

Follow-up Analyses to the O3 LIGO-Virgo-KAGRA Lensing Searches

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Along their path from source to observer, gravitational waves may be gravitationally lensed by massive objects leading to distortion in the signals. Searches for these distortions amongst the observed signals from the current detector network have already been carried out, though there have as yet been no confident detections. However, predictions of the observation rate of lensing suggest detection in the future is a realistic possibility. Therefore, preparations need to be made to thoroughly investigate the candidate lensed signals. In this work, we present some follow-up analyses that could be applied to assess the significance of such events and ascertain what information may be extracted about the lens-source system by applying these analyses to a number of O3 candidate events, even if these signals did not yield a high significance for any of the lensing hypotheses. These analyses cover the strong lensing, millilensing, and microlensing regimes. Applying these additional analyses does not lead to any additional evidence for lensing in the candidates that have been examined. However, it does provide important insight into potential avenues to deal with high-significance candidates in future observations.

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