

# The Universe before the hot Big Bang

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## Resumen

With Big Bang nucleosynthesis theory and observations, we are confident of the theory of the early Universe at temperatures up to  $T \simeq 1$  MeV, the corresponding age being  $t \simeq 1$  second. With the LHC, we hope to be able to go up to temperatures  $T \sim 100$  GeV and down to age  $t \sim 10^{-10}$  seconds. The question to be addressed in this talk is: Are we going to have a handle on even earlier epoch?

The key issue in this regard is the theory and observational data on cosmological perturbations - inhomogeneities in the energy density and, hopefully, relic gravity waves. We take a bottom up approach, and discuss the properties of the perturbations that we already know of and will possibly uncover in the future, and on this basis try to reconstruct the earliest cosmological epoch. Even though by now we know only very basic things about the density perturbations, these unequivocally show that the conventional hot epoch was preceded by another epoch with rather peculiar properties. The best guess is inflation, but interesting alternatives to inflation are not ruled out for the time being. It is likely that future observations will discriminate between various hypotheses about the earliest Universe.

