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Unraveling Inconsistencies in the Standard Λ CDM Model

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The standard Lambda Cold Dark Matter cosmological model has been incredibly successful in explaining a wide range of observational data, from the cosmic microwave background radiation to the large-scale structure of the universe. However, recent observations have revealed a number of inconsistencies among the model's key cosmological parameters, which have different levels of statistical significance. These include discrepancies in measurements of the Hubble constant, the S_8 tension, and the CMB tension. While some of these inconsistencies could be due to systematic errors, the persistence of such tensions across various probes suggests a potential failure of the canonical Λ CDM model. In this seminar, I will examine these inconsistencies and discuss possible explanations, including modifications to the standard model, that could potentially alleviate them. However, I will also discuss the limitations of these proposed solutions and note that none of them have successfully resolved the discrepancies. I will highlight the need for further investigation into these unresolved tensions and the potential for new physics beyond the standard model to provide a more complete understanding of the universe.

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