

Could gravitational lensing impact the observed BBH population?

Just like visible light, gravitational waves can be lensed by heavy masses between source and observer. Hence, a fraction of the observed distant binary black hole mergers could be magnified by lensing, some sources may have produced multiple observable images, and individual waveforms may be affected by wave optics and microlensing effects.

The predicted rate of such lensing is small for the current detector generation, and the first dedicated studies on aLIGO O1+O2 data have not found any evidence for lensed events.

However, with increasing detection rates, we are now approaching a regime where it will be worthwhile to make the step from stand-alone lensing studies towards properly including lensing into hierarchical models of the observed vs intrinsic BBH populations. This could help explain outliers in the observed distribution and reduce potential biases in the mass distribution and redshift evolution. But to avoid under-/overfitting, it will require careful treatment of astrophysical priors and of degeneracies with other population parameters.

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