Edge States and the Valley Hall Effect

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Abstract: I will discuss waves in perturbed honeycomb media with line-defects. In particular, I'll present recent work with Alexis Drouot [1] which clarifies the role in edge state formation played by the type of symmetry-breaking and the orientation of the line-defect. Our results provide a rigorous explanation of numerical observations in [2,3]; see also the photonic experimental study in [4]. We also discuss implications for the Valley Hall Effect, which concerns quantum Hall-like energy transport in honeycomb structures.

References

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[3] J.P. Lee-Thorp, M.I. Weinstein and Y. Zhu, Elliptic operators with honeycomb symmetry: Dirac points, Edge States and Applications to Photonic Graphene, Arch. Rat. Mech. Anal., Volume 232, 2019, 1-63

[4] J. Noh, S. Huang, K.P. Chen and M.C. Rechtsman, Observation of photonic topological valley Hall edge states, Phys. Rev. Lett. **120** (2018) 063902