

The Stringy Birth of the Cosmos: Evidence for Resonant Superstring Excitations during Inflation



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It is generally accepted that string theory is the best framework in which to describe the birth of spacetime out of quantum foam. However, the energy scale of superstrings is so high that it is impossible to ever observe a superstring in the laboratory. There is, however, one epoch in which the energy scale of superstrings was obtainable in Nature. That is in the realm of the early moments of chaotic inflation out of the string theory landscape. This talk explores the possibility that a specific superstring excitation may have made itself known via its coupling to the field of inflation. This may have left an imprint of "dips" in the power spectrum of temperature fluctuations in the cosmic microwave background. The identification of this particle as a superstring is possible because there may be evidence for different oscillator states of the same superstring that appear on different scales on the sky. It will be shown that from this imprint one can deduce the mass, number of oscillations, and coupling constant for the superstring. Although the evidence is marginal, this may constitute the first observation of a superstring in Nature.