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Late Reheating scenarios: How low can we really go?

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Modern, ground and space based observatories have provided us with a wide range of observations from different epochs of the Universe. Despite these efforts, the Universe before Big Bang Nucleosynthesis (BBN) remains obscure to us. Then, the measurements of the primordial abundances of light elements are key when exploring theories for the early Universe. In this talk, I will discuss the phenomenology of reheating scenarios around neutrino decoupling and the formation of primordial elements. In such cases, we parametrize the reheating with a new particle called X that is set to decay just before the start of BBN. The presence and posterior decay of such particle modifies the expansion history of the Universe as well as the neutrino thermalization, up until the freeze-out of the weak rates. I will explain what is our approach to these scenarios and why previous constraints on reheating temperatures are sometimes not as robust as we think. In the end, I will also mention the next steps to make the most general and consistent bounds on the reheating temperature.

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