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Wormhole restrictions from quantum energy inequalities

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It is known that all wormholes violate classical energy conditions, non-negativity constraints on contractions of the stress-energy tensor. Since these conditions are violated by quantum fields, it was believed that wormholes can be constructed in the context of semiclassical gravity. But negative energies in quantum field theory are not without restriction: quantum energy inequalities (QEIs) control renormalized negative energies averaged over a geodesic. Thus, QEIs provide restrictions on the construction of wormholes. First, I will briefly discuss both 'short' and 'long' (without causality violations) wormhole solutions in the context of semiclassical gravity. Then I will present constraints on the Maldacena, Milekhin and Popov 'long' wormhole from the smeared and the doubled smeared null energy condition.

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