Title:	Perturbations in tachyon dark energy and their effect on matter clustering
Authors:	Singha, Avinash (/jspui/browse?type=author&value=Singha%2C+Avinash) Jassal, H.K. (/jspui/browse?type=author&value=Jassal%2C+H.K.) Sharmaa, Manabendra (/jspui/browse?type=author&value=Sharmaa%2C+Manabendra)
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Abstract:	A non-canonical scalar tachyon field is a viable candidate for dark energy and has been found to be in good agreement with observational data. Background data alone cannot completely rule out degeneracy between this model and others. To further constrain the parameters, apart from the distance measurements, we study perturbations in tachyon scalar field and how they affect matter clustering. We consider two tachyon potentials for this study, an inverse square potential and an exponential potential. We study the evolution of the gravitational potential, matter density contrast and dark energy density contrast, and compare them with the evolution in the ΛCDM model. Although perturbations in dark energy at sub-Hubble scales are negligible in comparison with matter perturbations, they cannot be ignored at Hubble and super-Hubble scales (λp > 1000 Mpc). We also study the evolution of growth function and growth rate of matter, and find that the growth rate is significantly suppressed in dark energy dominated era with respect to the growth rate for Λ CDM model. A comparison of these models with Redshift Space Distortion growth rate data is presented by way of calculating fσ8(z). There is a tension of 2.9σ (2.26σ) between growth rate data and Planck-2015 (Planck-2018) Cosmic Microwave Background Radiation data for Λ CDM model. We present constraints on free parameters of these models and show that perturbations in tachyon scalar field reduce this tension between different data sets.
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