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Cosmology with strong gravitational lensing systems

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In the era of massive galactic surveys, strong gravitational lensing systems have entered a stage in which we observe their growing significance in astrophysics and cosmology.

In our work we present a catalog of 118 strong gravitational lensing systems built on SLACS, BELLS, LSD and SL2S samples and we use them to demonstrate that strong lensing data provide a good quality tool for constraining the values of cosmological parameters in dark energy equation of state. We focused ourselves on two cosmological scenarios explaining observed present accelerating expansion of the Universe - Λ CDM cosmology where dark energy is represented by an unknown kind of fluid with barotropic equation of state in which: i) w parameter has a constant value and ii) w parameter is allowed to evolve with redshift according to CPL parametrization ($w(z) = w_0 + w_1 * (z/(1+z))$). In our work we assume two models of mass distribution in lensing galaxies: SIS model with isothermal profile and more general one with arbitrary power-law index g (allowing it also to evolve with redshift $g(z)$).

Our results are in agreement both with w and g values obtained by other authors and also shows a trend of being complementary to latest supernova Ia data.

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