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Self sustained traversable wormholes and topology change induced by gravity’s rainbow.
(English) [Zbl 1334.83035]

Summary: We consider the effects of Gravity’s Rainbow on the self-sustained equation which is responsible to find new traversable wormholes configurations which are sustained by their own gravitational quantum fluctuations. The same self-sustained equation is also used to discover if topology change is possible. In this contribution, we will show that in both uses, the self-sustained equation will produce a Wheeler wormhole, namely a wormhole of Planckian size. This means that, from the point of view of traversability, the wormhole will be traversable in principle, but not in practice. From the topology change point of view, the background metric will be fixed to be Minkowskian in the equation governing the quantum fluctuations, which behaves essentially as a backreaction equation, and the quantum fluctuations are let to evolve. Analyzing this procedure, we will show that the self-sustained equation, endowed with a Gravity’s Rainbow distortion, will be responsible of a topology change with the appearance of a Planckian wormhole.

For the entire collection see [Zbl 1331.83002].

MSC:
83C45 Quantization of the gravitational field
54F65 Topological characterizations of particular spaces
81T20 Quantum field theory on curved space or space-time backgrounds
83C15 Exact solutions to problems in general relativity and gravitational theory

Keywords:
traversable wormholes; topology change; gravity’s rainbow; gravitational quantum fluctuations

Full Text: DOI

References:
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