Topological insulators: magnetoelectric and interaction effects

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We first explain how topological insulators can be viewed as materials with a quantized magnetoelectric coupling resulting from the spin-orbit modification of the bulk wavefunctions. Generalizing this result shows that there is a topological term present in the magnetoelectric coupling of all materials with low enough symmetry ("multiferroics"). We then review some recent work on correlation effects in topological insulators, including how some materials ("antiferromagnetic topological insulators", possibly including GdPtBi) might realize a combination of antiferromagnetism and topological behavior.