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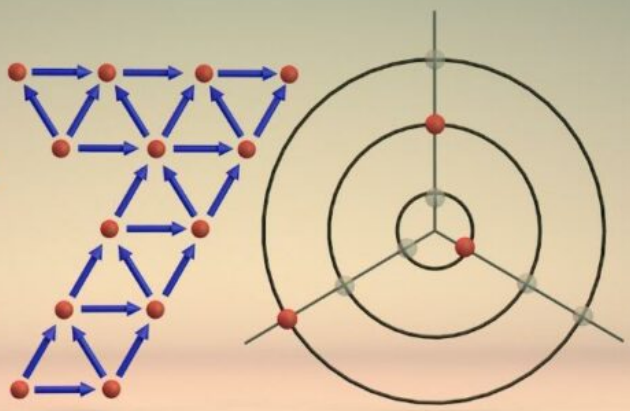

Conformal Invariance and Entanglement Entropy in Non-Hermitian Quantum Spin Chains

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Two new families of quantum spin chains with p multispin interactions were recently introduced in (1). One has Z(N) symmetry and describes free fermions (N=2) and parafermions (N>2) in the lattice (2). The other is an extension of XY model with N multispin interactions, having a large U(1) symmetry and is exactly solvable by Jordan-Wigner transformation. Both families are non-Hermitian for N>2 and under open boundary conditions they share quasi-energies obtained from the roots of a given characteristic polynomial. In this work, we show a general study of the conformal invariance properties and quantum information in a particular case of this new family of XY models. In this case, the quantum Hamiltonian has three spin interactions (p=2) and periodic boundary conditions. Although this model is non-Hermitian, the entanglement entropy (as von Neumann and Rényi entropy) is studied by exploring the translation invariance and using the correlation matrix technique.

(1) ALCARAZ, F. C.; PIMENTA, R. A. Free-parafermionic z(n) and free-fermionic xy quantum chains. Phys. Rev. E, American Physical Society, v. 104, p. 054121, Nov 2021.
(2) ALCARAZ, F. C.; PIMENTA, R. A. Free fermionic and parafermionic quantum spin chains with multispin interactions. Phys. Rev. B, American Physical Society, v. 102, p. 121101, Sep 2020.