Studies of Synthetic Frequency Dimension in Two Coupled Rings

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Synthetic dimension in photonics has exhibited the capability for applications in studying physical phenomena with exotic connectivities, exploring higher-dimensional physics in lower geometrical dimensionality, and manipulating light in multiple ways.

In this talk, I will report our recent works on the synthetic frequency dimension in two coupled rings. In the first experimental work, we find that one can construct a Su-Schrieffer-Heeger (SSH) lattice by coupling the supermodes in coupled rings through the bichromatic driving signals. Therein one can extract the topological phase directly from the bulk bandstructure [1]. In the second theoretical proposal, we study a one-dimensional Moire lattice model using two rings at different lengths, both of which are modulated resonantly. We discover the relationship between the flat band physics and the interlayer couplings and showcase the way to selectively excite a single frequency in such model [2]. Our work therefore brings more opportunities in exploring complicated models using the synthetic frequency dimension.

References

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