

Energy partition functions in gravitational waves

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Abstract

We study the energy partition function of a nonlocal field theory with a graviton, graviton derivative, and a scalar field in the vicinity of the source of the gravitational wave signal. We identify the partition function of gravitational waves that is based on the energy of the scalar field and the energy of the graviton. We derive the partition function for gravitational waves with a scalar field, the one that is commonly used in the literature, and a scalar field in the vicinity of the source. We find that the energy of scalar fields in the gravitational waves is proportional to the mass of the scalar field.