

Low-latency searches for strongly lensed gravitational wave signals in the third observing run of LIGO-Virgo detectors

Gravitational waves (GWs) from stellar-mass compact binary coalescences (CBCs) are expected to be strongly lensed when encountering large agglomerations of matter, such as galaxies or clusters. Searches for strongly lensed GWs have been conducted using data from the first three observing runs of the LIGO-Virgo GW detector network. Although no confirmed detections have been reported, interesting candidate lensed pairs have been identified. In this talk, I will describe the low-latency methods used to rapidly identify potential lensing candidates of both detectable (super-threshold) CBC pairs and pairs involving counterparts from targeted sub-threshold searches to confidently detect super-threshold CBC events. I will also summarize the results, follow-up strategies and challenges for the identification of strong lensing. The most significant candidate “super-sub” pair deemed by this analysis was subsequently found, by more sophisticated and detailed joint-PE analyses, to be among the more significant candidate pairs, but not sufficiently significant to suggest the observation of a lensed event.

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