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Gravitational Waves Induced by Scalar Perturbations during a Gradual Transition from an Early Matter Era to the Radiation Era

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We revisit the effects of an early matter dominated era on gravitational waves induced by scalar perturbations. We carefully take into account the evolution of the gravitational potential, the source of these induced gravitational waves, during a gradual transition from an early matter dominated era to the radiation dominated era, where the transition timescale is comparable to the Hubble time at that time. Realizations of such a gradual transition include the standard perturbative reheating with a constant decay rate. Contrary to previous works, we find that the presence of an early matter dominated era does not necessarily enhance the induced gravitational waves due to the decay of the gravitational potential around the transition from an early matter dominated era to the radiation dominated era. This talk will be based on our paper, arXiv:1904.12878.

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