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Conductance through step junctions in 3D topological insulators[1] MIREIA ALOS-PALOP, RAKESH P. TIWARI, MIRIAM BLAAUBOER, Delft University of Technology, Kavli Institute of Nanoscience — An effective continuous model for low-energy surface states of a 3D topological insulator was presented by Zhang *et al.*, *Nat. Phys.* **5**, 438 (2009). We present a general solution for this 3D model in a surface different from the standard (111)-surface. In our solution, surface states consist of a single Dirac cone with a Fermi velocity different from the one in (111)-surfaces, and the energy has an elliptical dispersion in k-space. We then study transport through a step junction composed of a (111)-surface – side-surface – (111)-surface and predict that the conductance saturates at 2/3 G_0, independent of eccentricity and velocity mismatch at the interfaces. We compare our model with a junction in a plane with only (111)-states where conductance saturation does depend on velocity mismatch. We also analyze the Fano factor and highlight experimentally relevant situations where our predictions could be tested.

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