Nanoscale Magnetic Skyrmions: Twists and Turns of Spin

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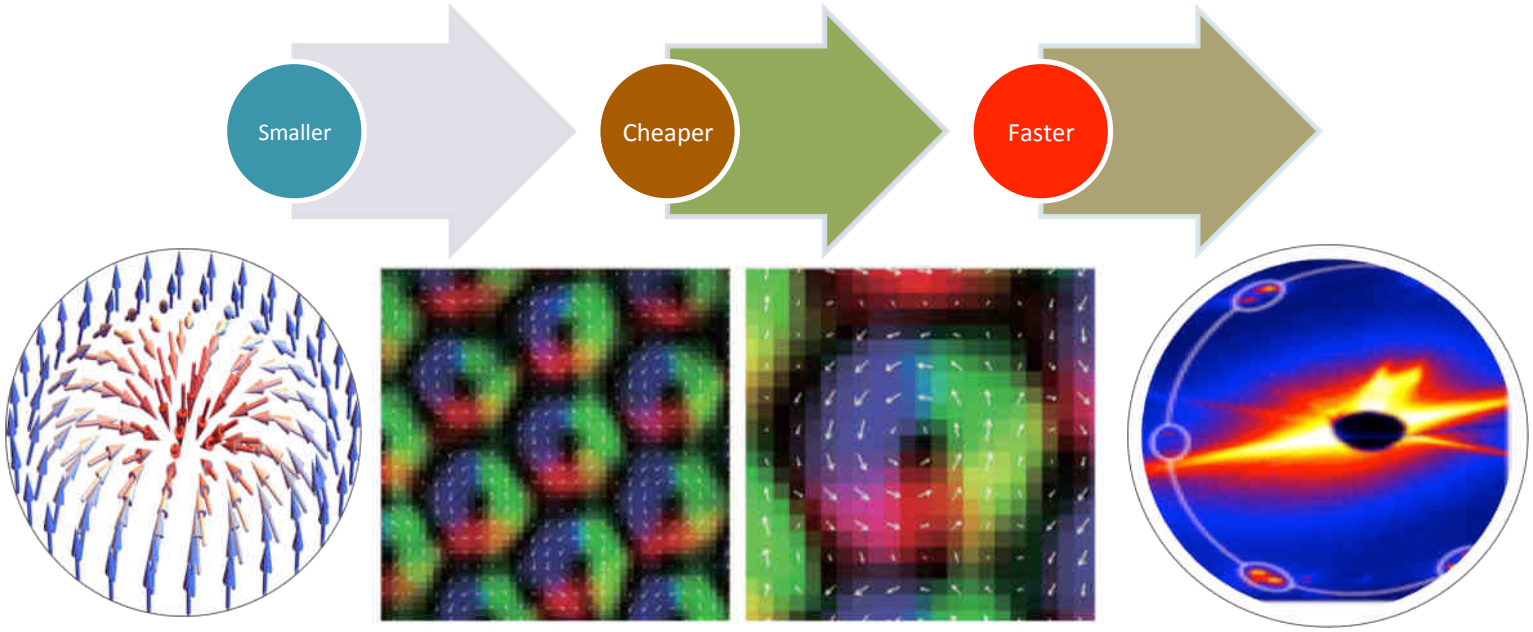
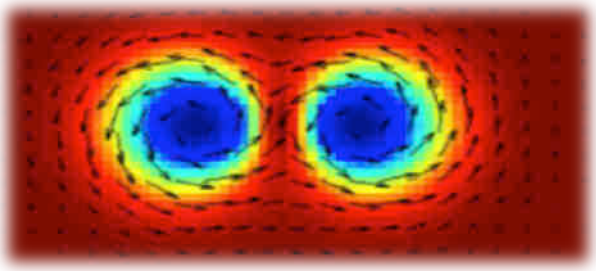
Natural chirality is mainly characterized by a reflection asymmetry; for example, our left hand is the mirror opposite to our right. When chirality appears in the structure of atoms in a solid, it affects the way in which the magnetic moments arrange themselves through the Dzyaloshinskii-Moriya (DM) interaction. In system like magnetic interfaces, DM interaction stabilizes the topologically protected magnetic defects called skyrmions. Magnetic skyrmions are small swirling topological configurations, which are mostly induced in non-centrosymmetric magnetic bulks or magnetic interfaces with broken inversion symmetry.



Skyrmion-based devices are on the horizon to the global race for next generation information technologies. The magnetic skyrmions are in focus because of their small size, high stability and emergent electromagnetism, making them ideal candidates for spintronics devices, which can be made compatible with conventional integrated circuit technology.

DST, Government of India has approved a project grant under its Nanomission program with total budget ***Rs 1.07 Crore*** on nanoscale magnetic skyrmions, which will be led by Dr. Shrawan Mishra at SMST, IIT (BHU). With this project, his team will focus on fabricating skyrmions based prototype memory devices. Investigations like spin dynamics, and magnetic imaging are major component of this project that will provide training to young talents with multiple sophisticated techniques at various international synchrotron sources.



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