EMCCD camera. The researchers around Prof. Jie Shan from Cornell University (USA) want to better understand the physics of magnetic fluctuations in this material and how to control them which could lead to the realization of magnet/spin-controlled devices in the future.

By using magnetic circular dichroism (MCD) they are able to achieve fast and sensitive imaging. MCD works similarly to circular dichroism but in the presence of a magnetic field. Left/Right-handed circular polarized light is scattered by the oriented atomic spins in the sample and using a setup of well aligned polarizers, regions of different spin orientations can be imaged with very high contrast and sub micrometer spatial resolution.

The samples are single atomic layers of a material called CrBr₃ that is encapsulated in thin atomic layers of hexagonal Boron nitride (this is called a van der Waals heterostructure made of two-dimensional materials). Sensitive imaging (10ms exposure time) is aided by the large magnetic moment of this material and helps taking image sequences with changing magnetic field.

Featured Paper/ Publication: <https://arxiv.org/abs/1910.13023>

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