

## Spintronics

Master MCN, Year 2007.

### Goals of the course:

- introduction to main experimental findings and models involving electronics transport in materials involving magnetic entities
- learn to read, summarize, and present the key points of a scientific article.

Methodology (the hard way...) 30 minutes presentation of a given paper, including related references.

The scientific paper is usually organized with:

- introduction and motivation (literature search, key concepts understood and presented, this is easily the longest part)
- keywords stating what new findings will be presented (anticipation of the results explained here)
- explanations of the methodology (in general experimental procedure), (present the experiment, samples, method of fabrication, measurement techniques)
- findings, usually key data plots (show the results, explain the details of the data)
- discussion: model and justification of the applicability of the model to the findings (here you should clarify how the authors show that they understand what they found)
- how are these results original, and what new knowledge do they bring (comparison motivation/results)
- conclusions (perspectives in terms of new applications or new understanding, check how much it is a rephrasing of the introduction)

Presentation will be done by teams of two, sharing the speaking time, and the grade.

You will have the opportunity to present two papers during the semester, allowing a change of partner. The presenting team has to show up on Monday afternoon in my office (1026) at 5:30 pm, with a presentation already sketched, for mandatory help of the teacher...

## Course program Spintronics

1. **Summary** of basic transport properties of transition metals ferromagnets. Two current model October 24, 31  
(Fert and Campbell, 1968)
2. **Giant magnetoresistance** : November 7 *GL*  
(Baibich et al., 1988)
3. **Current-perpendicular-to-plane GMR**: November 14  
(Lee et al., 1992) *HK*  
George et al ) *LN*
4. **Tunnel magnetoresistance** : November 21 *JB*  
(Moodera et al., 1995)
5. **Spin accumulation** (in metals) November 28 *MM*  
(van Son et al., 1987)
6. **Spintronics**, semiconductors mismatch December 5 *GL*  
(Schmidt et al., 2000)
7. **Carbon nanotubes** December 12  
*JB*(Sahoo et al) *LN*
8. **Spin electronics device example** December 19 *HK*  
(Ney et al., 2003)
9. **Spin Hall effect** January 8 *MM*  
(Valenzuela and Tinkham, 2006)

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- VALENZUELA, S. O. & TINKHAM, M. (2006) Direct electronic measurement of the spin Hall effect. *Nature*, 442, 176.
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### Liste des teams

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