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Temperature dependence of magnetic losses in GMR and TMR devices[1] KEVIN HAUGHEY, RYAN STEARRETT, ARIF OZBAY, EDMUND NOWAK, University of Delaware — Thermally induced magnetization fluctuations in the free and reference magnetic layers of giant and tunneling magnetoresistance (GMR and TMR) spin valves (SV) devices typically give rise to a low-frequency 1/f power spectral density that has been related to local dissipative processes [1]. Understanding the origin of these magnetic losses is essential for increasing the magnetic field sensitivity of GMR and TMR sensors. The low-frequency magnetic losses can be parameterized through a loss angle, ε(T, H). ε(T) for the reference layer in our GMR SV is non-monotonic: first decreasing with increasing T, then exhibiting a minimum near 50K and what may be the onset of a plateau or peak near 300K. The peak and minimum shift to lower temperatures when the applied field is oriented perpendicular to the exchange pinning direction. Data for TMR devices show similar trends. The measurements will be described in the context of a model involving thermally activated kinetics and a field-dependent distribution of activation energies for the nanoscale magnetic fluctuators.

[1] Z. Diao et al., PRB **84**, 094412 (2011)

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