Contribution ID: 14

Type: not specified

## **Pre-thermalized Gravitational Waves**

We investigate a novel gravitational wave (GW) production mechanism from gravitons generated during the pre-thermal phase of cosmic reheating, where the energy density is dominated by non-thermalized inflaton decay products, dubbed reheatons. We consider multiple production channels, including: i) pure inflaton-inflaton annihilation, ii) graviton Bremsstrahlung from inflaton decay, iii) scatterings between an inflaton and a reheaton, and iv) scatterings among reheatons. To determine the resulting GW spectrum, we solve the Boltzmann equation to obtain the graviton phase-space distribution for each channel. We find that the third channel, iii), dominates due to the large occupation number of reheatons at highly-energetic states during the pre-thermalization phase. Notably, in scenarios with a low inflaton mass, the GW spectrum could fall within the sensitivity range of future experiments such as the Einstein Telescope, the Cosmic Explorer, the Big Bang Observer, and ultimate DECIGO.

Primary author: BERNAL, Nicolás (New York University Abu Dhabi)