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Emergent Momentum-Space Skyrmion Texture on the Surface of Topological Insulators[1] NARAYAN MOHANTA, ARNO P. KAMPF, THILO KOPP, University of Augsburg, Germany — The quantum anomalous Hall effect has been theoretically predicted and experimentally verified in magnetic topological insulators. In addition, the surface states of these materials exhibit a hedgehog-like "spin" texture in momentum space. Here, we apply the previously formulated low-energy model for Bi_2Se_3, a parent compound for magnetic topological insulators, to a slab geometry in which an exchange field acts only within one of the surface layers. In this sample set up, the hedgehog transforms into a skyrmion texture beyond a critical exchange field. This critical field marks a transition between two topologically distinct phases. The topological phase transition takes place without energy gap closing at the Fermi level and leaves the transverse Hall conductance unchanged and quantized to $e^2/2h$. The momentum-space skyrmion texture persists in a finite field range. It may find its realization in hybrid heterostructures with an interface between a three-dimensional topological insulator and a ferromagnetic insulator.

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