

On the Fate of Alternative Gravitation and Extra-Dimensional Theories

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Abstract

The object of this (exceedingly) brief note is to point out that the recent discovery of gravitational waves may further constrain brane-worlds models and alternative theories of gravitation.

“Sic transit gloria mundi”

There are several mainstream theories that are likely to be impacted by the recent discovery of gravitational waves. At least for the time being, the physics community has been focused on the detection results and the future of gravitational wave astronomy while keeping silent on the implications of the LIGO discovery for high-energy theory. The main models to be further constrained (or re-evaluated) in the short-term are:

- 1) The original Kaluza-Klein model and its derivatives [1-3],
- 2) The Randall-Sundrum scenario of warped extra-dimensions [4],
- 3) The ADD model of large extra-dimensions [5],
- 4) Some alternatives theories of classical gravitation [6-7].

Although not immediately apparent, it is reasonable to presume that other popular models will be critically re-examined in the long-term. Among them, the AdS/CFT correspondence [8], as well as dimensional reduction in the far ultraviolet regime of

field theory [9]. It is plausible to infer that the maximal deviation from the three-dimensionality of space is limited to $\varepsilon = O(-10^{-5})$ [10], a finding consistent with the body of ideas developed in [11].

References:

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