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Barut–Girardello coherent states for anisotropic 2D-Dirac materials

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We construct the Barut–Girardello coherent states for charge carriers in anisotropic 2D-Dirac materials immersed in a constant homogeneous magnetic field which is orthogonal to the sample surface. Working in a Landau-like gauge, the anisotropic Dirac equation is solved for identifying the appropriate arising and lowering operators. The corresponding coherent states are constructed as eigenstates of a generalized annihilation operator with complex eigenvalues which depends on an arbitrary function f of the number operator. In order to describe the anisotropy effects on these states, we obtain the Heisenberg uncertainty relation, the probability density and mean energy value for three different functions f. As an example, the results obtained are discussed for the strained graphene case.

This is joint work with Yajaira Concha-Sánchez and Alfredo Raya.

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