The Clustering Properties of High-Redshift Galaxies in the GOODS

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Introduction

The GEMS Observatories with Deep Surveys includes both very deep ACS multicolor images that are set relatively near 1-arcsec (~0.08 sq. degrees) as well as relatively deep but still very deep in-frame lensing, and multi-color for images (over a larger area) ~0.5 sq. degree each.

This dataset is very useful for studying clustering of high-redshift galaxies in a wide range of their luminosity distribution. There is considerable interest in understanding the relationship between the clustering properties of forming galaxies and their other properties, such as luminosity, size, and morphology. In particular, we have measured the mass distribution using the GOODS deep field (Giavalisco & Dickinson, 2000; Penter et al., 2001).

Here we present a preliminary measurement of the angular correlation function of the lens and faint z = 3 and z = 4 Lyman break galaxies (UB and field drops) and the implied value of the mean correlation length, obtained via Lima de projection.

The Data Set

The data consists of two samples of Lyman break galaxies, one from each field drop and one from the field drop. The field drop was observed using the Hubble Deep Field North (HDF-N) survey around the GOODS north field, which is a

If the spatial correlation function is approximated by the usual power law

\[ \xi(l) = A_l (\ell/a_l)^{-\gamma} \times f(l) \]

where \( \ell \) is the angular length, the amplitudes of the two power laws are related by the Luminaria setting laws:

\[ A_l = C_l \frac{f(x)}{f(x)} \times \ell^{\gamma} N_l^{\gamma} \]

Here \( f(x) \) is a function of the cosmology, \( \gamma = 1 + \beta \), and \( D_l \) is the angular moment of the distribution.

\[ f(x) = \frac{1}{2} \left( 1 + \frac{1}{2} \left( 1 + \frac{1}{2} \left( 1 + \frac{1}{2} \right) \right) \right) \]

Finally, \( A_l \) is the redshift distribution function, an essential element in this analysis.

<table>
<thead>
<tr>
<th>( \gamma )</th>
<th>( A_l ) (arcsec)</th>
<th>( a_l ) (converting Mpc/h)</th>
</tr>
</thead>
<tbody>
<tr>
<td>U-band drop 25.0</td>
<td>1.7 ± 0.0</td>
<td>3.0 ± 0.4</td>
</tr>
<tr>
<td>B-band drop 25.0</td>
<td>1.7 ± 0.0</td>
<td>3.0 ± 0.4</td>
</tr>
<tr>
<td>U-band drop 26.0</td>
<td>1.7 ± 0.0</td>
<td>3.1 ± 0.6</td>
</tr>
<tr>
<td>B-band drop 26.0</td>
<td>1.7 ± 0.0</td>
<td>3.0 ± 0.4</td>
</tr>
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</table>

Table 1. The measured properties of the power-law form the angular correlation function of the two samples together with the derived spatial correlation length.
4. Discussion.

These observations, even if preliminary, provide additional evidence that high surface mass density is strong evidence for the presence of multiple UV lines. It is clear from the data that the UV lines are not likely to be associated with the presence of dust, but rather with the presence of gas. These observations provide support for the hypothesis that the UV lines are produced by the presence of gas and not dust. The observations also indicate that the UV lines are not confined to the central region of galaxies, but rather are distributed throughout the galaxy. This suggests that the UV lines are produced by the presence of gas and not dust.

Figure 1. The angular correlation function of the UV band drops as a function of galaxy surface mass density. The data points are shown as black circles, and the best-fit power law is shown as a red line. The correlation function is well described by a power law, indicating that the UV lines are produced by the presence of gas and not dust.

Figure 2. The angular correlation function of the UV band drops as a function of galaxy surface mass density. The data points are shown as black circles, and the best-fit power law is shown as a red line. The correlation function is well described by a power law, indicating that the UV lines are produced by the presence of gas and not dust.

Figure 3. The angular correlation function of the UV band drops as a function of galaxy surface mass density. The data points are shown as black circles, and the best-fit power law is shown as a red line. The correlation function is well described by a power law, indicating that the UV lines are produced by the presence of gas and not dust.

References


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Steidel, C., Adelberger, K., Dickinson, M., Giavalisco, M., Pettini, M., & Kellogg, M. 1999,