

Non-locality in QFT due to Quantum Effects in Gravity

Wednesday 24 February 2016 14:30 (15 minutes)

I show that General Relativity coupled to a quantum field theory generically leads to non-local effects in the matter sector. These non-local effects can be interpreted in terms of quantum black holes. This interpretation fits nicely with thought experiments that point towards the existence of a minimal length in Nature. Using effective field theory techniques, one can describe this non-locality using higher dimensional operators. In the case of scalar fields, these operators have an approximate shift symmetry. We then apply our results to inflationary models. We find that small non-Gaussianities are a generic feature of models based on General Relativity coupled to matter fields. However, these effects are too small to be observable in the Cosmic Microwave Background.

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