# Boundary modes using impurities: graphene and the Kane-Mele topological insulator

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We provide a new direct and non-numerical technique to describe the formation of edge states in the Kane-Mele model [1]: a topological insulator created by adding spin-orbit interactions to graphene. This technique is based on the T-matrix formalism. We start with an infinite system and model the boundary using a line-like infinite-amplitude potential. We also mention an analytical application of our method to obtain, within a lattice model, the wave functions of the edge states in zigzag- and bearded-edge graphene.

## REFERENCES

1. C. Kane and E. Mele, Phys. Rev. Lett., 95 (2005) 146802.
2. S. Pinon, V. Kaladzhyan and C. Bena, Phys. Rev. B, 101 (2020) 115405.
3. V. Kaladzhyan, S. Pinon, J. H. Bardarson and C. Bena, arXiv:2005.01719 (2020).

## FIGURES

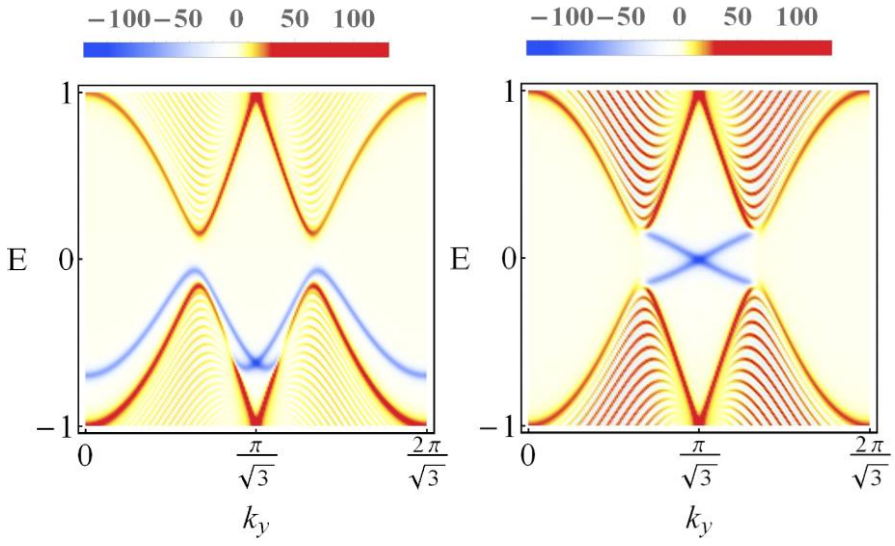


**Figure 1:** Spectral function obtained with our method for the Kane-Mele model, with (a) a weak impurity potential and (b) a strong impurity potential. The states created by the impurity can be seen in blue, while the bulk states are in red.