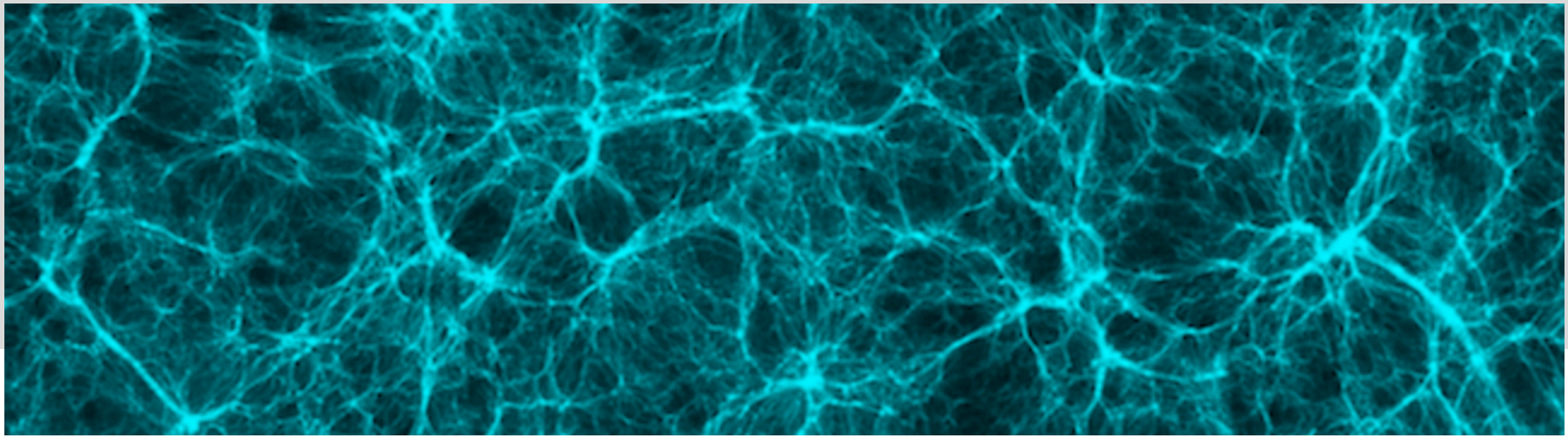
A large-scale super-structure at z=0.65 in the UKIDSS Ultra-Deep Survey field

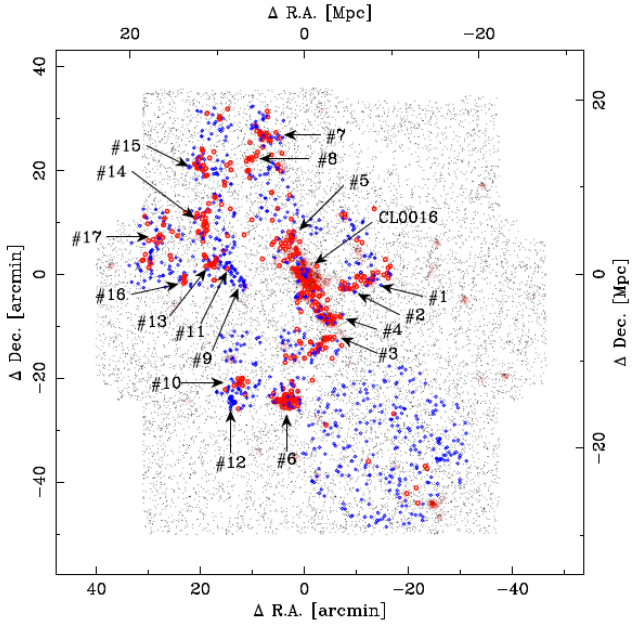


Audrey Galametz (MPE)

On behalf of CANDELS Clustering Working Group

LSS at z > 0.5

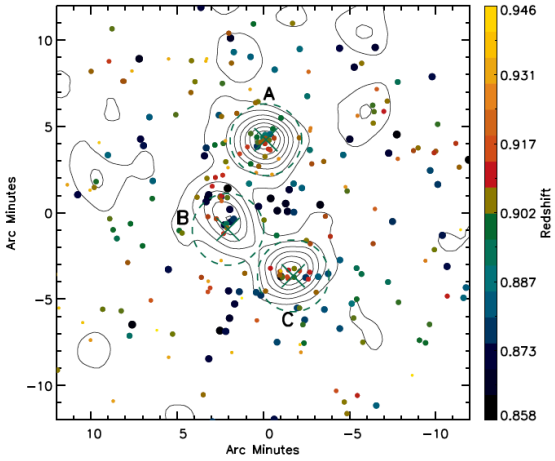
- The largest density enhancements
- Scales of 100-200 h^{-1} Mpc
- Powerful tool to constrain hierarchical formation scenarios
- Offer a wide range of densities to study environmental processes
- Few known at intermediate to high-z



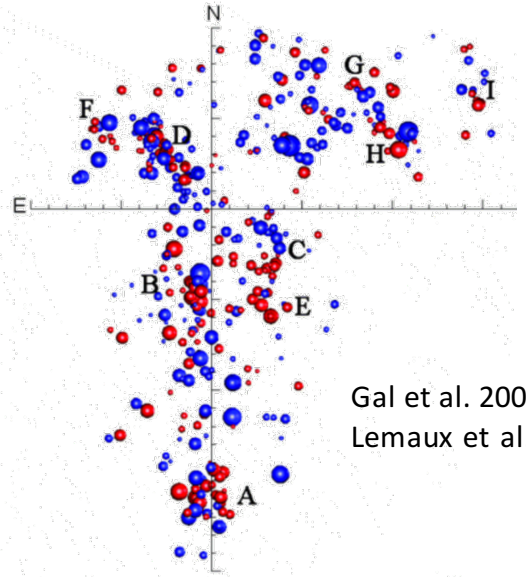
Tanaka et al. 2007, 2009

CL0016 - z=0.55 – over 30Mpc
>10 members – one with M > 10^{14} $M_{\odot}$

Gilbanx et al. 2008, Faloon et al. 2013

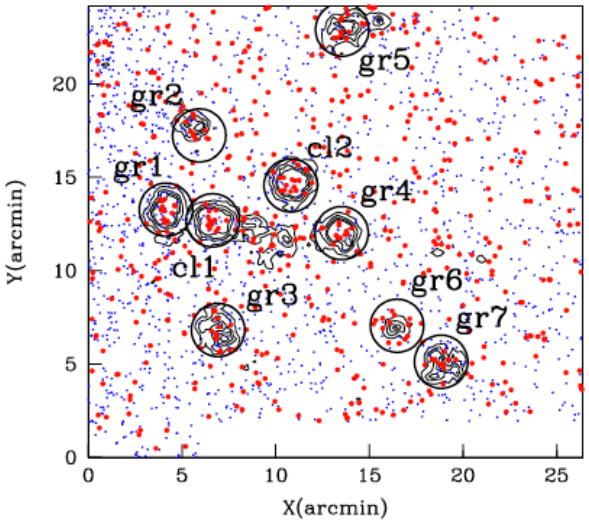


RCS2319+00
z = 0.9 – over 30 Mpc
3 X-ray-detected clusters



Gal et al. 2009
Lemaux et al. 2010

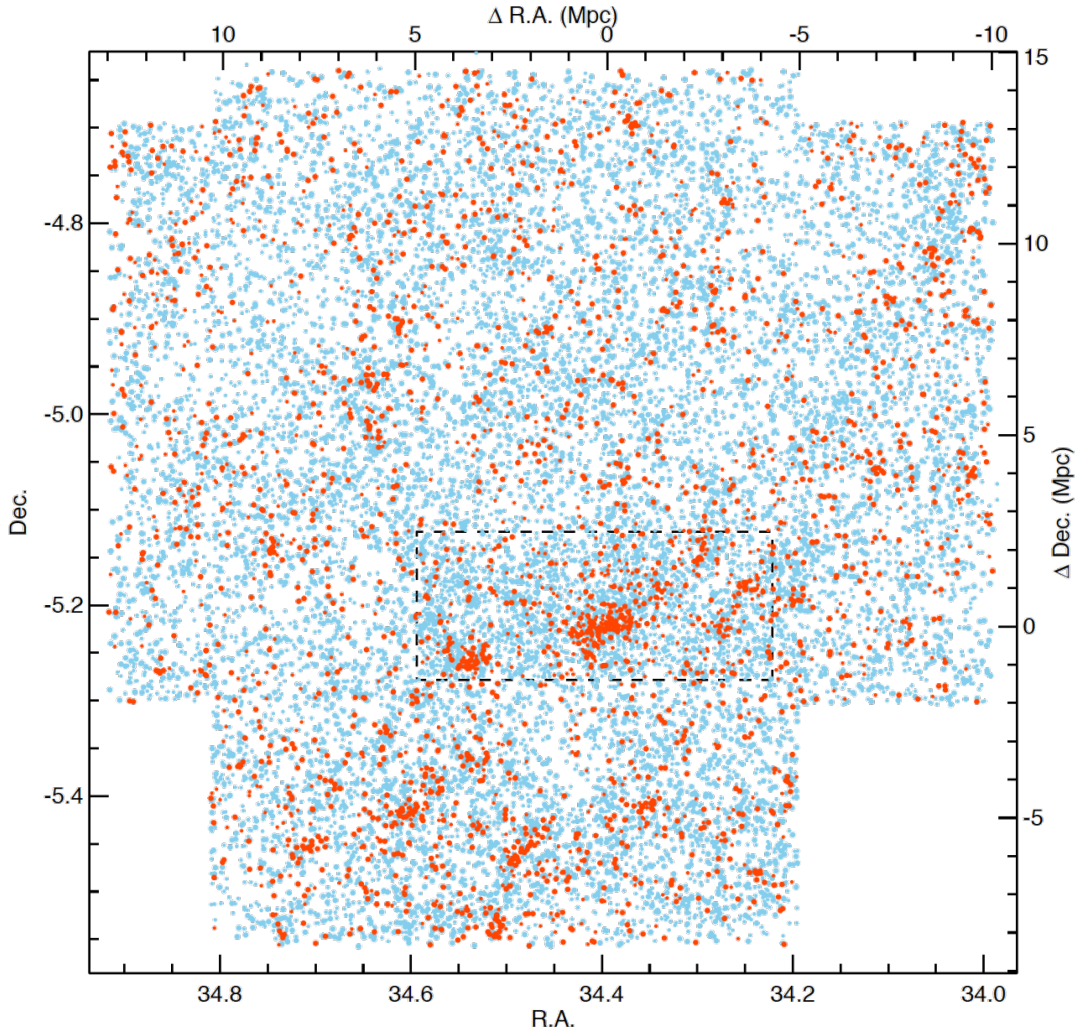
CL1604 – z ~ 0.9
8 clusters/groups – 13x100Mpc



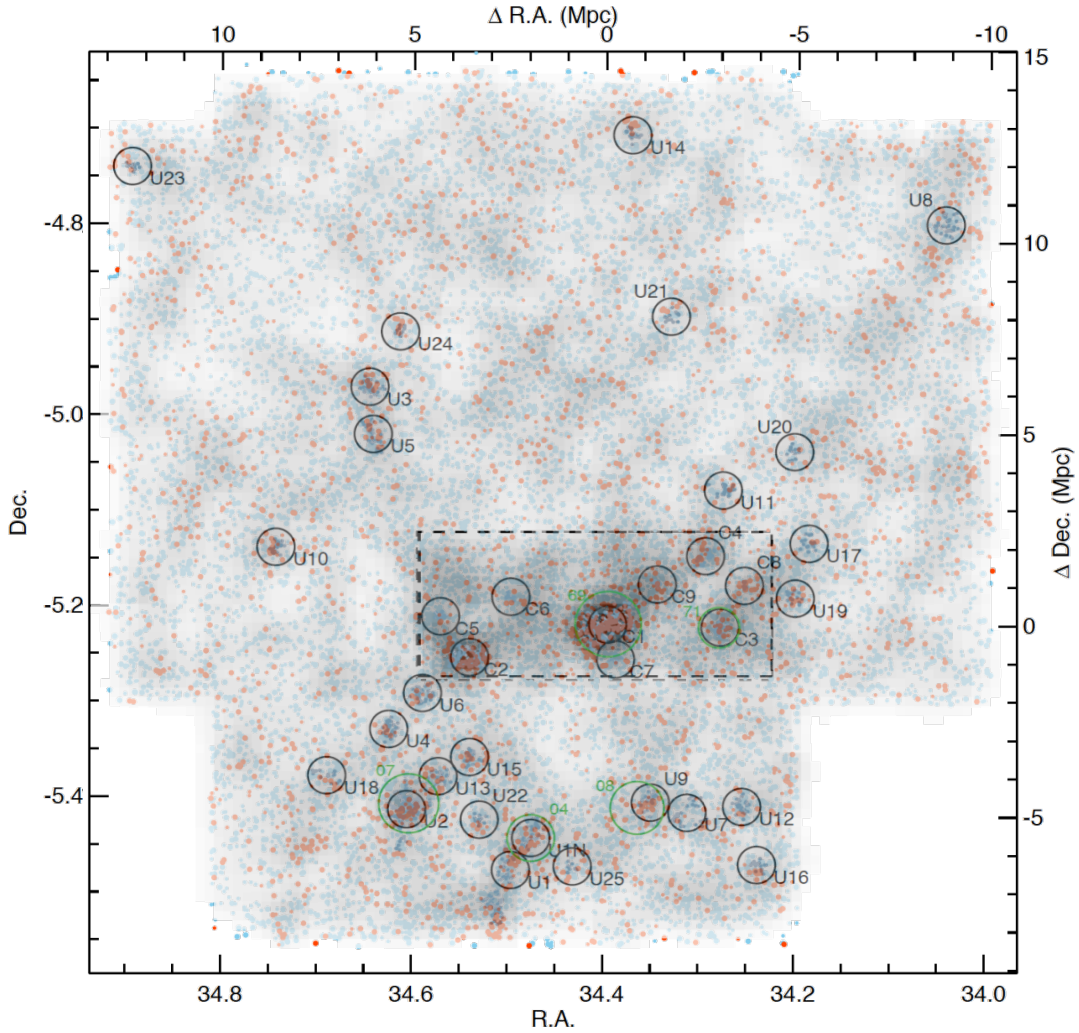
Rosati et al.1999 - Nakata et al. 2005

Lynx supercluster – z = 1.27
7 satellite groups
around the 'Lynx twins'

Overdensities at z_{phot}~0.65 in UKIDSS UDS

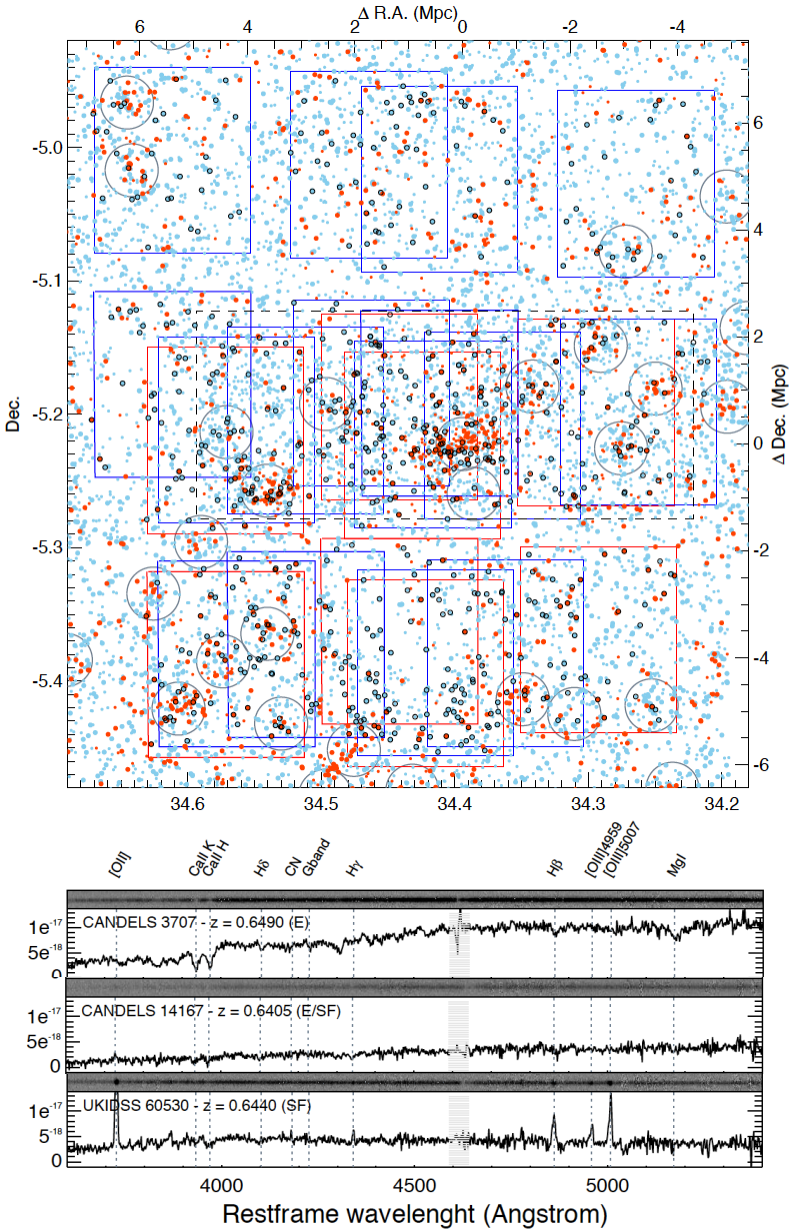


Cluster candidates at z_{phot}~0.65 in UKIDSS UDS

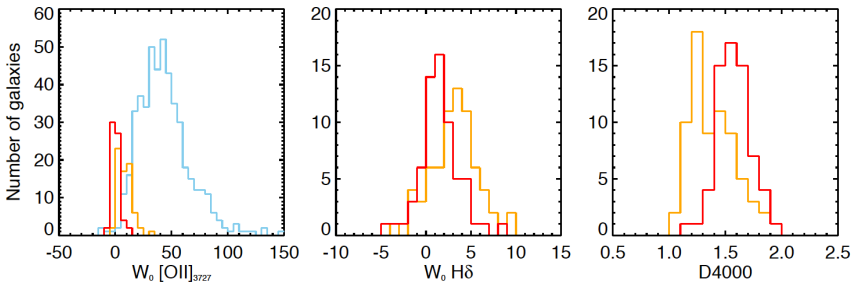


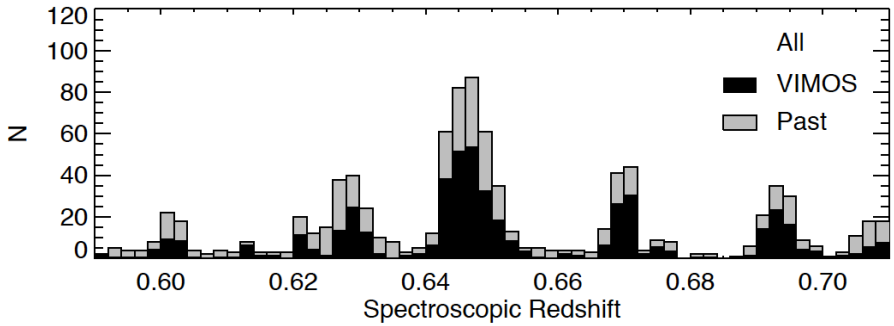
(2+1)D search for structures: 34 cluster candidates - 9 in CANDELS footprint.

Follow-up with VLT/VIMOS

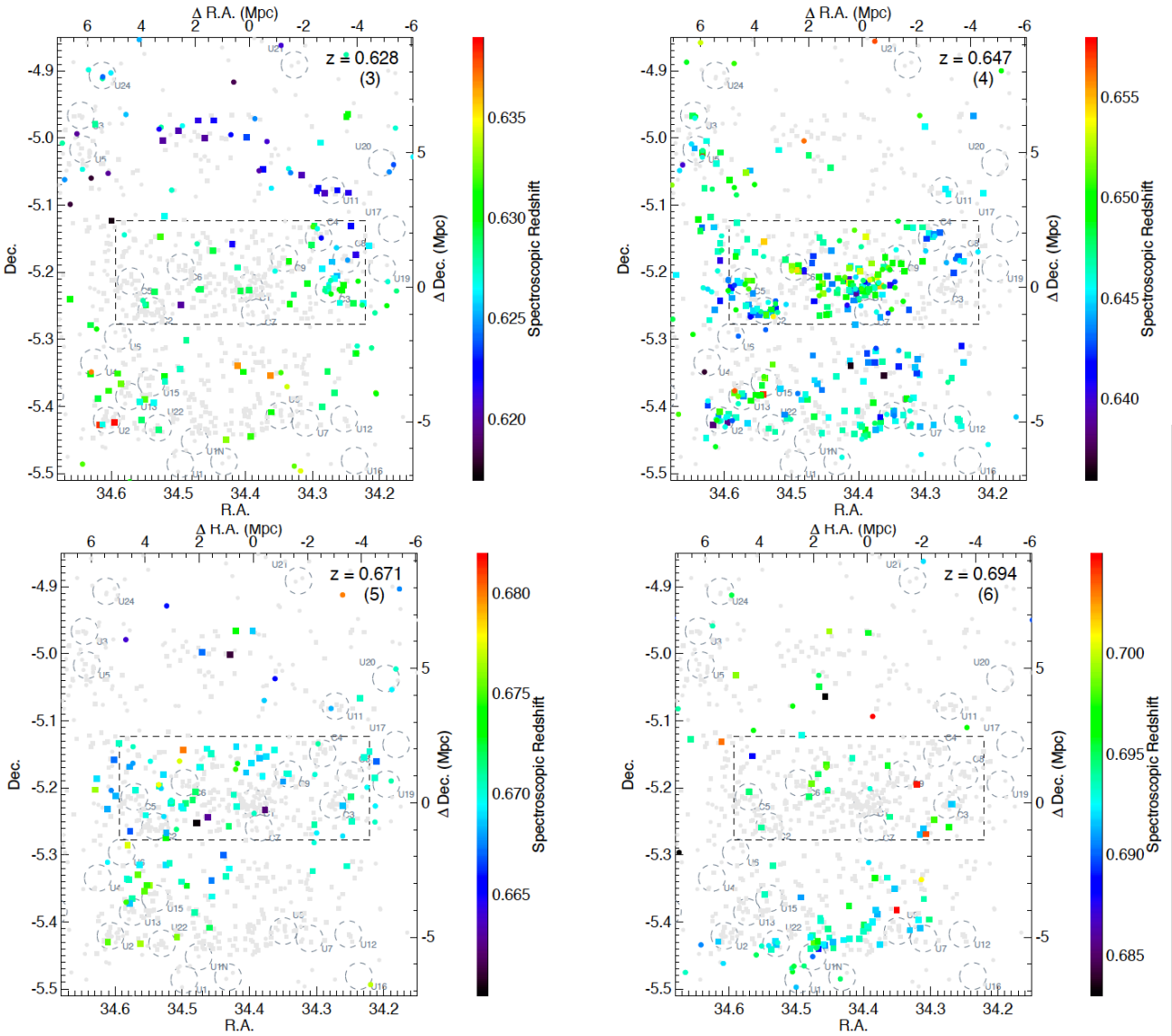


- 6 VIMOS masks
  - 2 ‘Deep’ (passive) + 4 ‘Shallow’ (SF)
  - ~ 700 targets at z_{phot} ~ 0.65
- ~ 85% Success rate
  - 625 sources with spec-z (~50 serend.)
- Galaxies classified in ‘E’, ‘E/SF’, ‘SF’ types





A large-scale structure at z~0.65



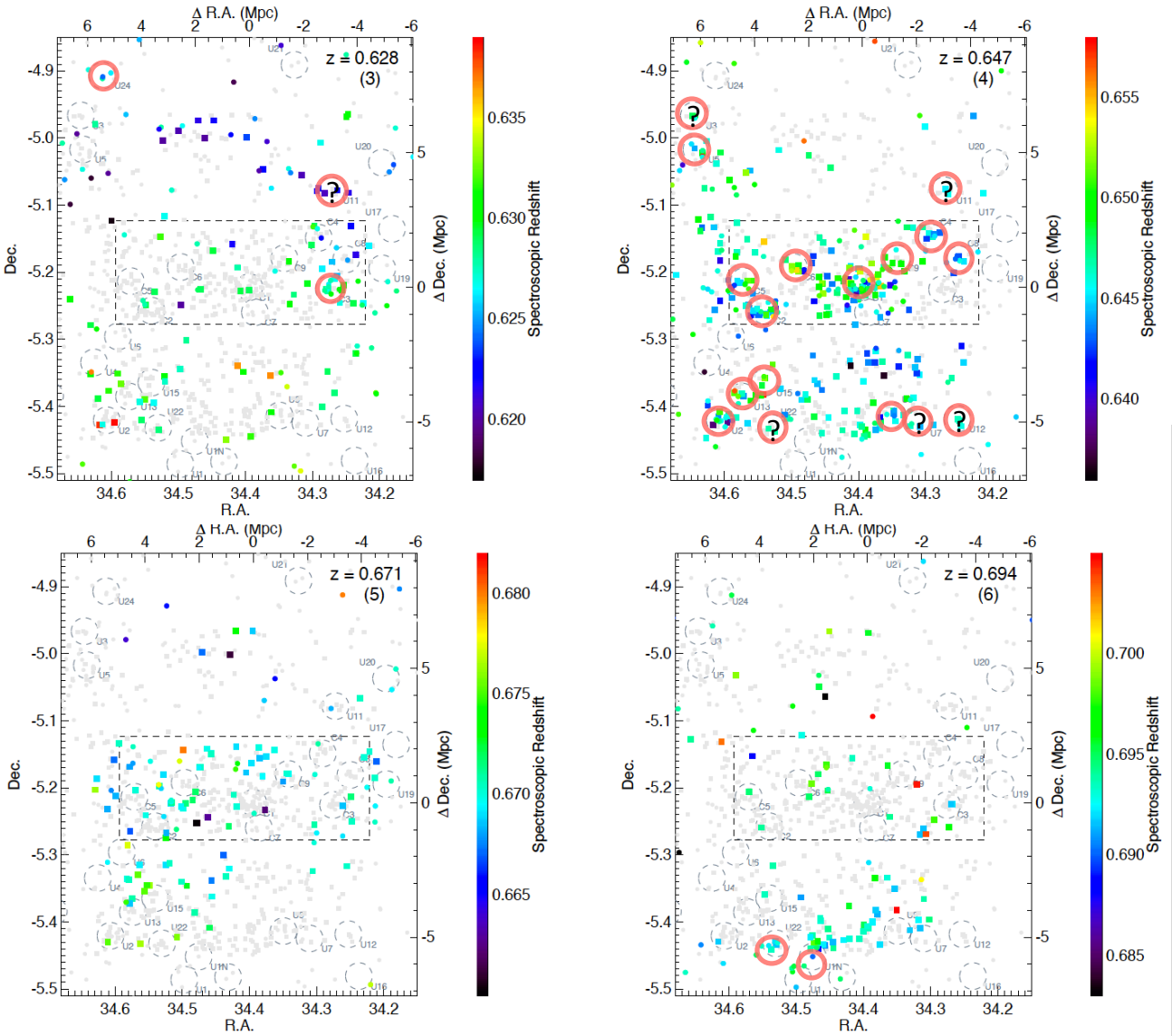
Id. (1)	Nb[a] (2)	$z_{cluster}$ (3)
C1	61	0.6470 ± 0.0004
C2	25	0.6453 ± 0.0004
C4[c]	3/3	0.643/0.646
C5	7	0.6462 ± 0.0036
C6	9	0.6508 ± 0.0052
C8[c]	4/4	0.643/0.646
C9[c]	5/3	0.649/0.669
U2	19	0.6459 ± 0.0004
U3	3	0.6476 ± 0.0014
U5[d]	9	0.6457 ± 0.0026
U7	3	0.6458 ± 0.0015
U9	10	0.6451 ± 0.0011
U11[c]	2/5	0.645/0.622
U12	3	0.6463 ± 0.0004
U13	7	0.6495 ± 0.0042
U15	5	0.6505 ± 0.0015
U21	2	0.6008 ± 0.0012
C7	3	0.6022 ± 0.0014
U24	4	0.6264 ± 0.0017
C3	14	0.6279 ± 0.0020
U1N	12	0.6937 ± 0.0007
U22[c]	6/5	0.693/0.646

Id.	σ km s^{-1}	R_{200} Mpc	M_{200} 10^{14} M$_\odot$ Carlberg et al. 1997
C1	662 ± 64	1.12 ± 0.13	3.51 ± 1.11
C2	488 ± 86	0.83 ± 0.16	1.41 ± 0.80
U2	377 ± 428	1.02 ± 0.39	0.65 ± 0.25
U9	411 ± 107	0.66 ± 0.13	0.84 ± 0.73
C3	305 ± 40	0.53 ± 0.07	0.35 ± 0.15
U1N	516 ± 126	0.87 ± 0.21	1.62 ± 1.29

3 LSS confirmed at z ~ 0.62, z ~ 0.65 and z ~ 0.69
(At least) 10 clusters/groups confirmed at z=0.65 …

… including
4 low-mass galaxy clusters

A large-scale structure at z~0.65



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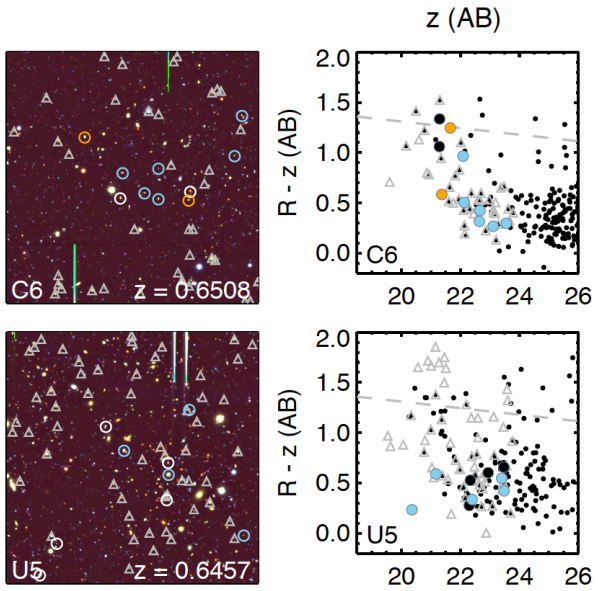
A diversity of structures

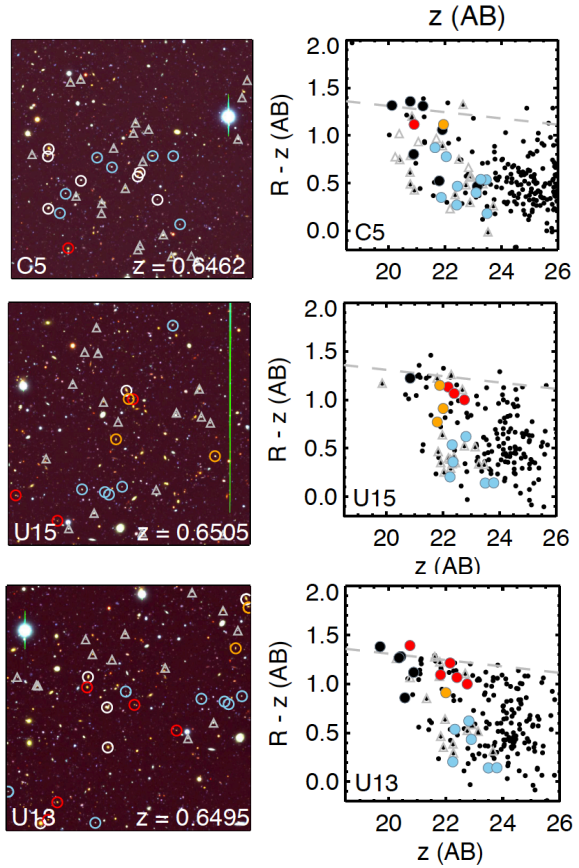
Knots in infalling filaments
Satellite SF groups



+ a large nber of the targeted groups with lower statistics

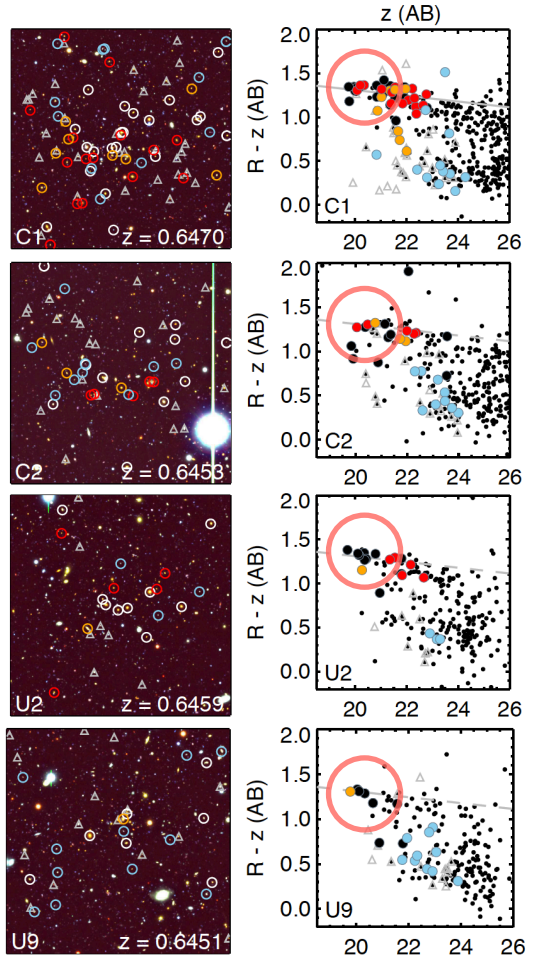
No red sequence
No core
No bright/massive galaxies

Galaxy groups



Few red sequence galaxies
Few/No bright galaxies in core
Falling in 'massive' structures

Clusters (0.8-3.5 $10^{14} M_{\odot}$)



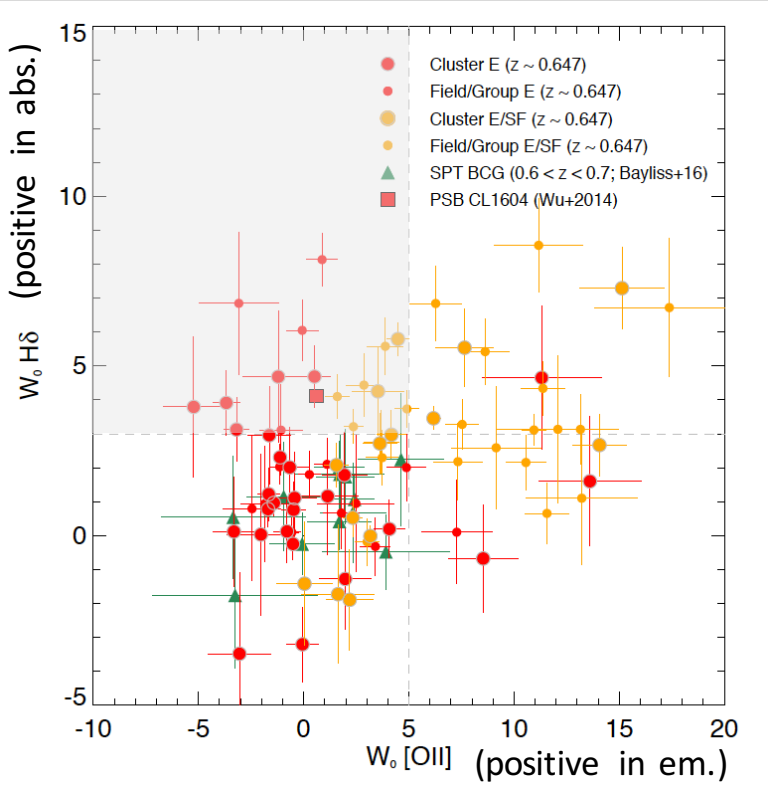
Red sequence in place
Core of bright galaxies
Spatial segregation E / SF

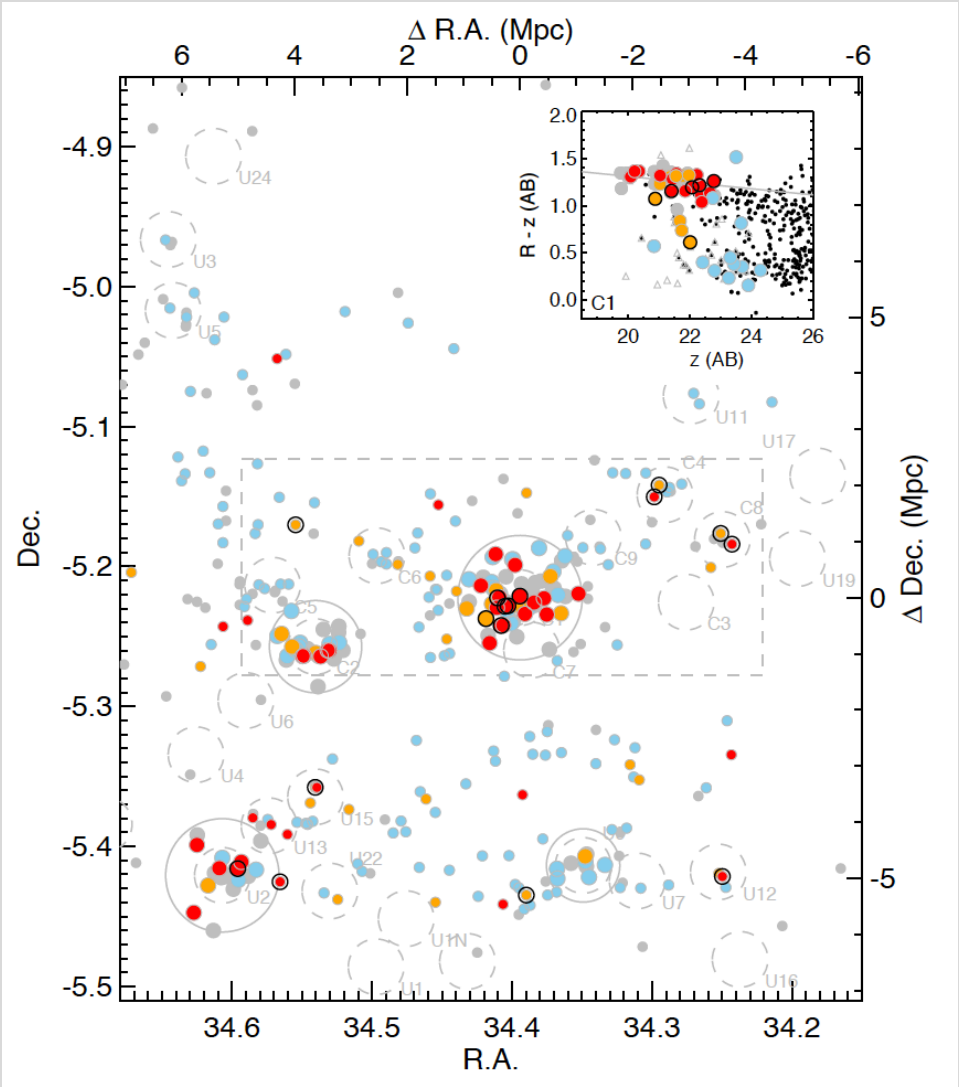
Star formation histories of core galaxies

Post-starburst galaxies

W_0 [OII] < 5Å (no on-going SF)

W_0 H_δ > 3Å (recent episode of SF)





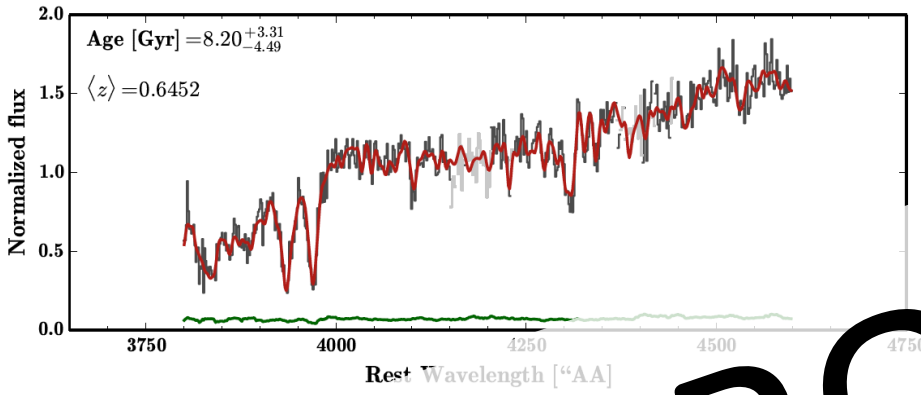
Lie well within the virial radius of clusters

No sign of mergers relics (e.g. no tidal tails)

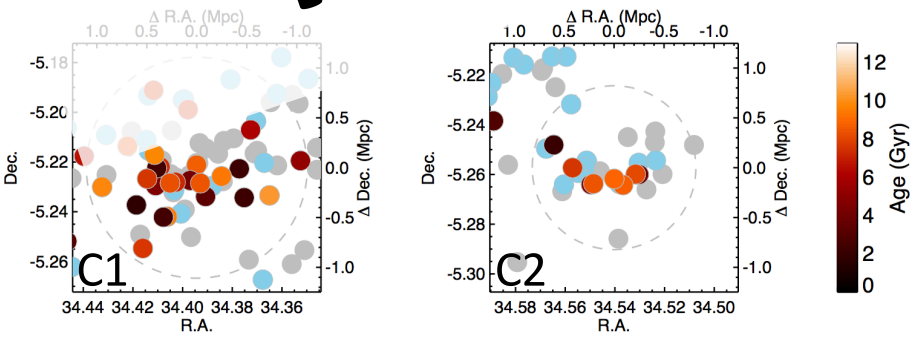
➡ Quenching due to interaction with ICM?

On-going studies

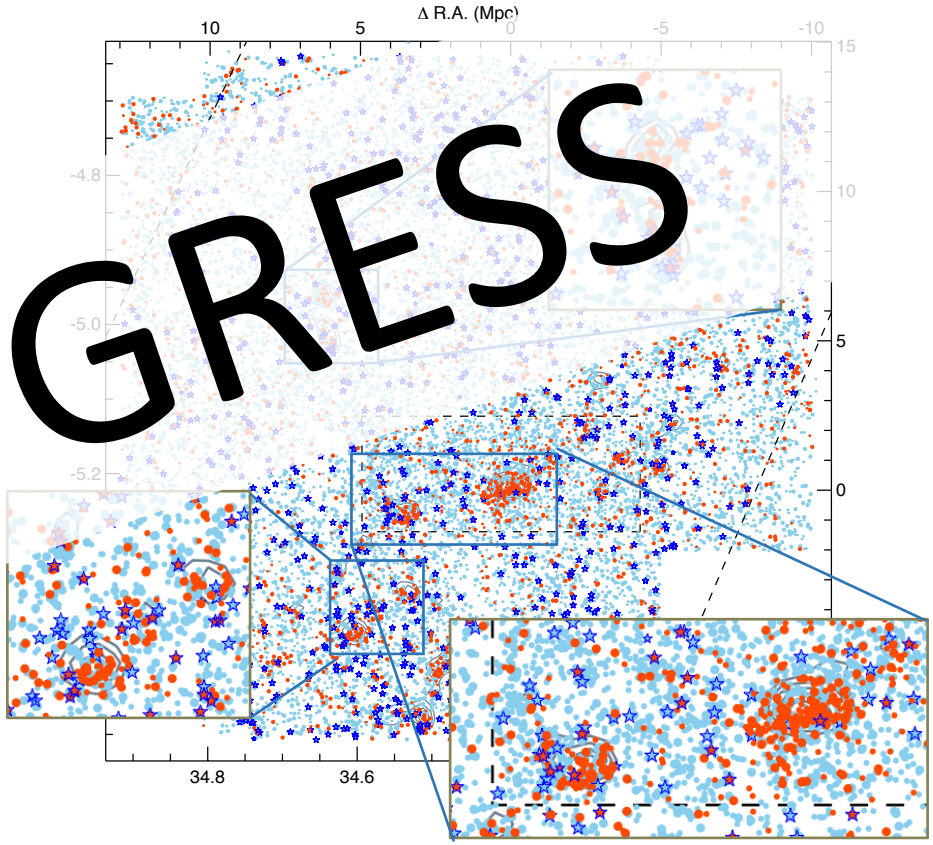
Ages of core galaxies



MILES models
Variable abundance ratios (Vazdekis+2015)
MCMC-based spectral fitting method



Pockets of SF in the LSS



MIPS 24µm-derived SFR estimates
Vs OII luminosity
Vs SED-fitting SFR

IN PROGRESS

Conclusions

- Supercluster at z = 0.65 in UKIDSS UDS field with at least four galaxy clusters and six groups satellites confirmed via spectroscopy.
- The galaxy clusters have masses of ~ $10^{14} M_{\odot}$.
- PSB locus supports a role of ICM into the shut down of their SF.

Perspectives

- LSS needs to be confronted with simulations to predict what structure it could be by redshift zero.
- Morphologies available for the full structure via CANDELS + UKIDSS
- New Chandra data (x-uds; P.I.s Kocevski, Hasinger) that covers the same area as our VIMOS coverage ➡ re-deriving cluster mass