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Introduction to spintronics:
(c.f. Overcoming the skyrmion Hall effect)

The recent years has witnessed a surge of research in the field of spintronics in which, the spin degree of freedom of electrons in combination with its charge, is employed to create smart, high-density, high-efficiency and low power-consuming data storage and memory technologies. Ever since it was demonstrated that current traversing a magnetic sample may alter its magnetic configuration through the transfer of angular momentum, research in this direction has evolved into a large zoology of subfields with enormous potential applications. Fundamental to the realization of such applications requires the detail understanding of the behavior of tiny magnets and magnetic heterostructures at very short length and time scales.

This talk starts with a pedagogic introduction to the field of spintronics and some of our recent results with focus on magnetic skyrmions - chiral, localized and topologically protected whirling spin textures with enormous potential for spintronic applications. An interesting property of magnetic skyrmions is that spin-polarized carriers feel an emerging electromagnetic field. In spite of the remarkable potential application of magnetic skyrmions, they suffer from the so-called skyrmion Hall effect-a motion transverse to the current flow. This parasitic effect hinders the robust manipulation of skyrmions via charge current. We will discuss different approaches/proposal to overcome this parasitic effect.