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Generation of Coherent Structures After Cosmic Inflation[1]
MARCELO GLEISER, Dartmouth College — The transition from inflation to power-law expansion is a rich nonlinear nonequilibrium physical process. For this reason, much is still unknown about this epoch in early universe physics, which has been dubbed the "new big bang" by many colleagues. Here I describe results from the past few years of research, some of which in collaboration with Noah Graham and Nik Stamatopoulos, where we explored the generation on extended structures at the end of inflation known as oscillons. In particular, in hybrid inflation models we solve the coupled Einstein-Klein-Gordon equations to find that as the field responsible for inflating the universe rolls down to oscillate about its minimum, it triggers the formation of long-lived two-field oscillons, which can contribute up to 20% of the total energy density of the universe. We show that these oscillons emerge for a wide range of parameters consistent with WMAP 7-year data. These objects contain total energy of about 25×10^{20} GeV, localized in a region of approximate radius 6×10^{-26} cm. We argue that these structures could have played a key role during the reheating of the universe, influencing the reheating temperature. We also explore the notion that these objects will appear in most symmetry-breaking phase transitions.

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