The Evolution of Red Cluster Galaxies



Rachel Reddick Eli Rykoff, Eduardo Rozo, Risa Wechsler Stanford University/SLAC/KIPAC August 12, 2013

Overview



- Measured Conditional Luminosity Function
- Radial galaxy distributions
- R Future work

Why Cluster Evolution



CR Understanding clusters is important to their use in cosmology

redMaPPer

- Red-galaxy cluster finder
- Uses all galaxies in cluster to estimate a redshift
- Includes membership probability and P(z)
- Small mass-richness scatter (~20-25%)



The Data



R DR8:

 \bigcirc 10,504 deg², clusters complete to z=0.35

R S82:

 \sim 220 deg², clusters to z=0.6

R DES:

 \bigcirc Upcoming, SV data ~200 deg² to z~1

○ First year (this winter), ~2000 deg² to less depth

 \bigcirc Full survey (five years), ~5000 deg² to z~1



CLF – DR8



CLF evolution – DR8



CLF evolution – S82



Radial profiles – DR8



Radial profiles – S82



Results So Far



- CLFs brighten with redshift mostly similar to passive evolution
- Satellite CLF brightness nearly constant with richness
- Radial profiles currently consistent with NFW even at small scales

Related References



ন্থ Remapper: ন্থ Rykoff et al 2013 ন্থ Rozo et al 2013

- R CLFs:
 - CR Hansen et al 2009
 - CR Yang, Mo, & van den Bosch 2008, 2009
 - CR Wang & White 2012
- ∝ N(r):
 - CR Hansen et al 2005

Current CLF fitting function



TABLE 2CLF OVERALL FITS – CENTRALS

Data	$\log(L_{c0}) \left[L_{\odot} / h^2 \right]$	a_c	b_c	σ_c [dex]	χ^2_c	Ncen
DR8	10.787 ± 0.002	0.422 ± 0.006	0.993 ± 0.06	0.186 ± 0.001	470	493
S82 (z_{λ})	10.806 ± 0.005	0.40 ± 0.02	0.66 ± 0.09	0.193 ± 0.002	192	185

TABLE 3CLF OVERALL FITS – SATELLTIES

Data	$\log(L_0^*) [L_{\odot}/h^2]$	a_s	b_s	$\phi_0 [\text{dex}^{-1}]$	$a_{\phi} [\text{dex}^{-1}]$	α	χ^2_s	Nsat
DR8	10.277 ± 0.004	0.026 ± 0.005	1.72 ± 0.03	40.7 ± 0.3	1.024 ± 0.004	-0.943 ± 0.007	545	650
S82 (z_{λ})	10.274 ± 0.010	0.012 ± 0.016	1.06 ± 0.06	40.6 ± 1.0	1.09 ± 0.02	-0.962 ± 0.019	223	309

$$\log L_c = \log L_{c0} + a_c \log\left(\frac{\lambda}{20}\right) + b_c \log\left(\frac{1+z}{1.3}\right)$$
$$\log L^* = \log L_0^* + a_s \log\left(\frac{\lambda}{20}\right) + b_s \log\left(\frac{1+z}{1.3}\right)$$
$$\log \phi = \phi_0 + a_\phi \log\left(\frac{\lambda}{20}\right)$$

n(r) DR8 – alt plot



