Relativistic Dynamical Quantum Non-locality

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Abstract

In nonrelativistic quantum mechanics, quantum correlations are largely thought to be absolute. However, when they are studied in the framework of relativistic quantum mechanics they could depend on the reference frame [1]. In particular, two particles could be entangled in one reference frame but unentangled in another one, thus quantum non-locality depends upon the reference frame.

Here, the non-locality of quantum dynamics was tracked, by working to the Weyl's representation of quantum mechanics, to the superposition principle. This is a kind of single particle non-locality, of different nature as the discussed above [2]. We extend this work to the relativistic framework of quantum mechanics. To do so, we review the basics of the relativistic Weyl's formalism and discuss the construction of the path-integral representation of the Wigner function, as well as the influence of the reference frame on this dynamical quantum non-locality.

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