



Contribution ID: 57

Type: **Workshop 2025/2026**

TMR-Based Angular Magnetoresistive Sensors

Thursday 29 January 2026 10:30 (15 minutes)

This integrated project establishes a comprehensive methodology for developing high-accuracy angular position sensors based on Tunnel Magnetoresistance (TMR) technology. By employing a Stoner-Wohlfarth macrospin model, the magnetic behavior of multilayer stacks is simulated to account for anisotropies and interlayer couplings, enabling performance prediction and design optimization. A Wheatstone bridge configuration with orthogonal reference layers is implemented to suppress harmonic distortions and generate orthogonal sine-cosine signals, facilitating full 360° angle reconstruction. The sensors are fabricated using a dedicated microfabrication process, including magnetron sputtering, lithography, and thermal annealing. Experimental characterization with a six-probe measurement system validates the design, demonstrating sinusoidal bridge outputs and a reconstructed angular error consistent with simulation trends. The work confirms TMR sensors as a robust platform for precision angular sensing and provides a validated framework for future performance enhancement and application-specific development.

Field of Research/Work

Condensed Matter and Materials

Author: MACEDO, Pedro