

Magnetic memory optimized for ultra low power consumption

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PhD may follow: Yes

Summary :

The power consumption of electronic circuits keep on increasing with their performances. This consumption has a static part associated with the leakage of the CMOS transistors and a dynamic part due to the charge/discharge of the interconnects during data transfer between memory and logic. In this context, magnetic memory can play an important role to save energy. These memories have been studied at SPINTEC for more than 10 years. They use spintronic phenomena (tunnel magnetoresistance, spin transfer torque, spin orbit torque...). They gather several assets: non volatility (ability to keep the information without being powered), speed (write/read in a few nanoseconds), density, write endurance. In a memory, there is always a tradeoff to find between the stability of the written information (memory retention) and the energy required to write. The research goal of the internship and of the PhD thesis which will follow, will be to optimize the magnetic tunnel junctions which constitute the memory dots (composition, shape, write process) to optimize this tradeoff with the aim of minimizing the power consumption depending on the required specifications for various types of applications (Smartphones, high power computing, quantum engineering...).