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Constraining the phantom dynamical dark energy model and smoothing the Hubble tension.

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The discrepancy between Planck data and direct measurements of the current expansion rate H_0 has become one of the most intriguing puzzles in cosmology nowadays. The H_0 tension has reached 5σ in the context of standard cosmology i.e ΛCDM. Therefore, explanations to this issue are mandatory to unveil its secrets. Despite its success, ΛCDM is unable to give a satisfying explanation to the tension problem. Unless some systematic errors are hidden in the observable measurements, physics beyond the standard model of cosmology must be advocated. In this perspective, we study a phantom dynamical dark energy model as an alternative to ΛCDM in order to explain the aforementioned issues. This phantom model is characterised by one extra parameter, $\Omega_{\rm pdde}$, compared to ΛCDM. We obtain a strong positive correlation between H_0 and $\Omega_{\rm pdde}$, for all data combinations. Using Planck18 measurements together with BAO and Pantheon, we find that the H_0 is 3.4σ. By introducing a prior on the absolute magnitude, $M_{\rm B}$, of the SN Ia, the H_0 tension decreases to 2.49σ with $H_0 = 69.7^{+0.83}_{-0.86}$ km s^{-1} Mpc^{-1}.

Primary author: Ms DAHMANI, Safae (Mohammed I University)

Co-authors: Dr BOUALI, Amine (Mohammed I University, Oujda, Morocco); Prof. EL BOJADDAINI, Imad (Mohammed I University, Oujda, Morocco); Prof. ERRAHMANI, Ahmed (Mohammed I University, Oujda, Morocco); Prof. OUALI, Taoufik (Mohammed I University, Oujda, Morocco)

Presenter: Ms DAHMANI, Safae (Mohammed I University)

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