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Stress-energy of a quantized scalar field in static wormhole spacetimes

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Abstract

An analytical approximation of ⟨T μν⟩ for a quantized scalar field in a static spherically symmetric spacetime with a topology S 2XR 2 is obtained. The gravitational background is assumed slowly varying. The scalar field is assumed to be both massive and massless, with an arbitrary coupling ξ to the scalar curvature and in a zero temperature vacuum state. It is demonstrated that for some values of curvature coupling the stress-energy has the properties needed to support the wormhole geometry. ©2001 The American Physical Society.