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Manipulating Topological States by Imprinting Non Collinear Spin Textures PETER FISCHER, Lawrence Berkeley Natl Lab, ROBERT STREUBEL, LUYANG HAN, Institute for Integrative Nanosciences IFW Dresden, MI-YOUNG IM, Lawrence Berkeley Natl Lab, FLORIAN KRONAST, Helmholtz-Zentrum Berlin fuer Materialien und Energie GmbH, ULRICH K. ROESSLER, Institute for Theoretical Solid State Physics IFW Dresden, FLORIN RADU, RADU ABRUDAN, Helmholtz-Zentrum Berlin fuer Materialien und Energie GmbH, GUNGUN LIN, OLIVER G. SCHMIDT, DENYS MAKAROV, Institute for Integrative Nanosciences IFW Dresden — Topological magnetic states, such as chiral skyrmions, are of great scientific interest and show huge potential for novel spintronics applications, provided their topological charges can be fully controlled. So far skyrmionic textures have been observed in noncentrosymmetric crystalline materials with low symmetry and at low temperatures. We propose theoretically and demonstrate experimentally the design of spin textures with topological charge densities that can be tailored at ambient temperatures. Tuning the interlayer coupling in vertically stacked nanopatterned magnetic heterostructures, such as a model system of a Co/Pd multilayer coupled to Permalloy, the in-plane non-collinear spin texture of one layer can be imprinted into the out-of-plane magnetised material. We observe distinct spin textures, e.g. vortices, magnetic swirls with tunable opening angle, donut states and skyrmion systems of Dn symmetry. We show that applying a small magnetic field, a reliable switching between topologically distinct textures can be achieved at remanence.

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