Constraining galaxy assembly bias with galaxy-galaxy measurements of Sloan Digital Sky Survey

ABSTRACT

1. Introduction

Throughout this paper, unless stated otherwise, all radii and densities are in comoving units. Standard flat λCDM is assumed, and all cosmological parameters are set to the planck 2015 best-fit estimates.

2. Galaxy assembly bias

The assumption that galaxies reside dark matter halos is the bedrock of the modern cosmology and large-scale structure formation theories. One of the most powerfuls model for descibing the galaxy-halo connection is the halo occupation modeling. The underlying assumption of the traditional HOD modeling is that the halo mass alone is sufficient in determining the population of halos. Despite its simplifying assumption, this model has ben widely used in fitting the measurements of galaxy clustering an galaxy-galaxy lensing.

3. Galaxy-Galaxy Lensing

In galaxy-galaxy lensing, the connection between dark matter and galaxies is probed by measuring the cross correlation between the two. In particular, one can define the galaxy-matter cross correlation as the ensemble average of the product of galaxy over densities and matter overdensities

$$\xi_{gm}(r) = \langle \delta_g(\vec{x}) \delta_m(\vec{x} + \vec{r}) \rangle, \tag{1}$$

where δ_g and δ_m are overdensities of matter and galaxies respectively and we have assumed the cross-corrlation depends only on the radial separation due to isotropy in distribution of matter and galaxies.

This cross correlation can be related to the azimuthally-averaged projected surface density of the gravitational lenses,

$$\begin{aligned}\Sigma(R) &= \bar{\rho}_m(z)\int_0^\infty [1+\xi_{gm}(\sqrt{\chi^2+R^2})]\, d\chi \\ &= 2\bar{\rho}_m(z)\int_R^\infty [1+\xi_{gm}(r)]\, \frac{rdr}{\sqrt{r^2-R^2}}.\end{aligned} \tag{2}$$

4. Concentration-dependence of galaxy-halo connection

5. Method

6. SDSS measurements

7. Results

8. Discussion

REFERENCES