NTHU Physics Colloquium

Universal Model of Floquet Operator Krylov Space

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Abstract: The stroboscopic time evolution under a Floquet unitary, regardless of spatial dimension or the choice of Hermitian operator, can be mapped to an operator Krylov space equivalent to that generated by the edge operator of a one-dimensional, non-interacting Floquet transverse-field Ising model (TFIM) with inhomogeneous Ising and transverse-field couplings. This Floquet TFIM exhibits four distinct topological phases, distinguished by the presence (topologically non-trivial) or absence (topologically trivial) of edge modes at quasi-energies 0 and/or π. The Floquet dynamics exhibit universal features determined by how the Krylov parameters vary in the topological phase diagram of the TFIM with homogeneous couplings. The mathematical foundation of this mapping is rooted in the theory of orthogonal polynomials on the unit circle. Several examples and applications are presented to illustrate the mapping and its implications.

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