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Cosmological tests of a bivalent tachyonic dark energy scalar field model

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We investigate a Friedmann universe filled with tachyonic scalar field which can behave as dark energy in a period of the evolution. The universe exhibits a bivalent future: depending on initial parameters can run either into a de Sitter exponential expansion or into a traversable future soft singularity followed by a contraction phase. We also include in the model radiation, baryonic matter and cold dark matter. Out of a variety of six types of evolutions arising in a more subtle classification, we identify two in which in the past the scalar field effectively degenerates into a dust (its pressure drops to an insignificantly low negative value). One type of these trajectories evolves into the de Sitter fix point and the other hits the future soft singularity. We confront the background evolutions with various cosmological tests, including the supernova type Ia Union 2.1 data, baryon acoustic oscillation distance ratios, the Omh2 diagnostic and the cosmic microwave background (CMB) acoustic scale. At perturbative level we investigate the CMB temperature power spectrum.

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