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Power Series Solution of Massless Klein-Gordon Equation in Spatially Dependent Gravitational Wave Background

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The direct observation of gravitational waves was one of the most exciting events in physics in the last decade. It opened a whole new window for studying the universe and prompted a lot of interest in the observable effects of gravitational waves. One example of this is studying the effect of gravitational waves on quantum fields. In this talk I will discuss the series solution of the massless Klein-Gordon equation in a region of spacetime with curvature described by a spatially dependent gravitational wave that falls off with distance from the source. This will allow us to study how a quantum plane wave will be affected by a gravitational wave. This seemingly straightforward problem actually requires careful analysis in order to get the correct result in the limit where the gravitational wave and the quantum wave are collinear. One of the interesting results of this analysis is an enhancement of the probability current of the quantum wave along the direction of propagation of the gravitational wave.

Keyword-1

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Keyword-2

Klein-Gordon Equation

Keyword-3

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