

IFMP Seminar

Date: Tuesday, October 19, 2021, at 14:50

BigBlueButton:

<https://selfservice.zih.tu-dresden.de/link.php?m=150166&p=833f8917> (TUD)

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Speaker: **Yasuyuki Kato**
University of Tokyo

Title: **Spin Excitation Spectra in Helimagnetic States: Proper-Screw, Cycloid, Vortex Crystal, and Hedgehog Lattice**

Abstract: We investigate the spin excitation spectra in chiral and polar magnets by the linear spin-wave theory for an effective spin model with symmetric and antisymmetric long-range interactions. In one dimension, we obtain the analytic form of the dynamical spin structure factor for proper-screw and cycloidal helical spin states with uniform twists, which shows a gapless mode with strong intensity at the helical wave number. When introducing spin anisotropy in the symmetric interactions, we numerically show that the stable spin spirals become elliptically anisotropic with nonuniform twists and the spin excitation is gapped. In higher dimensions, we find that similar anisotropy stabilizes multiple- Q spin states, such as vortex crystals and hedgehog lattices. We show that the anisotropy in these states manifests itself in the dynamical spin structure factor: a strong intensity in the transverse components to the wave number appears only when the helical wave vector and the corresponding easy axis are perpendicular to each other. Our findings could be useful not only to identify the spin structure but also to deduce the stabilization mechanism by inelastic neutron scattering measurements.