

Mathematical Physics

Deformed Clifford algebra and supersymmetric quantum mechanics on a phase space with applications in quantum optics

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In order to realize supersymmetric quantum mechanics methods on a four dimensional classical phase-space, the complexified Clifford algebra of this space is extended by deforming it with the Moyal star-product in composing the components of Clifford forms. Two isospectral matrix Hamiltonians having a common bosonic part but different fermionic parts depending on four real-valued phase space functions are obtained. The Hamiltonians are doubly intertwined via matrix-valued functions which are divisors of zero in the resulting Moyal-Clifford algebra. Two illustrative examples corresponding to Jaynes-Cummings-type models of quantum optics are presented as special cases of the method. Their spectra, eigen-spinors and Wigner functions as well as their constants of motion are also obtained within the autonomous framework of deformation quantization.

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