

## The $H_0$ and $S_8$ tensions necessitate early and late time changes to $\Lambda$ CDM

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The Hubble tension is a result of variations between the late-Universe measurements of  $H_0$  and those inferred from early-Universe physics measurements. Many solutions have been proposed to address this tension; among the most successful are alterations to the early-Universe physics such as Early Dark Energy (EDE). However, each of these proposed solutions mitigate the tension at the expense of other quantities, such as the mild  $S_8$  tension. Conversely, other solutions have been proposed to address the  $S_8$  tension, such as Decaying Dark Matter (DDM), but these similarly fail to address all constraints as they do not alter  $H_0$ . The difficulty in finding a resolution could be an indicator that a single solution is not sufficient to resolve the tensions. Here we investigate how merging compatible models can address both  $H_0$  and  $S_8$  simultaneously, in particular, EDE + DDM where EDE raises  $H_0$  and DDM controls the growth of structure.

**Author:** CLARK, Steven (Brown University)

**Presenter:** CLARK, Steven (Brown University)

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