

Warm inflation and Swampland conjecture

Haidar Sheikhahmadi

h.sh.ahmadi@gmail.com

For details and main references see: Abolhassan Mohammadi, Tayeb Golanbari, **Haidar Sheikhahmadi**, Kosar Sayar, Lila Akhtari, M. A. Rasheed, Khaled Saaidi “Warm Tachyon Inflation and Swampland Criteria” ( Chinese Physics c Vol. 44, No. 9 (2020), arXiv: 2001.10042 [gr-qc]

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The tachyonic Klein-Gordon field equation reads



Swampland conjectures

Abstract:

The scenario of tachyon warm inflation is considered in which a tachyonic field plays the inflaton role and interacts with photonic gas during inflationary phase. To investigate the concordance of theoretical results with observations besides Planck data one has to consider some extra constraints risen from string field theory. Amongst them one can refer swampland conjecture, which puts a lower and upper constraints on the evolution of the potential and perturbations of inflaton.

Then power spectrum reads



The model

* The distance conjecture: it is an upper bound that confines the scalar field excursion in the field space as 
* The de Sitter conjecture: it imposes a lower bound on the gradient of the potential stating that slope of a positive potential, V > 0, of the scalar field should satisfy the following bound 

The desire for building a model based on the consistent effective field theory, EFT, which lives on the landscape, requires a mechanism to separate the consistent and in consistent EFTs. The efforts have been resulted in some conjectures in which the swampland criteria are the most recent proposal.

One can observe that, both cases of the dissipation coefficient were examined which determined that the first case, where the dissipation coefficient is a function of only the scalar field, could not satisfy even one of the criteria. On the other hand, for the second case, where the dissipation coefficient is a function of both the scalar field and the temperature, the model properly satisfies both swampland criteria. The following plot explains how swampland conjectures are satisfied in our model.

The energy conservation equations are then modified as



Here we can express slow-roll parameters as follows



Tachyonic energy density and pressure expressed as

