

High sensitivity vertical magnetic sensor based on domain wall displacement

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PhD may follow: Yes

Summary :

Magnetic sensors have invested most of our everyday objects: cars, smartphones, tablets, joysticks, ... and their applications become more diverse every day. Among them, real-time spatial recognition, e.g. for gps assistance in closed environment, generates a growing interest among the industrial actors. It is based on a fast magnetic sensor. This speed can only be achieved by a high sensitivity, which decreases integration time. The internship will aim at providing such a high sensitivity perpendicular magnetic microsensor. Its concept is based on the controlled and reproducible movements of magnetic domain walls, and on their electrical detection. Both are now possible thanks to recent developments in the laboratory in the field of magnetic tunnel junctions with perpendicular magnetization.

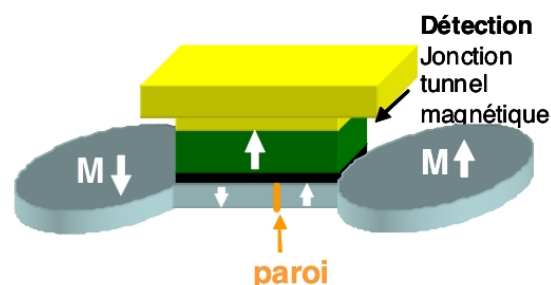
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Full description :

During this internship we will focus on a one-dimensional sensor. The magnetic sensor consists of a submicron magnetic track in which the magnetization is oriented perpendicularly to the layer plane. In the presence of a perpendicular magnetic field, the wall moves in the track. This movement is converted into electric signal by a magnetic tunnel junction patterned on the track (see figure), and then into the measurement of the magnetic field. The great mobility of the wall makes it very sensitive to weak magnetic fields. Our goal is to measure the Earth's magnetic field with great accuracy (uncertainty on the direction



Requested skills :

M2 Nanoscience, Solid state physics or condensed matter physics