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Effect of inhomogeneities on the propagation of gravitational waves from binaries of compact objects

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We consider the propagation of gravitational waves in the late time Universe with the presence of structure. Before detection, gravitational waves emitted from distant sources have to traverse through regions of space-time which are far from smooth and homogeneous. We investigate the effect of inhomogeneities on the observables associated with the gravitational
wave sources. In particular, we evaluate the impact of inhomogeneities on gravitational wave propagation by employing Buchert's framework of averaging. In context of a toy model within the above framework, it is first shown how the redshift versus distance relation gets affected through the averaging process. We then study the variation of the redshift dependent part of the observed gravitational wave amplitude for different combination of our model parameters. We show that the variation of the gravitational wave amplitude with respect to redshift can deviate significantly compared to that in the ΛCDM-model. Our result signifies the importance of local inhomogeneities on precision measurements of parameters of gravitational wave sources.

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