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Multi-electrode probe optimization for characterization of magnetic tunnel junction stacks

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One of the most important metrologies extensively used worldwide for evaluation of Magnetic Tunnel junction (MTJ) stacks is the current-in-plane tunneling (CIPT) technique. The CIPT method has been of fundamental importance in the development of MRAM technology in the past decade. Until now, the design of multi-electrode probes and choice of sub-probes have been based on a best-guess practice. In this study, we perform a numerical optimization of the geometrical design of multi-electrode probes as well as optimal choice of subprobes. A drastic improvement in the measurement precision for the resistance-area product and the TMR is achieved.

**Measurement Precision prediction**

By modeling the main noise sources of the CIPT measurement, the precision, intended as the relative standard deviation (STD) on RA and MR, can be predicted with a software tool. 4 different MTJ stacks and different probe geometries were tested.

**Bibliography**
