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Vortices in Nanomagnetism

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Vortices are ubiquitous in nature: from a micro- to a macrocosm. In Nanomagnetism vortices are topologically distinct and robust magnetic configurations, providing stable bit on a scale of about hundred nanometers. Magnetic nanoparticles in vortex state and their structures are very promising candidates for the high density magnetic storage and high speed magnetic random access memory. One bit of information corresponds to the upward or downward magnetization of the vortex core (vortex polarity), another one corresponds to the clockwise or counterclockwise direction of magnetization circulation (vortex chirality). Exciting the vortex motion by high-frequency magnetic fields or by a spin polarized currents, one can switch the vortex polarity and chirality on a scale of nanometers and picoseconds.

The purpose of the talk is to overview the current stage of this rapidly developing field of Nanomagnetism.