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## Model-Independent test of Scalar-Tensor gravity theory by reconstructing scalar mode of GW170817

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Einstein's general relativity predicts that a gravitational wave is allowed to have two polarizations called tensor-mode: plus and cross modes. On the other hand, the general metric theory of gravity predicts that a gravitational wave is allowed to have up to six polarizations: two scalar and two vector modes in addition to tensor modes. In case the number of laser-interferometric gravitational wave telescopes is larger than the one of the polarizations the gravitational waves have, all the polarizations can be reconstructed separately. Since it depends on theories of gravity which polarizations the gravitational waves have, the investigation of polarizations is important for the test of theories of gravity.

In this paper, in order to test the scalar-tensor gravity theory, one of important alternative theories of gravity, we search for the scalar-mode of GW170817 observed by LIGO Livingstone, Hanford and Virgo without prior information about any tensor-scalar gravity theories. As a result, we found the maximum SNR of the scalar-mode of GW170817 was 2.77, the p-value was 0.01, and the band-limited  $h_{rss}$  was  $1.55 \times 10^{-21} [1/\sqrt{Hz}]$  with the time window of 2[s] and frequency window of 60-120[Hz].

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