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Topological Spintronics: Materials, Phenomena and Devices
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The two-dimensional surface states of three-dimensional topological insulators such as Bi$_2$Se$_3$ and (Bi,Sb)$_2$Te$_3$ possess a spin texture that can potentially be exploited for spintronics applications. We provide a perspective on the emergence of “topological spintronics,” demonstrating how this spin texture can be engineered using either quantum tunneling between surfaces [1] or by breaking time-reversal symmetry [2]. We then discuss recent experiments that show striking spintronic phenomena useful for proof-of-concept devices, including a spin-orbit torque of record efficiency at room temperature [3] and an electrically-gated “giant anisotropic magnetoresistance” at low temperature [4].

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