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Templated search for black hole echo signals in LIGO data

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We show details of the AEI search for black hole echoes in LIGO public data. Echoes of gravitational waves of a compact binary merger provide a potential way to test alternative models of black holes. Abedi et al. claimed in 2016 to have found evidence of these echoes in LIGO public data. We have developed an extended analysis pipeline to evaluate these claims. This includes extending the parameter space of the echo signal and searching over more of the LIGO open data. The effect of a phase flip at the inner reflective boundary is investigated.

We test our analysis with injected signals and pure Gaussian noise, and are able to recover signals similar to those claimed to be found by Abedi et al..

We conclude that current results do not provide sufficient observational evidence for claiming the existence of Planck-scale structures at black hole horizons, while encouraging further investigation of this interesting possibility as well as collaboration using the LIGO open data.

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