

# PROCEEDINGS OF SPIE

## ***Spintronics VI***

**Henri-Jean Drouhin**  
**Jean-Eric Wegrowe**  
**Manijeh Razeghi**  
*Editors*

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## Introduction

The sixth edition of the Spintronics symposium of the SPIE conference gathered more than one hundred speakers in San Diego from Sunday 25 to Thursday 29 August 2013.

As for the five previous editions, the symposium covered the main topics of Spintronics, witnessing for the dynamism of a very active field of research. These proceedings report some important results presented at the meeting and the aim of the present introduction is to give an echo of the informal and fruitful discussions. Many open questions have been debated, including some recurrent puzzling problems discussed since the beginning of the Spintronics conferences.

The symposium was divided into 26 sessions that covered: Spin-Seebeck effects (two sessions), skyrmions, quantum dots, topological insulators (two sessions), new materials, spin optics (two sessions), spin injection (2 sessions), cold atoms, spin transfer, oxides and multiferroics (two sessions), spin Hall effect, spin dynamics, spin orbit (two sessions), graphene (three sessions), and devices (three sessions).

This 6th edition of the symposium confirms the interest for the hot topics, e.g. Spin Caloritronics (present in the sessions devoted to spin Seebeck effects and spin Hall effects), spin-optics (see the keynote presentation of D. L. Andrews in this proceedings), topological insulators, skyrmions, domain wall motion (see the keynote of S. S. P. Parkin), and graphene. The frontier topic of spin physics based on cold atoms has been introduced in the present Spintronics VI edition (with the keynote lecture of M. Di Ventra). L. J. Sham introduced the session 18 of spin dynamics with "A theory of quantum dynamics of a nanomagnet under excitations" (see these proceedings).

The traditional topics of spintronics are however still very present (spin injection, spin dynamics, spin transfer, spin Hanle effect, spin Hall effects, spin pumping), with some new experimental observations together with persistent interrogations about the very nature of spin currents. Some of the problems had been put forward at the first Spintronics symposia (see e.g. the keynote of M. I. Dyakonov in 2008 and later that of E. Sonin in 2011), and are still under debate. Indeed, the difficulty of defining univocally the spin current is present for both the fundamental quantum current in the presence of spin-orbit interactions, and also for the macroscopic pure spin currents that flow without electric current but in the presence of spin dependent scattering. This puzzling situation about some basic physical properties impacts the descriptions of recent experimental results, based on, for example, spin Seebeck effects, spin Hanle and inverse spin Hanle effects, spin Hall and inverse spin Hall effects, thermal or non-local spin transfer, etc.

Overall, the conference was an invaluable opportunity for open exchange and stimulating discussions in a friendly atmosphere.

We are grateful to SPIE, to the Program Committee, and to all speakers and authors that have made this conference a success.

**Henri-Jean Drouhin  
Jean-Eric Wegrowe  
Manijeh Razeghi**