

Peer Review

Review of: "Transverse-Traceless Gauge Dynamics and the Reframing of Gravitational Wave Coherence"

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This paper deals with gravitational coherence effects that can occur in the linearized regime of general relativity. In particular, gravitational waves in a perturbed (flat) FLRW background are considered. The paper then shows that coherent states can be constructed in this background and discusses coherence effects that can be interpreted in terms of different types of measurement results (known from the literature).

My overall impression of the work is that it is based on a great deal of well-established textbook knowledge and contributes little or no new insights. In particular, it is completely clear a priori that gravitational coherence effects can and must occur in the linearized regime of GR. The fact that coherent states can be constructed is also no great surprise; after all, these are eigenstates of an annihilation operator. One aspect that is not addressed at all is the fact that in a dynamical spacetime such as the FLRW universe, no unique vacuum state can be identified. Accordingly, for each individual $t=\text{const.}$ hypersurface of said spacetime, a separate coherent state would have to exist. However, how these states arise or are connected with each other is not discussed at all. These omissions therefore cast a deep shadow over the following sections, in which concrete effects are discussed on an experimental basis. Against this background, I cannot accept this paper for publication.

Declarations

Potential competing interests: No potential competing interests to declare.