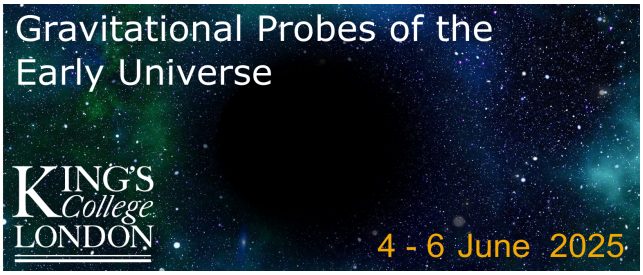

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Inflationary Gravitational Waves as a Probe of the Unknown Expansion History of the early Universe

One of the key predictions of the standard inflationary paradigm is the quantum mechanical generation of tensor fluctuations due to the rapid accelerated expansion of space, which later constitute a stochastic background of primordial Gravitational Waves (GWs). The amplitude of the (nearly) scale-invariant inflationary tensor power spectrum at large cosmological scales provides us with crucial information about the energy scale of inflation. Furthermore, the spectral energy density of the GWs at sufficiently small scales (or, large frequencies) serves as an important observational probe of the post-inflationary primordial dynamics. In fact, the small-scale spectral tilt of the GWs is sensitive to the (unknown) post-inflationary equation of state (EoS) of the universe: with a softer (than radiation) EoS resulting in red-tilted GWs, while a stiffer EoS resulting in blue-tilted GWs. The post-inflationary dynamics of the Universe, however, is generically expected to be quite complex, potentially involving a number of distinct cosmic epochs. In this talk, the speaker will discuss the possibility of multiple sharp transitions in the EoS of the post-inflationary universe and illustrate the corresponding spectral energy density of the inflationary GWs. The region of the parameter space which leads to a potentially detectable signal in the upcoming GW detectors, without violating the current constraints, will be explicitly presented.

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