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Andreev Reflection in two-dimensional Topological Insulators
AWADHESH NARAYAN, STEFANO SANVITO, Trinity College Dublin — A metal-superconductor interface may reflect an incident electron from the metal as a positively charged hole with opposite spin, while a cooper pair is formed in the superconductor. This electron-hole conversion is Andreev reflection (AR) and has served as a useful probe for spin-polarized currents. In this work we study AR at topological insulator-superconductor interface, for both time-reversal symmetric (Z_2) and time-reversal broken (*Chern*) cases. We model Z_2 insulators using the proposal of Kane and Mele, while for *Chern* insulator we use a spinful version of the Haldane model. By employing Landauer-Büttiker scheme we find for both cases perfect AR, which is highly robust to disorder and persists as long as the edge states are present. Further, we propose an experiment to distinguish between the two types of topological insulators. The proposal involves a local doping with magnetic impurities at one of the edges of the two-dimesional material. This suppresses one of the channels for reflection and the AR coefficient drops by a factor of two. No such suppression is seen for the *Chern* insulator.

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