

Where is the photon?

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Abstract: The title of this talk is an echo of the one of an article of Stephan de Bièvre, “Where’s that quantum?”, published in 2007[1]. In it, together with a companion article [2] the question of the spatial localization properties of free bose fields was treated on the basis of earlier works by J.M. Knight [3]. The main conclusion is that for any single quantum state there exists a local observable whose expectation value is different from zero anywhere in space. We will present a related recent result, in which the non-locality of single photon states is expressed in terms of a single observable: For any single-photon state the expectation value of the local energy density is different from zero anywhere in space. The energy density is an observable that can be measured in experiments, using superconducting nanowire detectors.

References

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