
SPIN-ORBITRONICS

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Abstract

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Spintronics can be described as a new type of electronics based on the propagation of spin-polarized currents. In classical spintronic devices the exchange interaction between the spin of conduction electrons and local spins in magnetic materials is used to create spin-polarized current or to manipulate nanomagnets by spin transfer from spin-polarized currents. A novel direction of spintronics exploits more the spin-orbit coupling than the exchange, either to generate spin-polarized currents with only nonmagnetic materials or to create new types of magnetic objects like skyrmions. I will review recent advances in two directions of this field.

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- a) Magnetic skyrmions induced by interface-induced Dzyaloshinsky-Moriya interactions in thin films and current induced motion of skyrmions in magnetic tracks.
- b) Spin Hall, Rashba, Edelstein-Rashba effects and their use for current-induced motion of domain walls (or skyrmions).