Study of High-redshift Galaxies Clusters in CFHTLS W2 Field: Preliminary Results

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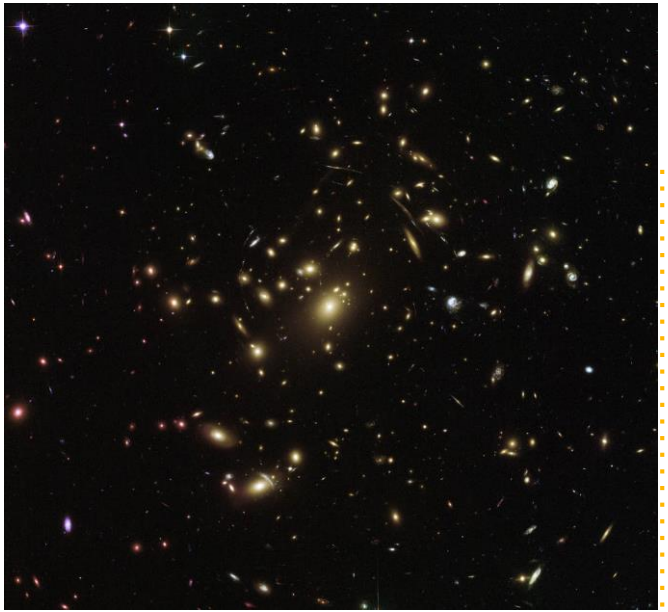
Galaxy Clusters

- Most massive gravitationally bound structures
- Part of Large Scale Structures

- Grew from fluctuation in early universe
- Indicator of Dark Matter Haloes
- Constrain Cosmological Parameters

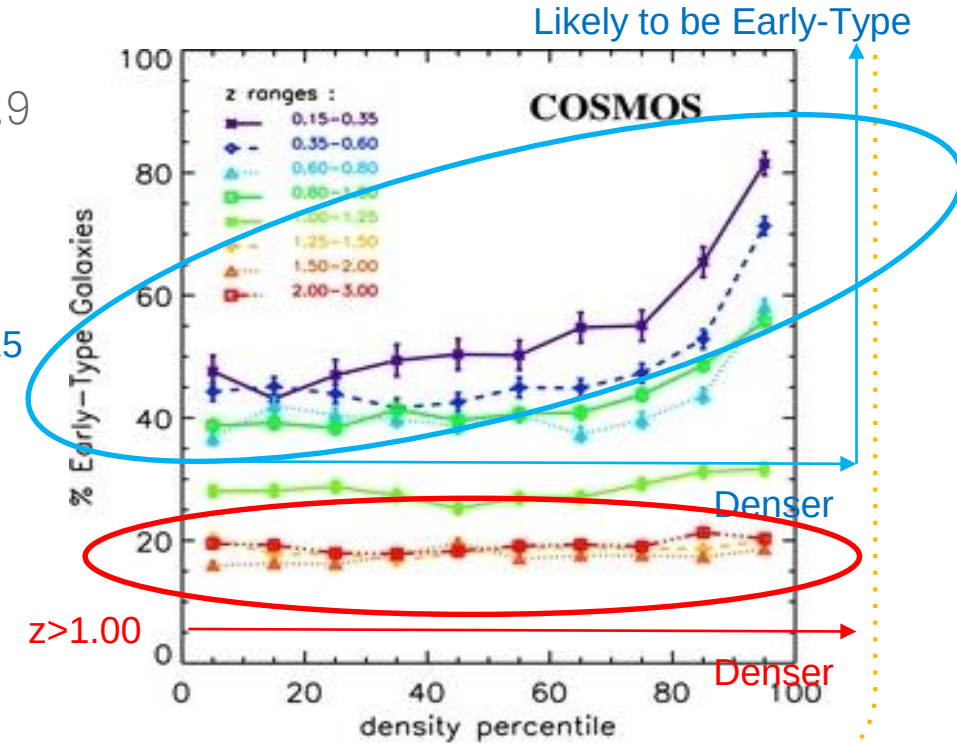
Bond, Kofman & Pogosyan 1996
Allen, Evrard & Mantz 2011
Williamson et al, 2011



Credit: ESA/Hubble/NASA

Galaxy Clusters at z~1.0

- Cosmic Star Formation peaks at z~1.9
  (Madau & Dickinson, 2014)
- In local universe,
  galaxies in dense environment: z~0.15
  more early-type galaxies
  redder, low SFR
- This trend diminished beyond z~1



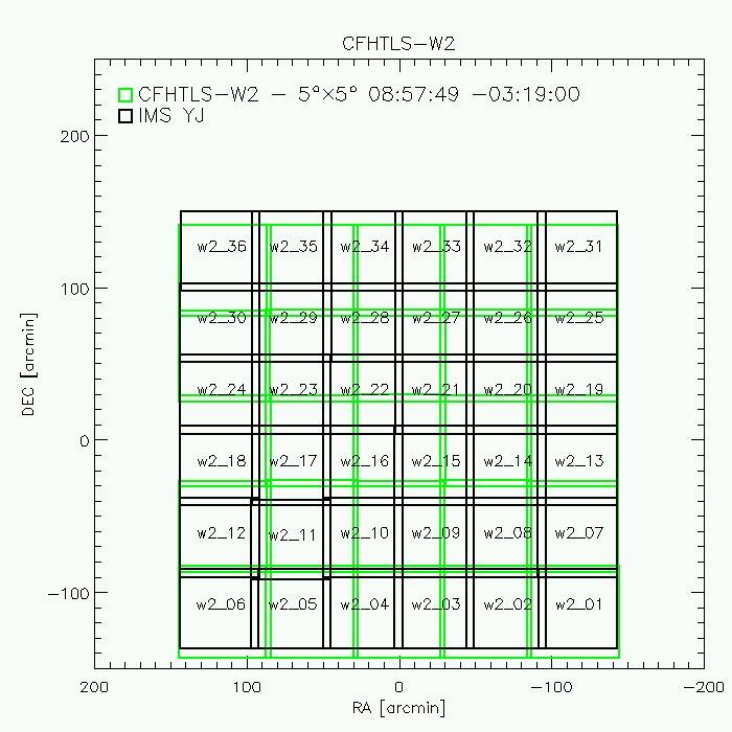
Scoville et al. 2013

CFHTLS Wide 2 Field

- Wide field 2 (5 deg × 5 deg) centered at 08:57:49,-03:19:00
- Canada-France-Hawaii Telescope Legacy Su
  MegaCam (u*, g', r', i', z')
- Infrared Medium-Deep Survey
  United Kingdom Infrared Telescope Wide Field Camera (Y,J

- At z~1; approx. 8kpc per arcsec
- Supercluster size ~100 Mpc

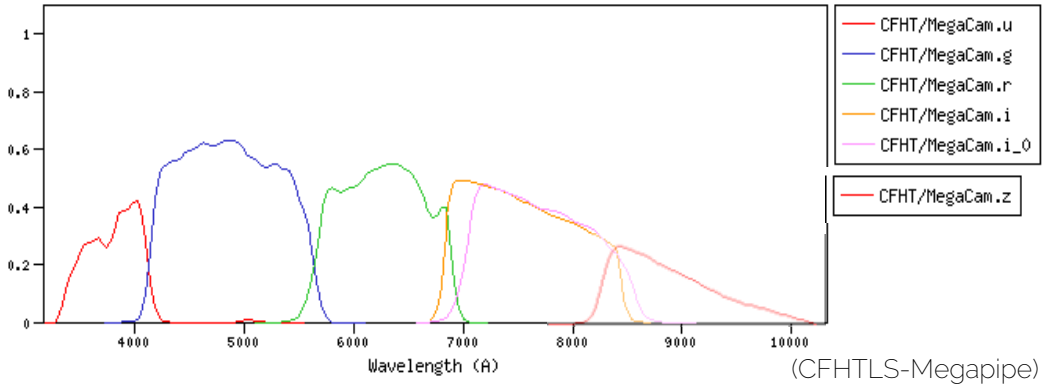
(Tully et al. 2014)



Data

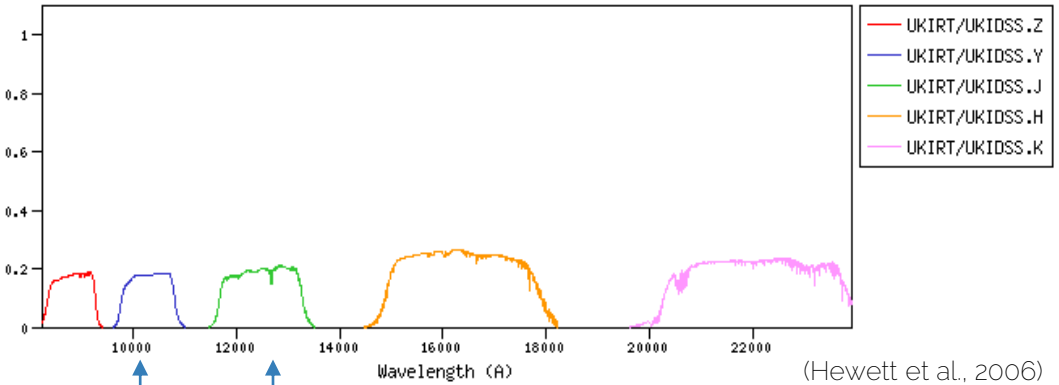
- Previous Study on CFHTLS Wide Field was limited to z<1.15
  (Durret et al., 2011, Mirkazemi et al., 2015)
- With only MegaCam Filter set photometric redshift < 1.15
  (Coupon et al., 2009)
- Near-IR data from IMS
- Higher redshift

Filter Set of CFHTLS MegaCam



(CFHTLS-Megapipe)

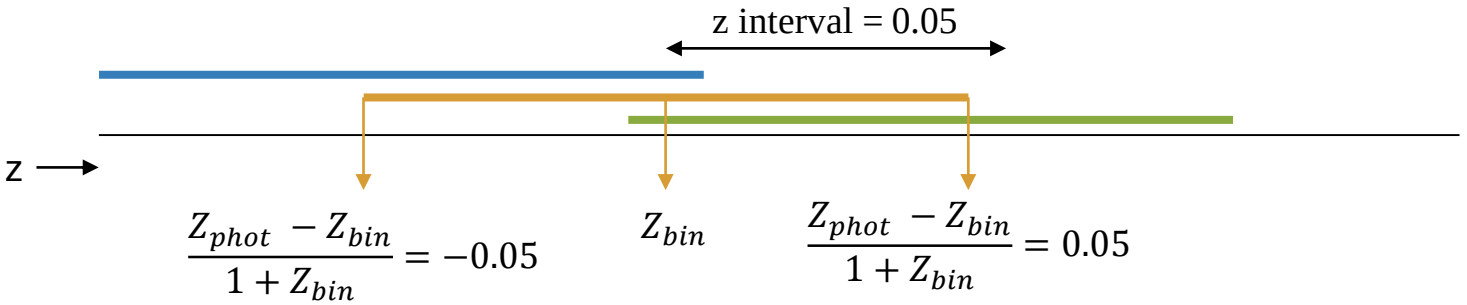
Filter Set of UKIRT WFCAM



(Hewett et al., 2006)

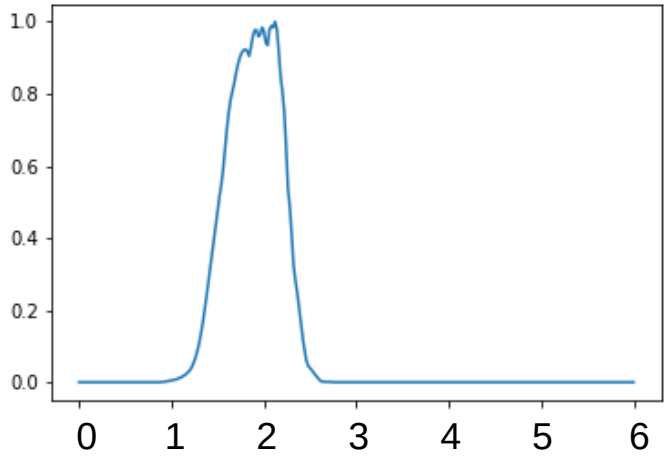
Mapping Overdensities

- Using the photometric redshift (Z_{phot}) data, the galactic sources were organized into redshift bins of 0.05 interval from z ~ 0.6 to z ~ 1.4.
- Each bin covered $\frac{|Z_{phot} - Z_{bin}|}{1+Z_{bin}} < 0.05$



Mapping Overdensities

- Each extended source in the bin was weighted by
$$w = \int_{z-0.05(1+z)}^{z+0.05(1+z)} pdf(z)dz$$
- Integrate w within 1 Mpc
- Mark the ones with weight higher than 3 σ



Cluster Candidates

- Friends of Friends method

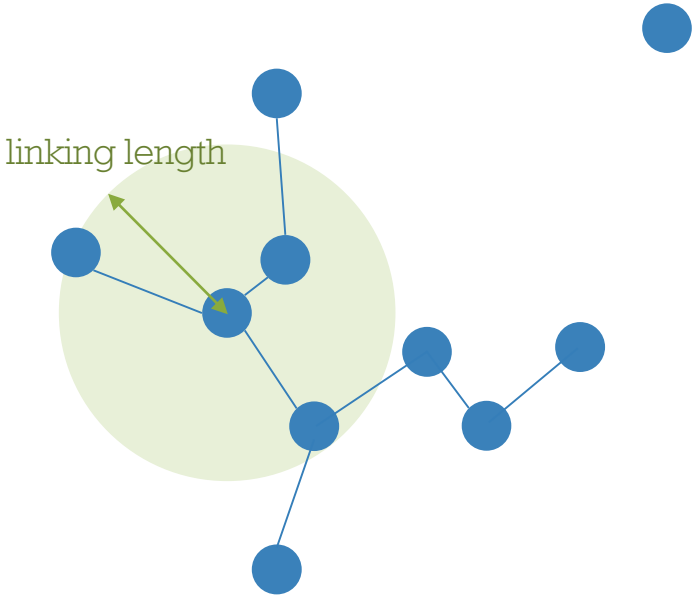
Start with a galaxy in dense region

Find galaxies within linking length
Within the distance matrix

Find ‘friend of friend’

Isolate galaxy

Repeat the process



Summary

CFHTLS(optial) + IMS(NIR) data

Photometry + Photometric Redshift

Nearby Weight Density

FoF group selection

542 Cluster Candidates Selected