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The Superconductivity of the Topologically Protected Surface States of Bi_2Se_3 : Theory NICHOLAS SEDLMAYR, IAN DAYTON, Michigan State University, ALEX LEVCHENKO, University of Wisconsin-Madison, STUART TESSMER, Michigan State University — The superconducting proximity effect induced in materials in close contact with a superconductor is well known. Similarly the topologically protected surface states recently found on the surfaces of special crystals can leak into appropriate adjoining materials. We bring these two effects into proximity and study how superconductivity and topologically protected surface states interact with each other, a situation of interest in the search for Majorana bound states. We look at the scanning tunneling microscopy of a large topological insulator with superconducting islands deposited on the surface, and analyze theoretical models which capture the hybridization between the topological surface states and the superconducting states. The density of states of both the topological insulator and the superconductor turn out to exhibit interesting proximity effects.

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