

Frustrated Magnetic Skyrmions and Bimerons

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The topologically non-trivial spin textures hold great promise in novel electronic and spintronic applications [1], such as the racetrack memory and spin logic gates. The understanding of topological spin texture dynamics is important for the development of practical applications. In this talk, I will first briefly introduce magnetic skyrmions and other topological spin textures [2]. Then I will talk about the static and dynamic properties of isolated skyrmions and bimerons in a ferromagnetic monolayer with frustrated exchange interactions [3]. I will discuss the dynamic behaviors of isolated skyrmion and bimeron driven by the spin-orbit torques, including linear motion, elliptical motion, and rotation. Besides, I will discuss the current-induced dynamics of skyrmion clusters and bimeron clusters in the frustrated magnetic system. Finally, at the end of the talk, I will point out possible future research directions on topological spin textures in terms of magnetic materials, spin structures, and driving forces.

[1] Nat. Nanotech. 8, 899 (2013); Chin. Phys. B 24, 017506 (2015); Chin. Phys. B 24, 128501 (2015); J. Phys.: Condens. Matter 27, 503001 (2015); Nat. Rev. Mat. 1, 16044 (2016); J. Phys. D: Appl. Phys. 49, 423001 (2016); Proc. IEEE 104, 2040 (2016); Nat. Rev. Mat. 2, 17031 (2017); Phys. Rep. 704, 1 (2017); Adv. Mater. 29, 1603227 (2017); J. Phys. D: Appl. Phys. 50, 293002 (2017); Rep. Prog. Phys. 80, 026501 (2017); Front. Phys. 6, 98 (2018); J. Appl. Phys. 124, 240901 (2018).

[2] J. Phys. Condens. Matter 32, 143001 (2020).

[3] Nat. Commun. 6, 8275 (2015); PRB 93, 064430 (2016); Nat. Commun. 8, 14394 (2017); PRL 119, 207201 (2017); Nat. Commun. 8, 1717 (2017); PRApplied 11, 044046 (2019); PRB 101, 144435 (2020); APL 118, 052411 (2021).

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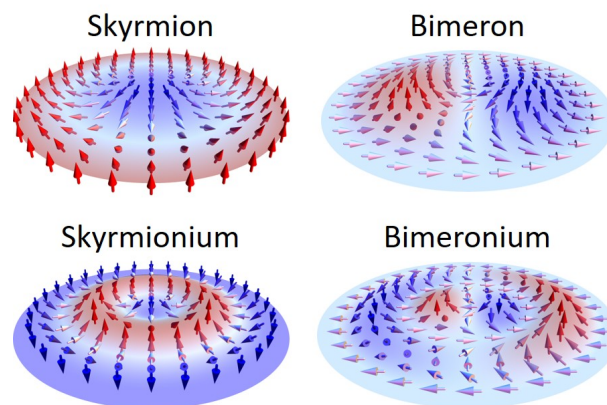


FIG: Some typical topological spin textures in magnetic thin films, including skyrmion, skyrmionium, bimeron, and bimeronium.