

Studying Luminous Red Galaxies to probe $H(z)$ at high redshift

A. Ratsimbazafy¹, C. Cress^{1,2}, S. Crawford³ and SCALPEL team

¹Physics Dept, University of the Western Cape, Private Bag X17, Cape Town 7535, South Africa

email: raljha.a@gmail.com

²Centre of High Performance Computing, 15 Lower Hope St. Cape Town 7700, South Africa

³South African Astronomical Observatory, PO box 9, Cape Town 7935, South Africa

Abstract. Luminous Red Galaxies (LRGs) have old, red stellar populations often interpreted as evidence of a formation scenario in which these galaxies form in a single intense burst of star formation at high redshift. By measuring the average age of LRGs at two different redshifts, one can potentially measure the redshift interval corresponding to a time interval and thus measure the Hubble parameter $H(z) \approx -(1+z)^{-1} \Delta z / \Delta t$ (as in Jimenez & Loeb). The goal of this project is to measure directly the expansion rate of the universe at the redshift range $0.1 < z < 1.0$ within 3% precision. We explore the age-dating of Sloan Digital Sky Survey LRGs using the stellar population models of Lick absorption line indices after stacking spectra in redshift bins to increase the signal-to-noise. We also use the method of full spectral fitting to measure the ages of LRGs observed with the Southern Africa Large Telescope (SALT).

Keywords. galaxies: evolution , cosmology: cosmological parameters , cosmology: observations

Below, we show one of the SALT spectra of an LRG at $z = 0.40$ which we will use, along with many other LRG spectra at $z = 0.4$ and $z = 0.55$ to calculate Δt associated with $\Delta z = 0.15$ at $z_{av} \approx 0.47$. See Crawford *et al.* (2010) for more details.

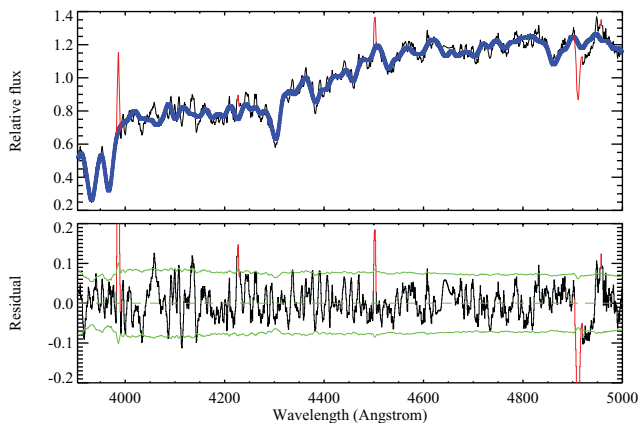


Figure 1. Preliminary result: Full spectrum fitting of SALT LRG at $z = 0.40$ using Ulyss package (Vazdekis models, Miles library). The thin black line is the observed SALT spectrum, the thick blue line is the best fit. Age = 8.165 ± 1.897 Gyr.

References

- Crawford, S., Ratsimbazafy, A., Cress, C., *et al.* 2010, *MNRAS*, 406, 2569
Jimenez & Loeb 2002, *ApJ*, 573, 37