

Driven-dissipative topological phases in parametric resonator arrays

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The topology of non-Hermitian systems has gained interest due to some new effects with technological applications. Among them, one of interest is topological amplification.

In this talk I will describe the phenomena of topological amplification in arrays of parametric oscillators [1].

I will show the presence of two phases of topological amplification (Fig.1), both with directional transport and exponential gain with the number of sites, and one of them featuring squeezing [2].

I will also show a topologically trivial phase with zero-energy modes which produces amplification but lacks topological protection.

Finally, to physically characterize these phases, I will describe their resilience to disorder, their stability, gain and noise-to-signal ratio (Fig.2). Also, I will discuss their experimental implementation with state-of-the-art techniques in arrays of Josephson junctions [3].

References

- [1] Á. Gómez-León, T. Ramos, A. González-Tudela and D. Porras. PRA 106, L011501 (2022).
- [2] Á. Gómez-León, T. Ramos, A. González-Tudela and D. Porras. arXiv:2207.13715.
- [3] T. Ramos, Á. Gómez-León, J.J. García Ripoll, A. González-Tudela and D. Porras. arXiv:2207.13728

Figures

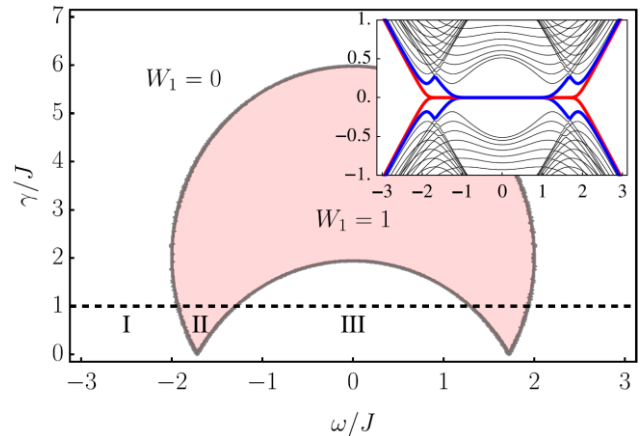


Figure 1: Topological phase diagram as a function of frequency and losses. Inset: Spectrum at the value indicated by the dashed line.

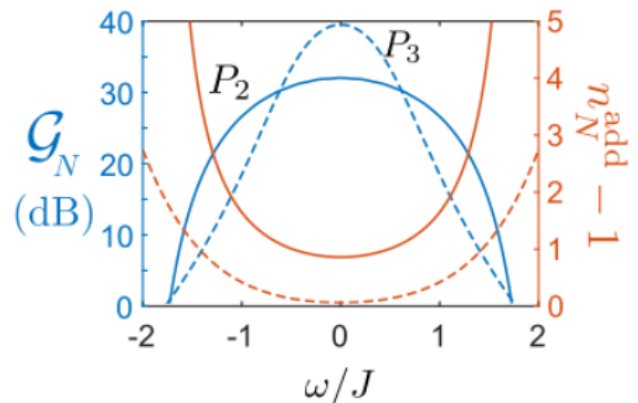


Figure 2: Gain and noise added by the amplifier at different points of the phase diagram.