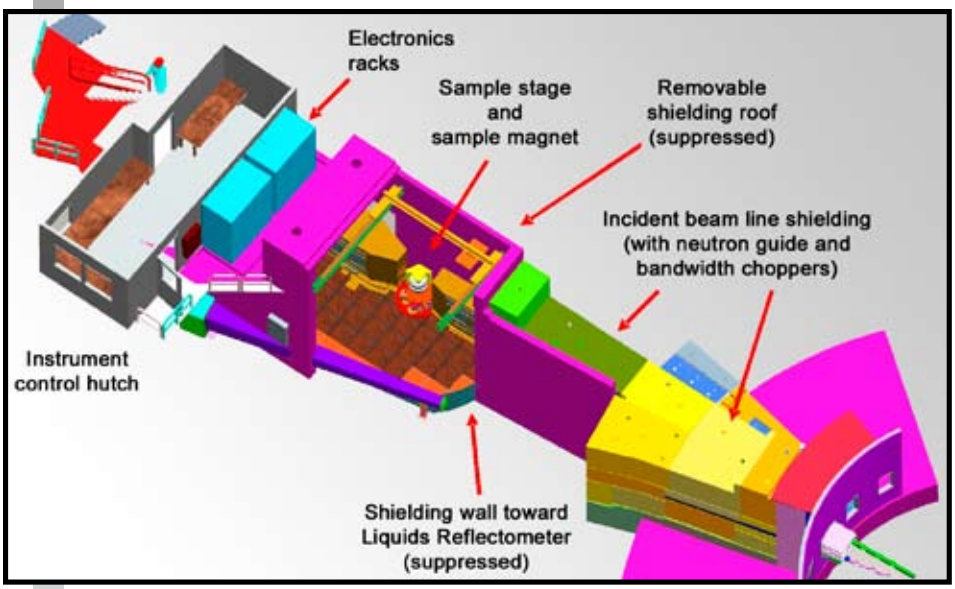
INSTRUMENT Fact Sheet

BEAM LINE 4A

SPALLATION NEUTRON SOURCE

MAGNETISM REFLECTOMETER

The Magnetism Reflectometer is dedicated to reflectometry studies of magnetic thin films, superlattices, and nanoscale structures. The combination of the high-power SNS and the use of advanced neutron optics allows for off-specular scattering studies of in-plane magnetic and nonmagnetic structures. High-angle diffraction geometry is available for experiments on thin films and multilayers. The availability of polarized neutrons and polarization analysis suggests that this instrument can also be used for specific studies of nonmagnetic thin-film samples. Examples of the latter include contrast variation, incoherent background reduction, and phase determination for direct inversion of reflectivity data into real-space scattering-length density profiles.



APPLICATIONS

The Magnetism Reflectometer is applicable primarily to studies with thin magnetic films, an increasingly important area of solid-state physics. Experiments could also benefit engineering, metallurgy, or biological problems. Instrument capabilities allow, for example, studies of magnetic recording media and magnetic sensors, as well as depth-dependent studies of structural/magnetic nanoparticles or domains. The instrument's unique capabilities provide for multilength-scale experiments, and it has sufficient beam intensity for detailed structural/magnetic phase-diagram determinations. In situ studies on ultrathin films in an ultrahigh-vacuum environment are planned as a future upgrade capability.

SPECIFICATIONS

Source-to-sample distance	18.64 m
Sample-to-detector distance	0.5–6 m
Detector size	18 x 18 cm^2
Detector resolution	1.5 mm
Moderator	Coupled supercritical hydrogen
Bandwidth	$\Delta\lambda$ = 3.1 Å
Wavelength range	1.8 Å < λ < 14.0 Å
Q range	0 $Å^{-1}$ < Q < 7.0 $Å^{-1}$
Magnetic field	Max 1.2 T with a gap of 50 mm
T range	5 - 300 K
Minimum reflectivity	10–7

Status: Operational

FOR MORE INFORMATION, CONTACT

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http://neutrons.ornl.gov/instrument_systems/beamline_04a_mr

SNS

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