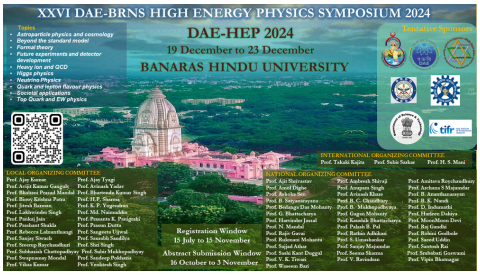

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Quantum Entropies for a non-Hermitian two level system coupled to bosonic oscillators and PT phase transition

The study of non-Hermitian systems is spreading very rapidly over the various branches of physics. We consider a spin-1/2 particle in an external magnetic field coupled to bosonic oscillators via non-hermitian interactions to study the various information theoretic measures. The present system is not PT symmetric but Pseudo-hermitian with respect to two different operators, parity (P) and σ_z. We show that this system can be reduced to smaller invariant subspaces with k (=1,3,5 $\cdots$) number of states. Each subspace possess a second order exceptional point (EP) and we observe complex to real phase transition at EP. We further calculate the density matrix of the system in these invariant subspaces and hence calculate the quantum entropies such as von Neumann entropy and Rényi entropy. We study how these quantum entropies changes with strength of the non-Hermiticity. We observe that both of these entropies remain real in some region of the unbroken phase and become complex in other regions, for each subspace.

Field of contribution

Theory

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Track Classification: Formal theory