

Reviews of Modern Physics highlights recent research on Spin Hall effects

November 16 2015, by Icn2

The prestigious *Reviews of Modern Physics* has just published a review paper on Spin Hall effects.

The authors of the review, all of whom have played an influential role in the development of the field, are Prof Jairo Sinova, (Johannes Gutenberg Universität Mainz, Germany and Academy of Science of the Czech Republic, ASCR, Czech Republic), ICREA Prof Sergio O. Valenzuela, Group Leader of the Physics and Engineering of Nanodevices Group at the Catalan Institute of Nanoscience and Nanotechnology (ICN2), Prof J. Wunderlich (ASCR, Czech Republic and Hitachi UK), Prof C. H. Back (Universität Regensburg, Germany) and Prof T. Jungwirth (ASCR, Czech Republic and University of Nottingham UK).

The spin Hall effect is a collection of relativistic spin-orbit coupling phenomena in which electrical currents generate transverse spin currents and vice versa. The review describes the rapid development of this sub-field of spintronics, providing an overview of the current experimental understanding and of the theoretical tools that are used to describe it, including their level of success and limitations. The review also connects the spin Hall effect with important related phenomena, and describes their potential for applications, particularly in the area of magnetization dynamics.

The article starts with a short chronological description of the evolution of the spin Hall effect field and the resolution of some early controversies. The main body of the review deepens into the theoretical

and experimental approaches. It is structured from a pedagogical point of view, focusing on well-established and accepted physics. At the end, the authors also outline from their personal perspective some of the remaining challenges and opportunities, underlining how the spin Hall effect research relates to other emerging fields, which include topics such as graphene and other 2D systems, topological insulators and spin-caloritronics. They argue that the future of the field is exciting and that new fundamental [physics](#) concepts and disruptive technologies are to be expected.

More information: Spin Hall effects. J. Sinova, S. O. Valenzuela, J. Wunderlich, C. H. Back, and T. Jungwirth. *Rev. Mod. Phys.* 87, 1213 – Published 27 October 2015
[journals.aps.org/rmp/abstract/ ... 3/RevModPhys.87.1213](https://journals.aps.org/rmp/abstract/.../3/RevModPhys.87.1213)

Provided by Catalan Institute of Nanoscience and Nanotechnology

Citation: Reviews of Modern Physics highlights recent research on Spin Hall effects (2015, November 16) retrieved 19 April 2024 from <https://phys.org/news/2015-11-modern-physics-highlights-hall-effects.html>

This document is subject to copyright. Apart from any fair dealing for the purpose of private study or research, no part may be reproduced without the written permission. The content is provided for information purposes only.