Contribution ID: **37** Type: **Talk**

New early dark energy and its equation of state

Wednesday 12 March 2025 16:00 (20 minutes)

The Hubble Tension is the discrepancy between the measured value of the Hubble parameter H_0 and its ΛCDM model prediction using CMB data. New Early Dark Energy (NEDE) addresses this tension using a triggered phase transition in the dark sector. In this work we constrain the properties of NEDE using recent CMB and supernovae datasets, as well as the new BAO data from the DESI survey. We study the equation of state parameter, characterizing the post-phase transition fluid, allowing it to evolve in time. Our results indicate that data is compatible with a simple time dependence that could arise from a mixture of radiation and a stiff fluid. Our model shows a significant reduction of the tension down to below 3σ.

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Session Classification: Contributed talks