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# Dark Energy Instabilities induced by Gravitational Waves

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In this talk I will discuss the decay of gravitational waves (GW) into dark energy fluctuations $\pi$ in the context of the EFT of Dark Energy.
In such theories, the time-dependence of the Dark Energy (DE) field spontaneously breaks Lorentz invariance. Therefore as for light in a material, GW travelling in the cosmic medium are affected by dispersion phenomena and can decay into DE fluctuations. For cubic Horndeski and beyond Horndeski theories, the gravitational wave acts as a classical background for $\pi$ and thus modifies its dynamics. In particular, for a sufficiently large amplitude of the wave, the kinetic term of $\pi$ becomes pathological, featuring gradient and ghost instabilities. For smaller gravitational wave amplitude, $\pi$ fluctuations are described by a Mathieu equation and feature instability bands that grow exponentially. The gravitational wave signal is affected by the $\pi$ back-reaction and this provides very stringent bounds on cubic and quartic GLPV theories.

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