

Classical gravity is safe from an ultraviolet catastrophe

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Abstract

Max Planck famously showed that the ultraviolet catastrophe of the classical electromagnetic radiation emitted by a black body is avoided by the quantization of electromagnetism. Does it follow, analogously, that in order to avoid an ultraviolet catastrophe of gravitational wave radiation, gravity should be quantized as well? To this end, we compute the power radiated from the major thermal source in cosmology, the CMB, into classical gravitational waves. We find that the result is non-catastrophic and in agreement with the observed absence of evidence for significant heat loss from the CMB into gravitational radiation. Hence, at least from this thermodynamic perspective, linearized gravity does not require quantization.