

Whispers from the Dark Universe - Particles & Fields in the Gravitational Wave Era

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WHISPERS FROM THE DARK UNIVERSE – PARTICLES & FIELDS IN THE GRAVITATIONAL WAVE ERA

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A Coordinate-Independent Formalism for Detecting High-Frequency Gravitational Waves

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In an external electric or magnetic field, a gravitational wave (GW) may be converted into electromagnetic radiation. We present a coordinate-invariant framework to describe the GW signal in a detector that is based on this effect, such as cavities for axion searches. In this framework, we pay special attention to the definition of manifestly coordinate-independent expressions for the electromagnetic fields that an external observer would detect. A careful assessment of the detector's perceived motion allows us to treat both its mechanical and its electromagnetic response to the GW consistently. We illustrate our findings in two examples, an infinitesimally thin rod and a spherical electromagnetic cavity.

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