Astrophysics > Cosmology and Extragalactic Astrophysics

Dynamics and constraints of the dissipative Liouville cosmology

Spyros Basilakos (Athens Academy and Barcelona U.), Nick E. Mavromatos (King's Coll. London and CERN), Vasiliki A. Mitsou (Valencia U., IFIC), Manolis Plionis (Athens Observ. and INAOE, Puebla)

(Submitted on 18 Jul 2011 (v1), last revised 21 May 2012 (this version, v2))

In this article we investigate the properties of the FLRW flat cosmological models in which the cosmic expansion of the Universe is affected by a dilaton dark energy (Liouville scenario). In particular, we perform a detailed study of these models in the light of the latest cosmological data, which serves to illustrate the phenomenological viability of the new dark energy paradigm as a serious alternative to the traditional scalar field approaches. By performing a joint likelihood analysis of the recent supernovae type Ia data (SNIa), the differential ages of passively evolving galaxies, and the Baryonic Acoustic Oscillations (BAOs) traced by the Sloan Digital Sky Survey (SDSS), we put tight constraints on the main cosmological parameters. Furthermore, we study the linear matter fluctuation field of the above Liouville cosmological models. In this framework, we compare the observed growth rate of clustering measured with those predicted by the current Liouville models. Performing a chi^2 statistical test we show that the Liouville cosmological model provides growth rates that match sufficiently well with the observed growth rate. To further test the viability of the models under study, we use the Press-Schechter formalism to derive their expected redshift distribution of cluster-size halos that will be provided by future X-ray and Sunyaev-Zeldovich cluster surveys. We find that the Hubble flow differences between the Liouville and the LambdaCDM models provide a significantly different halo redshift distribution, suggesting that the models can be observationally distinguished.

Comments:	15 pages, 4 figures, 4 tables, matches version to appear in Astroparticle Physics
Subjects:	**Cosmology and Extragalactic Astrophysics (astro-ph.CO)**; General Relativity and Quantum Cosmology (gr-qc); High Energy Physics - Theory (hep-th)
Journal reference:	Astropart.Phys. 36 (2012) 7-17
DOI:	10.1016/j.astropartphys.2012.04.007
Report number:	KCL-PH-TH/2011-23; CERN-PH-TH/2011-160; LCTS/2011-09; IFIC/11-36

Cite as: arXiv:1107.3532 [astro-ph.CO]
(or arXiv:1107.3532v2 [astro-ph.CO] for this version)

Submission history

From: Vasiliki Mitsou [view email]
[v1] Mon, 18 Jul 2011 19:28:57 GMT (42kb)
[v2] Mon, 21 May 2012 21:51:45 GMT (59kb)