

Fragile Dislocation Modes

Rodrigo Soto Garrido

Gabriel Malavé, Jorge Schifferli, Pedro A. Orellana and Vladimir Juricic

*Pontificia Universidad Católica de Chile,
Vicuña Mackenna 4860, Santiago, Chile*

rodsoto@uc.cl

Abstract (Century Gothic 11)

We introduce the notion of fragile dislocation modes, confined to a specific portion of a topological phase while otherwise extending into the bulk continuum. As demonstrated in this work, these dislocation modes appear in the two-dimensional Su-Schrieffer-Heeger model. Nevertheless, their presence is confined to a finite region characterized by an indirect gap at high energy. The dislocation modes appear as chiral pairs at finite energies, enjoying protection through a combination of chiral (unitary particle-hole) and point group (C_{4v}) symmetries. Within this parameter range, we affirm the stability of these defect modes by tracking their localization and introducing a mild chemical potential disorder explicitly. Consequently, our findings bear significance for the experimental detection of such modes in engineered topological crystals and classical metamaterials

References

- [1] G. Malavé, J. Schifferli, R. Soto-Garrido, P. A. Orellana and V. Juricic. arXiv:2310.10779.
- [2] W. A. Benalcazar and A. Cerjan, Phys. Rev. B 101, 161116 (2020).

Figures

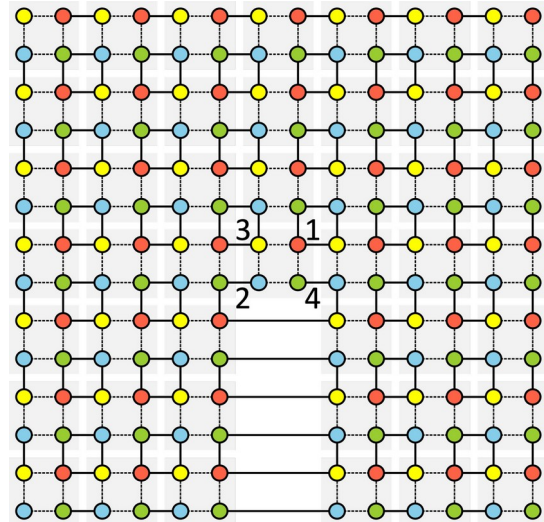


Figure 1: Two-dimensional (2D) Su-Schrieffer-Heeger (SSH) model with a single dislocation.

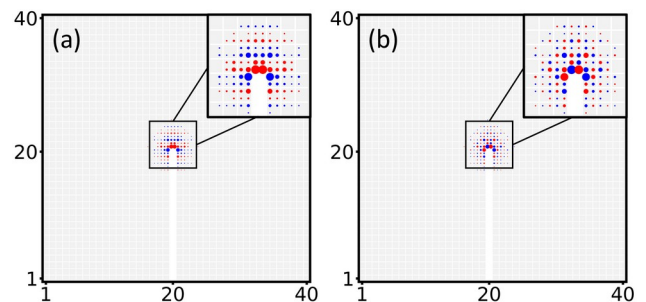


Figure 2: Two chiral pairs of the fragile dislocation bound states in the topological phase. (a) $E = 0.72$ and (b) $E = -0.72$