

Abstract Submitted
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Topological insulators driven by an electron spin MAXIM DZERO,
Kent State University — The application of ideas developed in topology to the electronic band structure led to an intriguing discovery: materials can conduct electricity at the surface while remaining insulating at the bulk. These materials, called topological insulators, will have transformative impact on spintronics, low-power transport, and quantum computing. The search for a true topological insulator took years because even best candidates exhibited significant bulk conductivity. Only recently, literally in the past few months, several experimental groups established that samarium hexaboride, discovered in 1969 in Bell Labs, is a first topological insulator in its bulk form. In my talk, I review the theory which paved the way for this discovery. I will explain how crystalline symmetry, electron-electron interactions, and orbital degeneracy contribute to protecting the topological states in SmB₆. In addition, I will discuss the experimental signatures of metallic surface states.

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