Title:	Gravitational lensing of gravitational waves: effect of microlens population in lensing galaxies
Authors:	Meena, Ashish Kumar (/jspui/browse?type=author&value=Meena%2C+Ashish+Kumar) Jasjeet Singh Bagla, Jasjeet Singh (/jspui/browse?type=author&value=Jasjeet+Singh+Bagla%2C+Jasjeet+Singh)
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Abstract:	With increasing sensitivities of the current ground-based gravitational wave (GW) detectors, the prospects of detecting a strongly lensed GW signal are going to be high in the coming years. When such a signal passes through an intervening lensing galaxy or galaxy cluster, the embedded stellar mass microlenses lead to interference patterns in the signal that may leave observable signatures. In this work, we present an extensive study of these wave effects in the Laser Interferometer Gravitational Wave Observatory/Virgo frequency band (10–104 Hz) due to the presence of the microlens population in galaxy scale lenses for the first time. We consider a wide range of strong lensing (macro) magnifications and the corresponding surface microlens densities found in lensing galaxies and use them to generate realizations of the amplification factor. The methodologies for simulating amplification curves for both types of images (minima and saddle points) are also discussed. We then study how microlensing is broadly affected by the parameters like macro-magnifications, stellar densities, the initial mass function, types of images, and microlens distribution around the source. In general, with increasing macro-magnification values, the effects of microlensing become increasingly significant regardless of other parameters. Mismatch analysis between the lensed and the unlensed GW waveforms from chirping binaries suggests that, while inferring the source parameters, microlensing cannot be neglected for macro-magnification $\gtrsim$15. Furthermore, for extremely high macro-magnifications $\gtrsim$100, the mismatch can even exceed 5 per cent, which can result in both a missed detection and, consequently, a missed lensed signal.
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