ICC IMR International Workshop on Spin Mechanics 2

Spin mechanics is the science and engineering of the coupling of mechanics, i.e. the spatiotemporal behavior of the lattice degrees of freedom such as rotations and vibrations, with the spin degree of freedom in magnetic nanostructures. The 2nd International Workshop dedicated to this topic was held at the Institute for Materials Research of Tohoku University, 21–24 June 2014 under the auspices of the ICC-IMR and sponsored by the collaboration network "SpinNet" of the German DAAD and the "Reimei" program of the Japan Atomic Energy Agency, and others.

Fig. 1: Conference picture in the yard of the Institute for Materials Research.

According to Noether's theorem, rotational symmetry implies conservation of angular momentum. In a condensed matter system, any variation of the magnetization and therefore the intrinsic (spin) angular momentum of the many-body electron wave function in time and space is accompanied by a torque on the embedding lattice. This coupling between spin and lattice is the subject of the field of Spin Mechanics.

The ICC-IMR workshop on Spin Mechanics covered all aspects associated with this principle. Relevant topics include acoustically induced spin pumping, mechanical control of magnetic anisotropy, Einstein, de Haas, and Sagnac effects in nanostructures, and spin currents generated by rotation. Spin mechanics found applications in mechanical spin detection such as magnetic resonance force microscopy (MRFM). Spin-flip dissipation-induced mechanical torques have been predicted and measured. The magnon-phonon interaction is intimately related with the spin Seebeck effect. Ultrasound and surface acoustic wave-induced magnetization dynamics, spin-torque induced mechanical motion, nanoscale pumps and motors, magnetic resonance force microscopy, magnetically actuated NEMS, spin-induced fluid dynamics, spin torque motors, and quantum effects such as magnetic tunneling and magnon Bose condensation; all received attention.

The workshop consisted of tutorials, invited talks, and poster sessions. For details of the program, and sponsors we refer to the website spinmechanics2.imr.tohoku.ac.jp. It attracted 126 registered participants, 45 of whom came from 13 overseas countries. Due to the large interest of the community, the series of workshops that started in Tokai will be continued; Spin Mechanics 3 to be organized by the Technical University Munich in June 2015 (chaired by Dr. Sebastian Gönnenwein).

We thank all members of the organizing and local committees for their great dedication as well as all conference participants for their contributions and hope that the workshop will stimulate new exciting research and international collaborations.

Fig. 2: Spin Mechanics 2 logo.

Keywords: spintronics, mechanical properties, magnetic properties
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