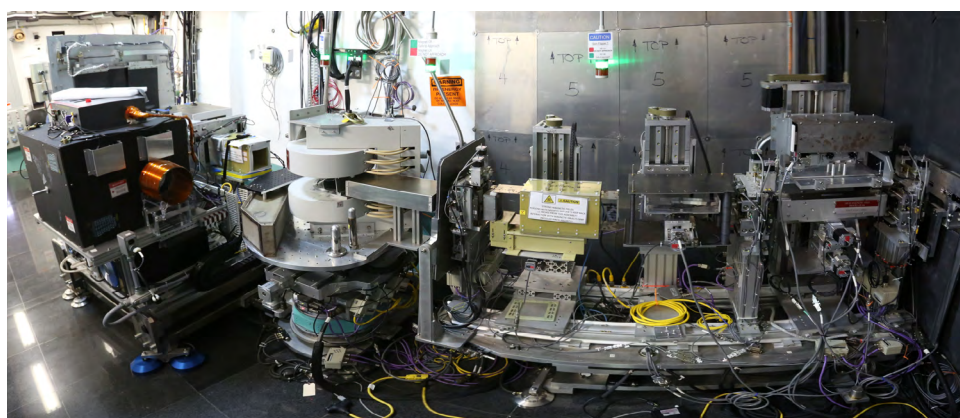


MAGREF

Magnetism Reflectometer

The Magnetism Reflectometer is a time-of-flight instrument optimized for studies of magnetic thin films, superlattices, and nanoscale structures using reflectometry, off-specular scattering and grazing incidence small-angle scattering. It is used to study the depth-profile and in-plane magnetic and nonmagnetic structures of thin films. The incident beam is polarized using either the reflection or transmission supermirror polarizers. Polarization analysis is performed using the multichannel fan-shaped supermirror analyzer, or the ^3He in-situ pumping analyzer. The instrument is enabled by a quick switch between polarized and unpolarized configurations of the incident neutron beam. Wide-angle diffraction geometry (< 30 deg) is accessible for experiments on thin films and multilayers.



APPLICATIONS

The Magnetism Reflectometer provides a broad variety of sample environment and experimental conditions with external magnetic fields, wide temperature range and electric fields to probe magnetism at the nanoscale in thin films and interfaces in quantum materials, spintronics, functional materials, soft matter, and biology. Examples span a wide range of materials:

- Interfacial complex behavior in quantum materials and structures hybridizing topological insulators or superconductors with ferromagnets
- Low dimensional van der Waals thin films under electrostatic gating, strain, and interface/proximity effects
- Complex oxide heterostructures
- Complex magnetic lateral structures, domains, skyrmions, patterned films
- In operando experiments using in situ photoexcitation, ferromagnetic resonance
- Polarized neutron beam also enables studies of non-magnetic materials including soft matter for contrast variation, incoherent background reduction, and phase determination for direct inversion of reflectivity data into real-space scattering-length density profiles.

SPECIFICATIONS

Source-to-sample distance	18.703 m
Sample-to-detector distance	2.2972 m
Detector size	21 x 18 cm ²
Detector resolution	1.4 mm
Moderator	Coupled supercritical hydrogen
Bandwidth	60 Hz ($\Delta\lambda=3$ Å) 30 Hz ($\Delta\lambda=6$ Å)
Wavelength range	1.8 Å $< \lambda <$ 14.0 Å
Q range	0 Å ⁻¹ $< Q <$ 3.5 Å ⁻¹
Minimum reflectivity	10 ⁻⁸
Polarization	Reflection Polarizer P = 99%-96% λ (2Å - 10.5Å) Transmission Polarizer P = 96%-90% λ (4.5Å - 12Å)
Magnetic field (Electromagnet)	1.2 T (50 mm gap) 3 T (10 mm gap, room T)
Temperature	5–750 K
Magnetic field (Cryomagnet)	5T
Temperature (Top-loading Cryostat)	1.6 K – 850 K

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