

Broadband FMR spectrometers



The NanOsc Instruments AB line of broadband ferromagnetic resonance (FMR) spectrometers offer a simple turn-key solution to the burgeoning field of magnetodynamics research. Broadband FMR spectroscopy allows for measurements continuously spanning several 10's of GHz. Measurements over a wide frequency range allow for significant improvements in accurately extracting a variety of material parameters not accessible by static measurement techniques.

Broadband FMR is particularly well-suited for studying magnetic thin films, which not only form the backbone of fundamental spintronics and magnonics research but are also constituents of current and future technologies focused on magnetic memories, sensors, logic, and microwave signal processing.

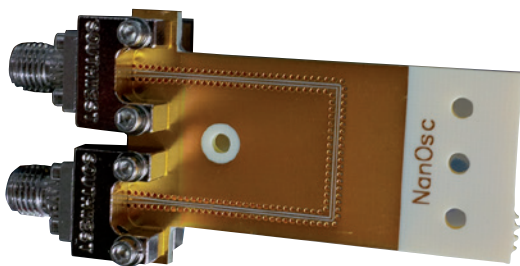
The PhaseFMR is available as room temperature version only, and has already been integrated into two different cryostats, namely the PPMS family from Quantum Design and the Cryostation from Montana Instruments. The low temperature versions of the PhaseFMR are called CryoFMR.

For integration with these cryostats, a dedicated modified multifunction probe with Helmholtz coils is required. NanOsc Instrument provides two CPWs for analysis of thin films with in-plane and out-of-plane magnetic fields together with the complete integration in the cryostat systems.

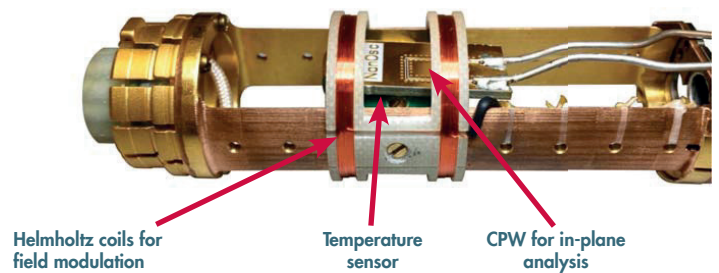
Key features

- Turn-key FMR spectrometer with easy to use software interface
- Broadband FMR using a coplanar waveguide
- Measures effective magnetization (M_{eff}), anisotropy (K), gyromagnetic ratio (γ), damping (α), inhomogeneous broadening (ΔH_0), exchange stiffness (A), inverse spin Hall effect (ISHE) voltage

Coplanar Waveguide (CPW) for room temperature PhaseFMR



CryoFMR probe insert for PPMS[®] (VersaLab[™])

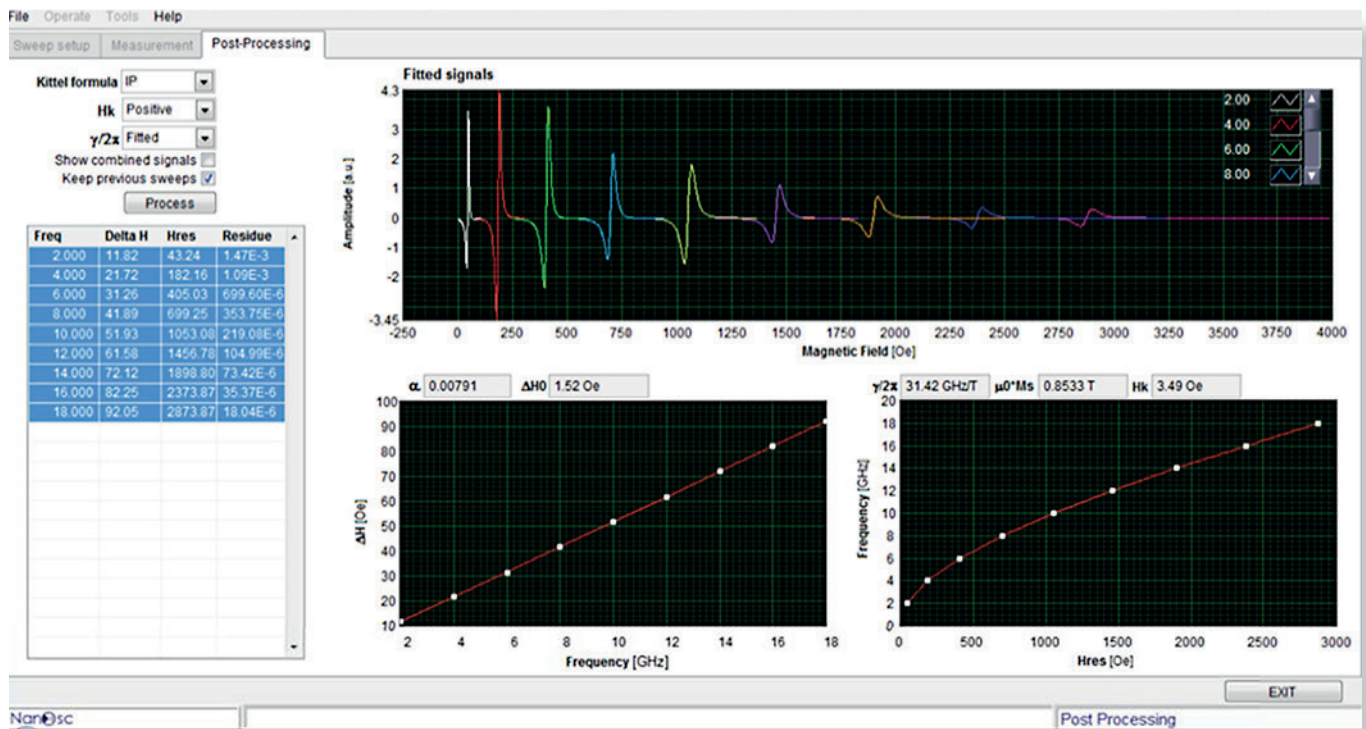


Specifications

Instrument	Bandwidth	Temperature range	Magnetic field
PhaseFMR-8	2-8 GHz	Room temperature	User supplied electromagnet/power supply
PhaseFMR	2-18 GHz		
PhaseFMR-40	2-40 GHz		
CryoFMR-8	2-8 GHz	4-400 K: PPMS [®] /DynaCool [™]	±9, 14, 16 T: PPMS [®] /DynaCool [™]
CryoFMR	2-18 GHz	55-400 K: VersaLab [™]	±3 T: VersaLab [™]
CryoFMR-40	2-40 GHz	10-350 K: MI Cryostation	±0.7 T: MI Cryostation

*Frequency accuracy of 0.05 GHz. SNR better than 10 for 10 nm Ni₈₀Fe₂₀ @ 40 GHz

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Software makes FMR easy. The software user interface is divided into three tabs:

1. Setting up the measurement sweeps
2. Monitoring the running measurements
3. Post-processing and parameter extraction

Example data

