

Phenomenology: Test of the Second Postulate of Relativity from Gravitational Wave Observations

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The second postulate of special relativity states that the speed of light in vacuum is independent of the emitter's motion. The test of this postulate so far remains unexplored for gravitational radiation. We analyzed data from the LIGO-Virgo detectors to test this postulate within the ambit of emission models, where the speed of gravitational waves emitted by a source moving with a velocity v relative to a stationary observer is given by $c' = c + kv$, where k is a constant. We have estimated the upper bound on the 90% credible interval over k to be $k \leq 8.3 \times 10^{-18}$, which is several orders of magnitude more stringent compared to previous bounds obtained from electromagnetic observations. The Bayes' factor supports the second postulate, with very strong evidence upholding the principle of relativity for gravitational interactions.

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