

New physics at low redshift cannot be the sole explanation for the H_0 tension

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What has everyone so excited about the H_0 tension is the potential for discovering new physics. In particular, the question of new physics explanations for this tension are often divided into whether the new physics plays a role at high redshift or low redshift. In this talk, I will make the case that there can be no low-redshift solution to the H_0 tension. To robustly answer this question, I used a very flexible parametrization for the dark energy equation of state, $w(z)$, such that every cosmological distance still allowed by the data exists within this prior volume. To then answer whether there exists a satisfactory solution to the H_0 tension within this comprehensive parameterization, I constrained the model using different partitions of the Planck, eBOSS/SDSS DR16 BAO, Pantheon SN and SH0ES H_0 datasets. When constrained by just the CMB+ H_0 datasets, there exists a set of $w(z)$ which yields high H_0 values, but these $w(z)$ functions are ruled out by the SN and BAO datasets. In other words, the constraint from CMB+SN+BAO datasets does not allow for high H_0 values and converges around $w(z)=-1$. Thus, the search for a solution to the H_0 tension should focus on high-redshift solutions. Hopefully ACT/SPTPol/CMB-S4 will be able to detect such instances of new physics on their own in order to make a convincing case for a solution to the H_0 tension.

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