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Dark energy and dark matter unification from dynamical space time: observational constraints and cosmological implications

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A recently proposed Dynamical Space-time Cosmology (DSC) that unifies dark energy and dark matter is studied. The general action of this scenario includes a Lagrange multiplier, which is coupled to the energy momentum tensor and a scalar field which is different from quintessence. First for various types of potentials we implement a critical point analysis and we find solutions which lead to cosmic acceleration and under certain conditions to stable late-time attractors. Then the DSC cosmology is confronted with the latest cosmological data from low-redshift probes, namely measurements of the Hubble parameter and standard candles (Pantheon SnIa, Quasi-stellar objects). Performing an overall likelihood analysis and using the appropriate information criteria we find that the explored DSC models are in very good agreement with the data. We also find that one of the DSC models shows a small but non-zero deviation from Λ cosmology, nevertheless the confidence level is close to ~ 1.5σ

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