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# Implications of a transition in the dark energy equation of state for the $H_0$ and $\sigma_8$ tensions

We explore the implications of a rapid appearance of dark energy between the redshifts ($z$) of one and two on the expansion rate and growth of perturbations. Using both Gaussian process regression and a parameteric model, we show that this is the preferred solution to the current set of low-redshift ($z < 3$) distance measurements if $H_0 = 73\,\mathrm{km\,s^{-1}\,Mpc^{-1}}$ to within 1\% and the high-redshift expansion history is unchanged from the $\Lambda$CDM inference by the Planck satellite. Dark energy was effectively non-existent around $z = 2$, but its density is close to the $\Lambda$CDM model value today, with an equation of state greater than $-1$ at $z < 0.5$. If sources of clustering other than matter are negligible, we show that this expansion history leads to slower growth of perturbations at $z < 1$, compared to $\Lambda$CDM, that is measurable by upcoming surveys and can alleviate the $\sigma_8$ tension between the Planck CMB temperature and low-redshift probes of the large-scale structure.

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