The numbers of z~2 star-forming and passive galaxies in 2.5 square degrees of deep CFHT imaging

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submitted to MNRAS
CFHT UM 2013
Why are we doing this?

http://www.mpa-garching.mpg.de/

Hopkins and Beacom 2006
Color-Color Selection Techniques

Lyman Break Galaxy (Steidel et al. 1996, 2003)

Extremely Red Objects (Lockwood, 1970, Thompson et al., 1999)

$BzK_s$ Selection Criteria (Daddi et al., 2004)

The $BzK_s$ Selection is a selection criteria able to select and distinguish between Star-Forming and Passive Galaxies at $z \sim 2$
Data: CFHTLS and WIRDS

**CFHTLS Deep fields**

- **D1** - 1 x 1 square degree
  *In W1*

- **D2** - 1 x 1 square degree
  10:00:28 02:12:30 2000
  *On the COSMOS/ACS survey field*

- **D3** - 1 x 1 square degree
  *In W3*

- **D4** - 1 x 1 square degree
  *Around the quasar LBQ52212-17*
The BzK$_{s}$ Selection Criteria

From BzK<sub>S</sub> to gzK<sub>S</sub>

**BzK<sub>S</sub> Selection**
- **Model SF-Galaxies**
  - a. GALAXEV Library.
  - b. CSF models with ages between 10<sup>-3</sup> and 2 Gyr.
  - c. E(B-V)=0,0.3,0.6

**gzK<sub>S</sub> Selection**

**Model PE-Galaxies**
- a. GALAXEV Library.
- b. SSP models with ages between 0.1 and 2 Gyr.
- c. E(B-V)=0
gzHK<sub>s</sub> Selection

a. g-band not deep enough.

b. Black arrows in the star-forming region could actually be passive galaxies
gzHK$_s$ Selection

\[ zHK_s \quad 1.4 \leq z \leq 2.5 \quad (z-K_s) > 2.55 \]

CFHTLS D3 zHK$_s$ [K$_s$ < 23.5] (z-K$_s$) > 2.55
Our results in numbers

<table>
<thead>
<tr>
<th>Field</th>
<th>Effective Area [deg$^2$]</th>
<th>$E(B-V)$</th>
<th>All objects</th>
<th>gzHK</th>
<th>PE-gzHK</th>
<th>SF-gzHK</th>
</tr>
</thead>
<tbody>
<tr>
<td>D1</td>
<td>0.68</td>
<td>0.0254</td>
<td>55,256</td>
<td>11,258–12,281</td>
<td>1,382</td>
<td>9,972–11,004</td>
</tr>
<tr>
<td>D2</td>
<td>0.89</td>
<td>0.0162</td>
<td>87,206</td>
<td>12,238–15,222</td>
<td>1,739</td>
<td>10,880–13,835</td>
</tr>
<tr>
<td>D3</td>
<td>0.45</td>
<td>0.0072</td>
<td>37,380</td>
<td>7,046–7,668</td>
<td>841</td>
<td>6,223–6,845</td>
</tr>
<tr>
<td>D4</td>
<td>0.45</td>
<td>0.0275</td>
<td>38,461</td>
<td>7,312–8,168</td>
<td>1,013</td>
<td>6,361–7,226</td>
</tr>
</tbody>
</table>

Total Effective Area $\sim 2.5$ deg$^2$

Four independent lines of sight

$\sim 40,000$ High-z Galaxies out of which $\sim 5000$ Passive Galaxies
$z \sim 2$ Galaxy Number counts from CFHT and previous results

- How many galaxies in 1 deg$^2$/0.5 mag.
- Our results are consistent with those of previous surveys.
- We have better statistics.
- Variations from field-to-field: Cosmic Variance
Galaxy Number counts from CFHT and previous results

• Results are also consistent.
• We observe a peak AND a turnover.
• Consistent with downsizing.
$z \sim 2$ Luminosity Function
$z \sim 2$ Stellar Mass Functions

![Graph showing the stellar mass functions for Star-Forming and Passive Galaxies at different redshifts.](image)
Mass and Environmental Quenching

• SMF at $z\sim 0$ is composed by *two* Schechter functions: Mass Quenching and Environmental Quenching.

• Mass Quenching (MQ) is more efficient at high-$z$ and for massive systems.

• Our results show the imprints of MQ at $z\sim 2$.

• At lower-$z$ EQ becomes more effective.
Summary

A. Large Sample: Estimate of how cosmic variance can influence our results.
B. Mass and Environment Quenching Scenarios.
C. Mass Quenching mechanism that may be universal and already at place at $z \sim 2$. 