

Cryogenic ST-FMR

NanOsc Instruments adds two spectrometer models, the **CryoFMR-20ST** and the **CryoFMR-40ST**, to expand its capabilities in the emerging area of spin torque ferromagnetic resonance (ST-FMR) measurements and analyses. The room temperature ST-FMR product line is now complemented with cryogenic temperatures together with the PPMS/DynaCool family from Quantum Design.

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.

Broadband **ST-FMR** opens for analysis of spin-orbit torques (SOTs) typically observed in ferromagnetic/heavy metal (FM/HM) structures. Such analysis has attracted a growing attention in the application fields of SOT-based magnetic random access memories (MRAMs) and SOT-based spin Hall nano-oscillators (SHNOs) for on-chip microwave wireless communication and neuromorphic computing.

Key Features:

- Turn-key FMR and ST-FMR spectrometers with easy-to-use software interface
- Frequency ranges **2 - 20 GHz** and **2 - 40 GHz** respectively
- Temperature range 5 - 400 K, dependent on bias current and RF frequency
- Built-in RF source, bias current source, bias-tee, detectors and lock-in
- Calculates the Effective magnetization (M_{eff}), anisotropy (K), gyromagnetic ratio (γ), damping (α), inhomogeneous broadening (ΔH_0)
- ST-FMR adds extraction of spin Hall angle (SHA), damping-like and field-like torque efficiencies (DLTE and FLTE)

