The Study of Classical and Quantum Double Kicked Top

Poster

Avadhut Purohit

Visvesvaraya National Institute of Technology, Nagpur, India.

We study the double kicked top (DKT), which is an extension of the standard quantum kicked top. The model allows us to study the transition from time-reversal symmetric to broken time-reversal symmetric dynamics. Our transformation in the kick strength parameter space $(k, k') \rightarrow (k_r, k_\theta)$ reveals two interesting features. The transformed kicked strength parameter kr drives a higher growth of chaos and is equivalent to the standard QKT, whereas the other transformed kicked strength parameter k_θ leads to weaker growth. We discuss the fixed points, their stability, and verify results obtained by computing the largest Lyapunov exponent and Kolmogorov-Sinai entropy. We exactly solve 2- to 4-qubit versions of DKT. Furthermore, we find the criteria for periodicity of the entanglement dynamics. We investigate measures of quantum correlations from two perspectives: the deep quantum and semi-classical regime. Our analysis reveals distinct quantum features, such as the quantum bifurcation, which is absent along k_θ in the classical dynamics. We find that average entanglement decreases with total spin. Our model is significant in systems with broken time-reversal symmetry and is experimentally realisable as an extension of the standard QKT.