

Gravitational Wave Miracles?

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Abstract

The idea of gravitational wave (GW), suggested by Albert Einstein in 1916, still poses outstanding challenges, which have to be resolved by the theoretical physics community as soon as possible.

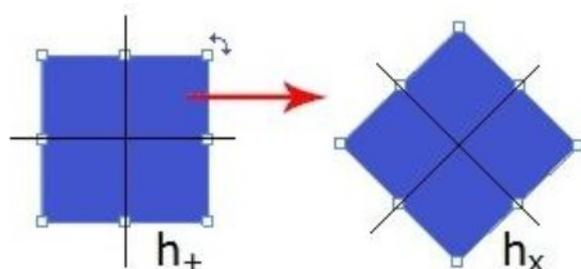
The idea of 'gravitational wave' (GW), suggested by Albert Einstein in 1916 [1], poses a number of non-trivial questions, which still have not been resolved by the theoretical physics community. We do not know how to define GWs in the full non-linear regime where the spacetime itself is dynamic [8]: 'waves with respect to what?' is the crucial question about the boundary of spacetime, which could be discussed only after we resolve the three issues below. Until then, I'm afraid the ideas of GW and its detection [9] will continue to look like a bunch of "miracles", which is of course totally unacceptable in science [2].

Let me begin with the critical 45° angle between two linearly independent polarization states h_+ and h_x , which are instructed to be in "superposition" along time (t) read with a clock. As explained by M. Vallisneri et al. in [3, p. 6], "the effect of each GW polarization is to contract fractionally the proper distance along one axis, while expanding it along the other (these axes being $(x; y)$ for h_+ , and axes rotated by 45° with respect to $(x; y)$ for h_x)." Look also in [4, p. 33]: "A generic gravitational wave can thus be understood as a superposition of two oscillating tidal fields that propagate at the vacuum speed of light."

Q1: What phenomenon could possibly produce an exact 45° angle between h_+ and h_x and keep it exactly fixed within the "superposition" of two oscillating metric fields, in such way that the latter will never conflate and intermingle? What could sustain the phases?

The two linearly independent polarization states h_+ and h_x , each of which "has its own gravitational-wave field" [10], are "akin to "stereo sound" information" [4, p. 8], but the physical nature of such "superposition" of metric fields is totally unclear. It is certainly not like a superposition of two quantum states of the famous Schrödinger's cat, live cat & dead cat. According to Freeman Dyson [2, p. 8], a generic GW "may be considered to be a coherent superposition of a large number of gravitons." Here comes the second question.

Q2: How could these "gravitons" [10] be arranged to keep the 45° angle between h_+ & h_x ?



Moreover, while “it would be hopeless to look for exact solutions for the gravitational waves emitted by realistic astrophysical sources” [5], we must nevertheless assume that strong GWs at the vicinity of a hypothetical “binary black-hole merger” [6] do exist, which brings us to the last question.

Q3: How could strong GWs sustain their properties of very weak GWs [3, 4, 9, 10] while interacting with matter and fields and other GWs, for over one billion years [7]?

We must not sweep these crucial questions under the rug: “miracles” do not exist. It is impossible to observe something that cannot exist, such as pink unicorns dancing with red herrings or some “back hole” merger [6] emitting “gravitons” by linearized GWs [2, 11]. The so-called GW150914 [7] is an insult to our intelligence.

References

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