Broadband FMR

NanOsc Instruments AB

The NanOsc Instruments AB line of broadband ferromagnetic resonance (FMR) spectrometers and coplanar waveguides (CPWs) 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.

Key Features:

- Turn-key FMR spectrometer with easy to use software interface
- Broadband FMR using a coplanar waveguide
- Calculates the Effective magnetization (M_{eff}), anisotropy (K), gyromagnetic ratio (γ), damping (α), inhomogeneous broadening ($\Delta H_{\circ}$),
- Enables the user to extract the exchange stiffness (A) and inverse spin Hall effect ISHE

Specifications:

Instrument	Bandwidth	Temperature Range	Magnetic Field
PhaseFMR	2−8, −18, −40, −60 GHz	Room Temperature	User Supplied Voltage Controllable Power Supply/Electromagnet
CryoFMR	2−8, −18, −40, −60** GHz	5*−400 K: PPMS®/DynaCool™ 55*−400 K: VersaLab™	±9, 12, 14, 16 T: ±3 T

*Minimum temperature dependent on modulation amplitude and RF frequency.
**60 GHz only available for PPMS/DynaCool.

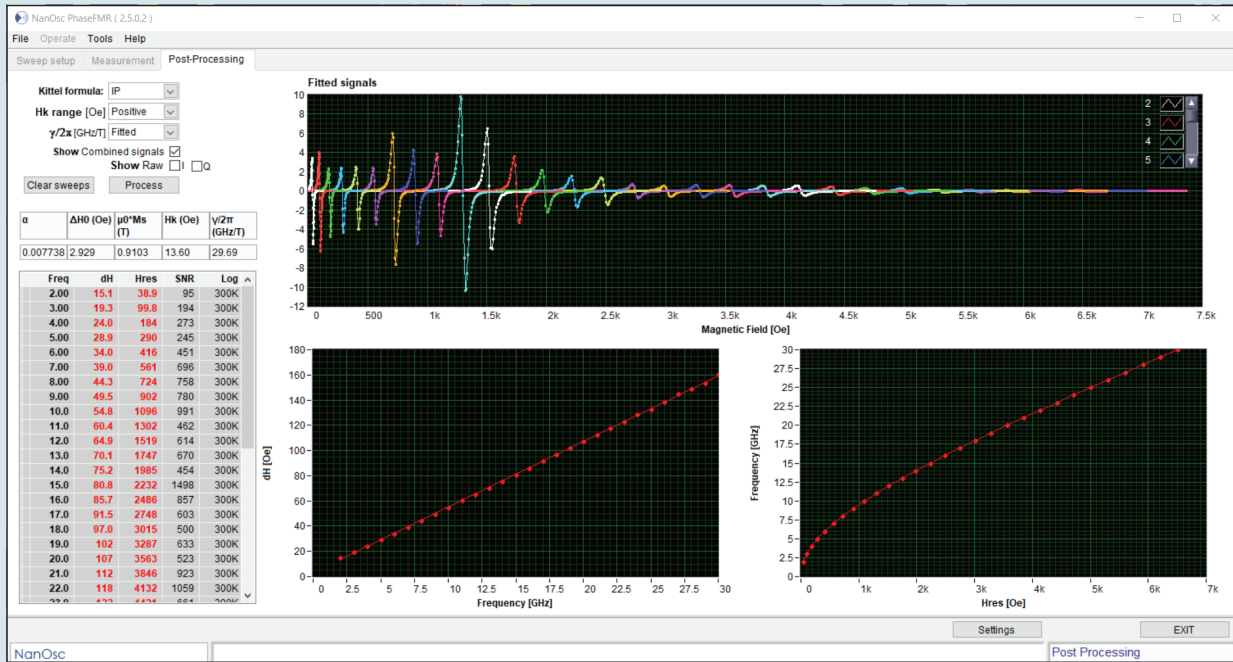CryoFMR Probe Insert for PPMS®/DynaCool™/VersaLab™
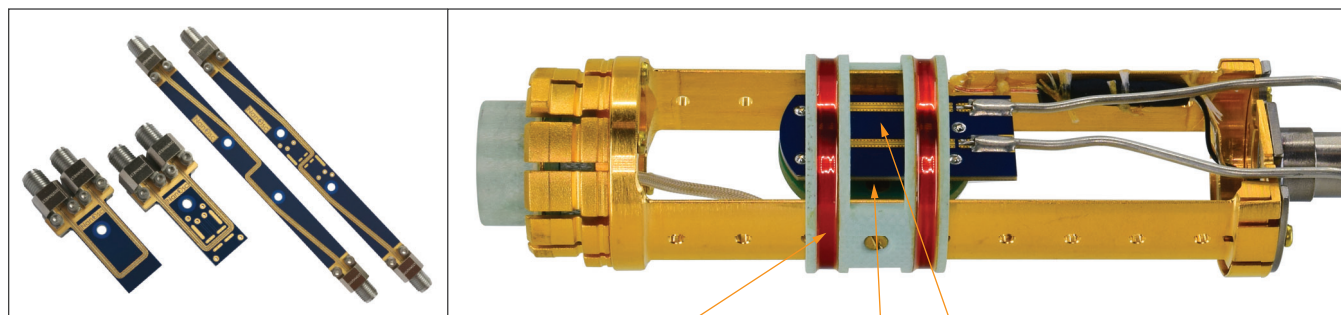
Coplanar Waveguides (CPWs) for room temperature PhaseFMR.
http://www.nanosc.se/wave-guides-cpws.html

Helmholtz coils for field modulation

Temperature sensor

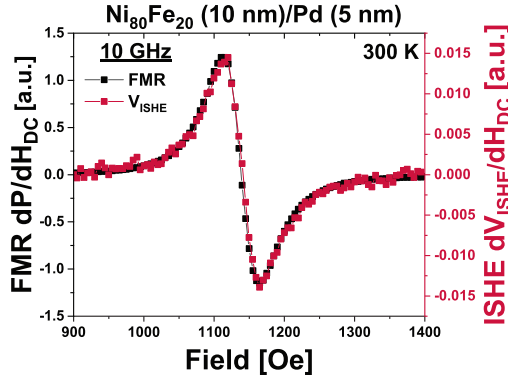CPW for in-plane analysis**

**out-of-plane CPW also included

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

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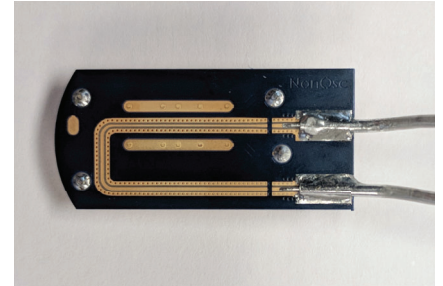3. Post-processing and parameter extraction

Example Data:

Inverse Spin Hall Effect

$Co_{40}Fe_{40}B_{20}$ (1.2 nm): PhaseFMR

$Ni_{80}Fe_{20}$ (10 nm)/Pd (5 nm)
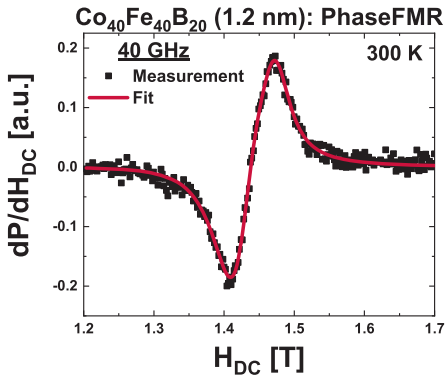
ISHE-CPW (4087-608*) for CryoFMR

*Not included with CryoFMR Probe