Room: Media Room (Staudinger Weg 7: 03 – 431)
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Antiferromagnetic Skyrmions

Manipulating small spin textures, which can serve as bits of information, by electric current, is one of the main challenges in the field of spintronics. Ferromagnetic skyrmions recently attracted a lot of attention because they are small in size and are better than domain walls at avoiding pinning while moved by electric current. Meanwhile, ferromagnetic skyrmions still have disadvantages such as the presence of stray fields and transverse dynamics, making them harder to employ for spintronic applications. In this work, we propose a novel topological object: the antiferromagnetic (AFM) skyrmion. This topological texture has no stray fields and we show that its dynamics are faster compared to its ferromagnetic analogue. We obtain the dependence of AFM skyrmion radius on the strength of Dzyaloshinskii-Moriya interaction coming from relativistic spin-orbit effects and temperature. We find that the thermal properties, e.g. such as the AFM skyrmion radius and diffusion constant, are rather different from those for ferromagnetic skyrmions. More importantly, we show that due to unusual topology the AFM skyrmions do not have a velocity component transverse to the current and thus may be perfect candidates for spintronic applications.

All interested are cordially welcome!

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