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Title:	Gravitational lensing of gravitational waves: wave nature and prospects for detection
Authors:	Meena, A.K. (/jspui/browse?type=author&value=Meena%2C+A.K.) Bagla, J.S. (/jspui/browse?type=author&value=Bagla%2C+J.S.)
Keywords:	Gravitational lensing: micro Gravitational lensing: strong Gravitational waves
Issue Date:	2020
Publisher:	Oxford Academic
Citation:	Monthly Notices of the Royal Astronomical Society 492(1), pp. 1127-1134
Abstract:	We discuss the gravitational lensing of gravitational wave (GW) signals from coalescing binaries. We delineate the regime where wave effects are significant from the regime where geometric limit can be used. Further, we focus on the effect of microlensing and the combined effect of strong lensing and microlensing. We find that microlensing combined with strong lensing can introduce time varying phase shift in the signal and hence can lead to detectable differences in the signal observed for different images produced by strong lensing. This, coupled with the coarse localization of signal source in the sky for GW detections, can make it difficult to identify the common origin of signal corresponding to different images and use observables like time delay. In case we can reliably identify corresponding images, microlensing of individual images can be used as a tool to constrain properties of microlenses. Sources of gravitational waves can undergo microlensing due to lenses in the disc/halo of the Galaxy, or due to lenses in an intervening galaxy even in absence of strong lensing. In general the probability for this is small with one exception: extragalactic sources of GWs that lie in the galactic plane are highly likely to be microlensed. Wave effects are extremely important for such cases. In case of detections of such sources with low signal-to-noise ratio, the uncertainty of occurrence of microlensing or otherwise introduces an additional uncertainty in the parameters of the source.
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