Supervisor: **Dr Khadija EL Bouchefry**
Institution: **Hartebeesthoek Radio Astronomy Observatory**
Contact details: khadija @hartrao.ac.za
Hartebeesthoek Radio Astronomy Observatory
P.O Box 443, Krugersdorp 1740, Gauten, South Africa

Improving Photometric Redshift Estimation Techniques

The determination of photometric redshifts is essential for many subjects in cosmology and extragalactic astronomy, like the large scale structure of the Universe, gravitational lensing, or galaxy evolution. With the development of the photometric redshift determination techniques approximate redshifts became available for all galaxies in a photometric multi-band survey, without having to do time-consuming spectroscopic follow-up observations.

The photometric redshift technique is a template matching algorithm, that follows Bayesian statistics. In principle, it compares an object's observed fluxes in the different passbands with a set of template spectral energy distributions (SED), that are redshifted and convolved with the respective filter transmission curves. These template SEDs can either be fully, or semi-empirical, or can be derived from models. The algorithm itself yields a probability distribution as a function of template spectrum and redshift.

However, photometrically determined redshifts possess larger errors than spectroscopically determined ones. The accuracy of the photometric redshift determination is typically worse than the spectroscopic one by more than two orders of magnitude. Thus, the photometric redshift errors correspond to roughly 50 times the typical velocity dispersion of bound structures, like galaxy groups or clusters.

In this project we will use photometric and spectroscopic data of Luminous Red Galaxies from the Sloan Digital Sky Survey Twelfth Data Release DR12 in order to analyse the precision of the Photometrci redshift calculated using a number of publicly available Phot_Z_codes (i.e. Hyperz, ANNZ, Le Phare, BPZ, EASY, Zebra). We will also use the

Virtual Observatory tools to compile many large astronomical catalogs for simple and quick cross matching based on coordinates with results from other surveys. This will allow us to identify how reliable codes are relative to each other if used as described in their public release.