

Discrete chiral jumping in a 1D XY spin chain with chiral spin interactions.

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Abstract:

A 1D XY spin chain with chiral spin interactions can model Dirac particles in black hole background [1]; here I will analyse the chiral characteristics of the system. When the chiral interactions become dominant, modelling the inside of the black hole, the dispersion relation shows a splitting of Fermi Sea. Discrete jumps of the system's chirality emerge as a function of the chiral coupling, with step spacing corresponding to the jumping of fermions in the Fermi Sea. A quantum and classical analysis is conducted to identify topological objects formed in this quantum phase of the system induced by the chiral interactions.

References

[1] Matthew D. Horner et al., Phys. Rev. Lett. 130, 016701 (2023)