UNIVERSITÄT DUISBURG ESSEN

Offen im Denken

Theorie-Kolloquium WS 2022/23

Fr 28.10.2022, 14:00-15:30

MC 351 & online (URL in E-Mail)

udue.de/TheoKoll

Non-Hermitian topology and directional amplification

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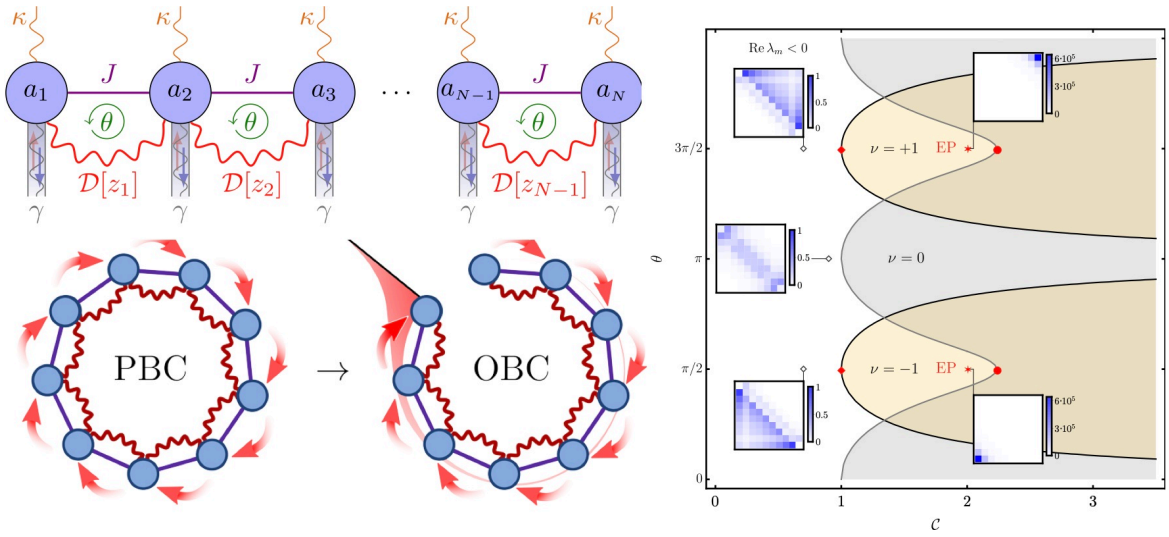
Universität Wien



Directional amplification, in which signals are selectively amplified depending on their propagation direction, has attracted much attention as a key resource for applications, including quantum information processing. I will present a unifying framework based on non-Hermitian topology to understand non-reciprocity and directional amplification in driven-dissipative cavity arrays. Specifically, I will unveil a one-to-one correspondence between a non-zero topological invariant defined on the spectrum of the dynamic matrix and regimes of directional amplification, in which the end-to-end gain grows exponentially with the number of cavities. I will then show that this correspondence also holds in the presence of disorder as long as the size of the point gap is larger than the disorder. Finally, I will show how to restore the bulk-boundary correspondence for one paradigmatic class of non-Hermitian Hamiltonians. Our work opens up new avenues in topological photonics and non-Hermitian phases of matter.

C.C. Wanjura, M. Brunelli, and A. Nunnenkamp, *Topological framework for directional amplification in driven-dissipative cavity arrays*, Nat Commun **11**, 3149 (2020). DOI:10.1038/s41467-020-16863-9

C.C. Wanjura, M. Brunelli, and A. Nunnenkamp, *Correspondence between non-Hermitian topology and directional amplification in the presence of disorder*, Phys. Rev. Lett. **127**, 213601 (2021). DOI:10.1103/PhysRevLett.127.213601

M. Brunelli, C.C. Wanjura, and A. Nunnenkamp, *Restoration of the non-Hermitian bulk-boundary correspondence via topological amplification*, https://arxiv.org/abs/2207.12427