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## Holographic $\beta$ function in de Sitter space

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We investigate infrared logarithms in inflationary Universe from holographic perspective. We derive gravitational Fokker-Planck and Langevin equations to investigate the time evolution of the de Sitter entropy  $S = \pi/G_N H^2(t)$ . H(t) is the time dependent effective Hubble parameter and  $G_N$  is the Newton's constant. Our approach focuses on the conformal modes to respect local Lorentz symmetry. In term of the curvature perturbations , it is shown to be consistent with  $\delta N$  formalism. Under the Gaussian approximation, we obtain the dynamical  $\beta$  function of g = 1/S. The dimensionless gravitational coupling g is asymptotically free toward the future. It also possesses the ultraviolet fixed point indicating that the Universe begun with the de Sitter expansion at the Planck scale with  $\epsilon = 0$ . We further interpret inflationary Universes as the UV complete composite states. Since our analysis is trustable for small g, our conclusion is that inflationary universe is consistent in the semiclassical regime.

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