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Interlayer Exchange Coupling: A route to stabilize skyrmions in magnetic multilayers ASHIS KUMAR NANDY, NIKOLAI S. KISELEV, STEFAN BLÜGEL, IAS-1, PGI-1, Forschungszentrum Jülich and JARA, Jülich, Germany — Magnetic skyrmion is a topologically nontrivial spin texture with particle like properties, which may emerge under an appropriate applied magnetic field in any magnetic thin layer or multilayer with surface or interface induced Dzyaloshinskii-Moriya interaction. However, magnetic fields required to stabilize skyrmions can be extremely large. We present an approach, which allows the stabilization of skyrmions in such magnetic multilayers even at zero magnetic field. It is based on fine-tuning the interplay between internal and interfaces induced interactions by adjusting the thicknesses and interface compositions of multilayers. Our multiscale approach is based on DFT calculations and atomistic spin dynamic simulations, which predicts the existence of a skyrmion lattice and isolated skyrmions in a thin film of a transition-metal monolayer grown on a heavy metal substrate. The simulated skyrmions exhibit high stability in an applied magnetic field and temperature. We provide a description for the complex phases occurring in such systems and present a magnetic phase diagram for a prototype example of Mn/W(001).

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