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Curvature-stabilized magnetic skyrmions¹ VOLODYMYR KRAVCHUK, Leibniz-Institut für Festkörper- und Werkstoffforschung — Magnetic skyrmion is striking example of a topological soliton, it is a particle-like (localized) excitation in perpendicularly magnetized ferromagnetic films. Due to the topological stability, the skyrmion is considered as a key element for the next generation data storage and logic spintronic devices. In the current study² we consider skyrmion on a curvilinear magnetic film. First, we show that the skyrmion topological charge experiences a shift, which is determined by genus of the surface. Thus, the skyrmion on a spherical shell is topologically trivial, as a consequence, it can be induced by uniform external magnetic field, what is not possible for a planar film. Performing the topological analysis we derive the general expression for the gyrocoupling vector for an arbitrary curvilinear surface. It is important for any further collective variable description of dynamics of topological solitons on curvilinear surfaces. Second, we demonstrate that the magnetic skyrmion can be stabilized by curvature effects only, even when the intrinsic Dzyaloshinskii-Moriya interaction (DMI) is absent. This in contrast to planar films, where the DMI is of principle importance for the skyrmion stabilization.

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²V. Kravchuk et al., Phys. Rev. B **94**, 144402 (2016)

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