

## Virtual practicals & on-line tutorials

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**N°19:** Integrated circuit design using Magnetic Tunnel Junctions: from schematic to layout for analog and digital applications

Teachers:

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The training will be separated in three parts.

In the first part, the attendants will learn how to use the standard design tools of microelectronics to make full custom design of hybrid CMOS magnetic logic circuits. We will present the compact models of magnetic devices used to perform electrical simulations of hybrid circuits and how to draw and verify the masks for the successive manufacturing steps (layout of the circuit). A non-volatile Flip-Flop will be used as an example to illustrate the design flow.

The second part will aim at demonstrating the full digital design flow for MRAM-based non volatile integrated circuit. Specific languages, tools and trade-off will be addressed comparing standard CMOS and NV circuits.

The last part will be dedicated to show several recent applications developed at Spintec, using different Magnetic Tunnel Junction flavors.