

Observable Gravitational Wave Strain at Second-order

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The definition of second-order gravitational wave (GW) strain in cosmological perturbation theory is traditionally ambiguous due to its dependence on spacetime slicing. This issue is particularly critical for secondary GWs induced by primordial fluctuations. This talk introduces a gauge-invariant formalism that defines GW strain via the time-delay of electromagnetic signals exchanged between geodesic observers. Our results confirm that this observable strain aligns with the transverse-traceless components in the Newton gauge, providing a robust physical foundation for interpreting secondary GWs and resolving the gauge-dependence controversy.

Presenter(s) : Mr WANG, Ao (Institute for Theoretical Physics, Chinese Academy of Science)

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