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# Constraints on a DE parametrization using BAO and Forecasting for future surveys

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For this work a parametrization for the Dark Energy (DE) equation of state is proposed and tested.

We derive constraints on our state equation parameters from the baryon acoustic oscillation (BAO) measurements. In particular we take advantage of high precision BAO measurements from galaxy clustering and the Lymann-$\alpha$ forest in the SDSS-III Baryon Oscillation Spectroscopic Survey (BOSS).

Our analysis lead us to propose a DE fluid featuring a transition from a high redshift value of $w_i(z \gg 0)$= -0.96 to a $w_0$=-0.93 value at $z = 0$. The transition redshift is constrained to be as high as $z_T$ = 1.83.

We find a good agreement of our model to the data, having a $\chi^2_{red} = 1.03$.

Given the upmost importance of designing the future DE experiments (such as DESI) we provide a simple statistical analysis to forecast the required reduction in observational errors to distinguish between a Cosmological constant scenario and a time evolving DE model. Specifically we find that a reduction of 11% on the associated errors to $r_{BAO}(z)$ observational measurements is enough to exclude a cosmological constant at $1\sigma$ of statistical significance in favor to our model and a 41% reduction would exclude the cosmological constant at $2\sigma$ level.

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