Title:	Aspects of gravitational decoherence in neutrino lensing
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Keywords:	Classical black holes General relativity equations & solutions
Issue Date:	2021
Publisher:	American Physical Society
Citation:	Physical Review D, 104(9).
Abstract:	We study decoherence effects in neutrino flavor oscillations in curved spacetime with particular emphasis on the lensing in a Schwarzschild geometry. Assuming Gaussian wave packets for neutrinos, we argue that the decoherence length derived from the exponential suppression of the flavor transition amplitude depends on the proper time of the geodesic connecting the events of the production and detection in general gravitational setting. In the weak gravity limit, the proper time between two events of given proper distance is smaller than that in the flat spacetime. Therefore, in presence of a Schwarzschild object, the neutrino wave packets have to travel relatively more physical distance in space to lapse the same amount of proper time before they decoher. For nonradial propagation applicable to the lensing phenomena, we show that the decoherence, in general, is sensitive to the absolute values of neutrino masses as well as the classical trajectories taken by neutrinos between the source and detector along with the spatial widths of neutrino wave packets. At distances beyond the decoherence length, the probability of neutrino flavor transition due to lensing attains a value which depends only on the leptonic mixing parameters. Hence, the observability of neutrino lensing significantly depends on these parameters and in-turn the lensing can provide useful information about them.
Description:	Only IISERM authors are available in the record
URI:	https://doi.org/10.1103/PhysRevD.104.095007 (https://doi.org/10.1103/PhysRevD.104.095007) http://hdl.handle.net/123456789/4612 (http://hdl.handle.net/123456789/4612)
Appears in Collections:	Research Articles (/jspui/handle/123456789/9)

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