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Vacuum polarization by cosmic strings

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We investigate the polarization of the vacuum for scalar, fermionic and electromagnetic fields induced by cosmic strings. Locally Minkowski, de Sitter and anti-de Sitter background geometries are considered. As local characteristics of the vacuum the expectation values of the field squared and of the energy-momentum tensor are considered. The contributions induced by the nontrivial topology of a cosmic string are explicitly extracted. The asymptotic behavior of the vacuum expectation values is discussed near the string and at large distances. For the de Sitter and anti-de Sitter geometries the influence of the gravitational filed on the vacuum characteristics is essential at proper distances from the string larger than the curvature radius of the background spacetime.

Primary author: Prof. SAHARIAN, Aram (Department of Physics, Yerevan State University)

Presenter: Prof. SAHARIAN, Aram (Department of Physics, Yerevan State University)