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Study of the robustness of two dimensional topological insulators DANIEL GOSALBEZ-MARTINEZ, Departamento de Fisica Aplicada, Universidad de Alicante, JOAQUIN FERNANDEZ-ROSSIER, International Iberian Nanotechnology Laboratory and Departamento de Fisica Aplicada, Universidad de Alicante, JUAN JOSE PALACIOS, Departamento de Fisica de la Materia Condensada, Universidad Autonoma de Madrid — Two dimensional topological insulators present gapless spin filtered edge states which are topologically protected against backscattering. As long as disorder does not mix the states of opposite edges or with bulk ones, these states contribute to the two terminal conductance as a single quantum channel regardless of the amount of non-magnetic disorder present in the sample. We address this problem studying the effect of different types of disorder: constrictions and Anderson disorder, for two different materials that have been predicted to present the quantum spin Hall insulator phase, graphene and a bilayer of Bi(111). We also study the effect of the zigzag edge reconstruction of graphene over the robust behavior of the edge states. We describe their electronic structure using an orthogonal tight-binding model in the Slater-Koster approximation including the intra-atomic spin-orbit interaction. The conductance is computed using the Landauer formula making use of the ALACANT transport package.

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