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

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#### 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)



*BzK<sub>s</sub>* Selection Criteria (Daddi et al., 2004)



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



The BzK<sub>s</sub> Selection is a selection criteria able to select *and* distinguish between Star-Forming and Passive Galaxies at  $z^2$ 



# Data: CFHTLS and WIRDS





CFHTLS Deep fields	
<b>D1</b> - 1 x 1 square degree 02:25:59 -04:29:40 2000 <i>In W1</i>	
D2 - 1 x 1 square degree 10:00:28 02:12:30 2000 On the COSMOS/ACS survey field	
<b>D3</b> - 1 x 1 square degree 14:19:27 +52:40:56 2000 <i>In W3</i>	
<b>D4</b> - 1 x 1 square degree 22:15:31 -17:43:56 2000 Around the quasar LBQS2212-17	









#### The BzK<sub>s</sub> Selection Criteria



Daddi et al. 2004, Reddy et al. 2006, Kong et al. 2006, Lane et al. 2007, Blanc et al. 2008, Panella et al. 2009, Hartley et al. 2010, McCracken et al. 2010, Bielby et al. 2012

# From BzK<sub>s</sub> to gzK<sub>s</sub>



#### 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

- 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

CFHTLS D3  $gzK_s$  [K $_s$  < 23.5]



- a. g-band not deep enough.
- Black arrows in the star-forming region could actually be passive galaxies

# gzHK<sub>s</sub> Selection



# Our results in numbers

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

Total Effective Area ~ 2.5 deg<sup>2</sup>

Four independent lines of sight

~ 40 000 High-z Galaxies out of which ~ 5000 Passive Galaxies

# z~2 Galaxy Number counts from CFHT and previous results

Number Counts CFHTLS SF Galaxies D1-4 Fields



- How many galaxies in 1 deg<sup>2</sup>/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.



Number Counts CFHTLS PE Galaxies D1-4 Fields



# z~2 Luminosity Function



Luminosity Function, CFHTLS gzHK<sub>s</sub>

# z~2 Stellar Mass Functions



# Mass and Environmental Quenching

- SMF at z~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~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~2.