

## Generalized Dirac oscillators Associated to Non-Hermitian Quantum Mechanical Systems

**Authors :** Debjit Dutta, P. Roy, O. Panella

**Abstract :** In recent years, non Hermitian interaction in non relativistic as well as relativistic quantum mechanics have been examined from various aspect. We can observe interesting fact that for such systems a class of potentials, namely the PT symmetric and  $\eta$ -pseudo Hermitian admit real eigenvalues despite being non Hermitian and analogues of those system have been experimentally verified. Point to be noted that relativistic non Hermitian (PT symmetric) interactions can be realized in optical structures and also there exists photonic realization of the (1 + 1) dimensional Dirac oscillator. We have thoroughly studied generalized Dirac oscillators with non Hermitian interactions in (1 + 1) dimensions. To be more specific, we have examined  $\eta$  pseudo Hermitian interactions within the framework of generalized Dirac oscillator in (1 + 1) dimensions. In particular, we have obtained a class of interactions which are  $\eta$ -pseudo Hermitian and the metric operator  $\eta$  could have been also found explicitly. It is possible to have exact solutions of the generalized Dirac oscillator for some choices of the interactions. Subsequently we have employed the mapping between the generalized Dirac oscillator and the Jaynes Cummings (JC) model by spin flip to obtain a class of exactly solvable non Hermitian JC as well as anti Jaynes Cummings (AJC) type models.

**Keywords :** Dirac oscillator, non-Hermitian quantum system, Hermitian, relativistic

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