

The evolution of the Brightest Cluster Galaxies from the ESO Distant Cluster Survey (EDisCS).

Alfonso Aragón-Salamanca
School of Physics and Astronomy
University of Nottingham

& the EDisCS collaborations

The ESO Distant Cluster Survey

Rudnick et al. 2003, The Messenger, 112

White et al., 2005, A&A, 444, 365

The Cast and Crew

S. White (MPA-Garching, D)	G. De Lucia (MPA, D)
A. Aragón-Salamanca (Nottingham, UK)	V. Desai (Caltech, USA)
R. Bender (Munich, D)	C. Halliday (Goettingen, D)
P. Best (ROE, Scotland)	B. Milvang-Jensen (Copenhagen, Denmark)
M. Bremer (Bristol, UK)	G. Rudnick (NOAO, USA)
S. Charlot (MPA, D & IAP, F)	R. Saglia (Munich, D)
D. Clowe (Bonn, D)	L. Simard (U. Victoria, C)
J. Dalcanton (U. Washington, USA)	S. Bamford (Nottingham, UK)
B. Fort (IAP, F)	A. v.d. Linden (MPA, D)
P. Jablonka (OPM, F)	I. Whiley (Nottingham, UK)
G. Kauffmann (MPA, D)	O. Johnson (ROE, Scotland)
Y. Mellier (IAP, F)	J. Moustakas (U. Arizona, USA)
R. Pello (OMP, F)	R. Finn (Siena College, USA)
B. Poggianti (Padova, I)	Y. Jaffe (Nottingham, UK)
H. Rottgering (Leiden, NL)	D. Maltby (Nottingham, UK)
P. Schneider (Bonn, D)	
D. Zaritsky (U. Arizona, USA)	

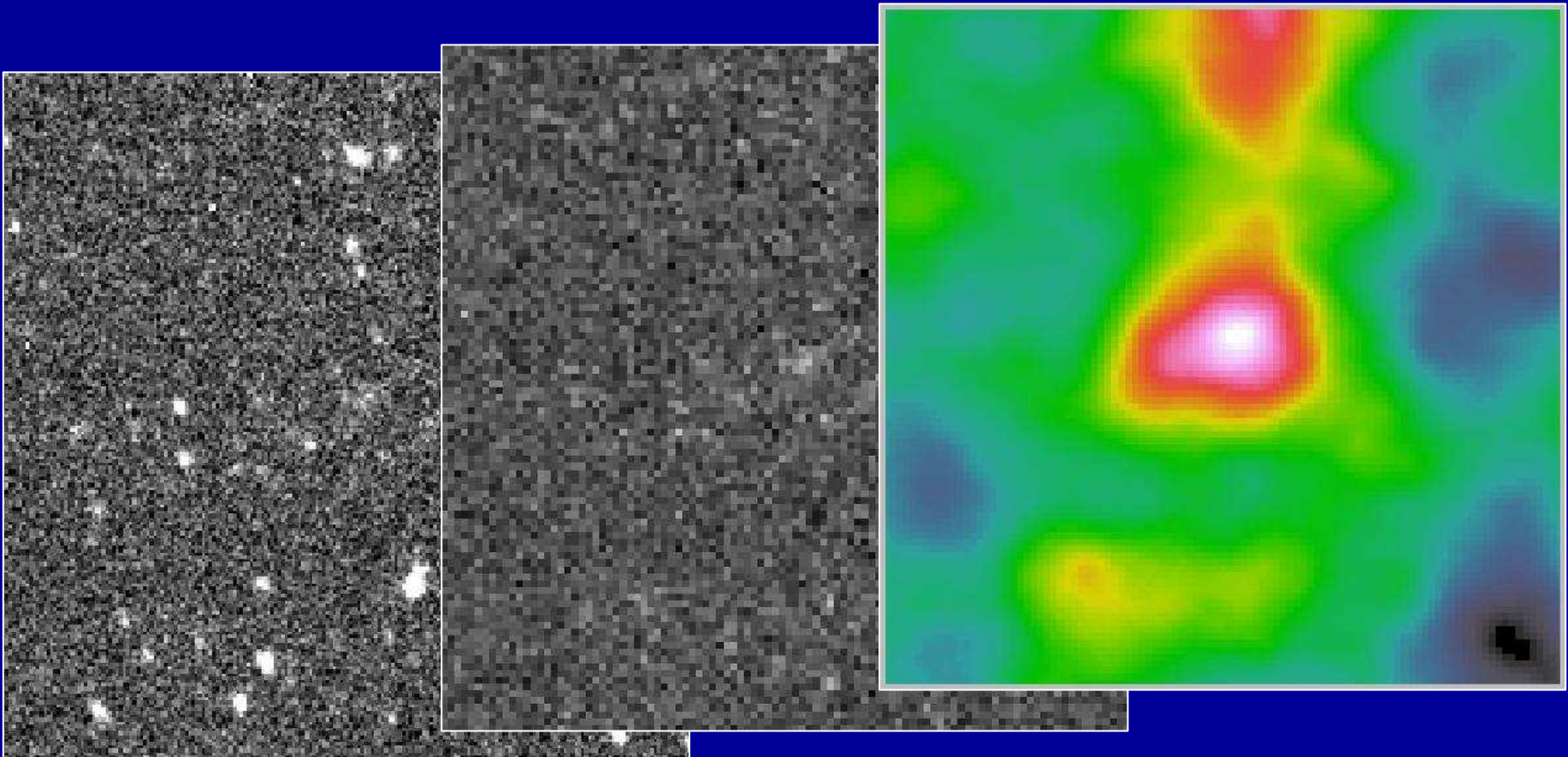
OVERVIEW

- The ESO Distant Cluster Survey (EDisCS).
- The colours of the BCGs.
- The growth of the stellar masses of the BCGs.
- BCGs and their parent clusters.
- The structural parameters and morphologies of BCGs.
- Conclusions.

Parent Sample: LCDCS

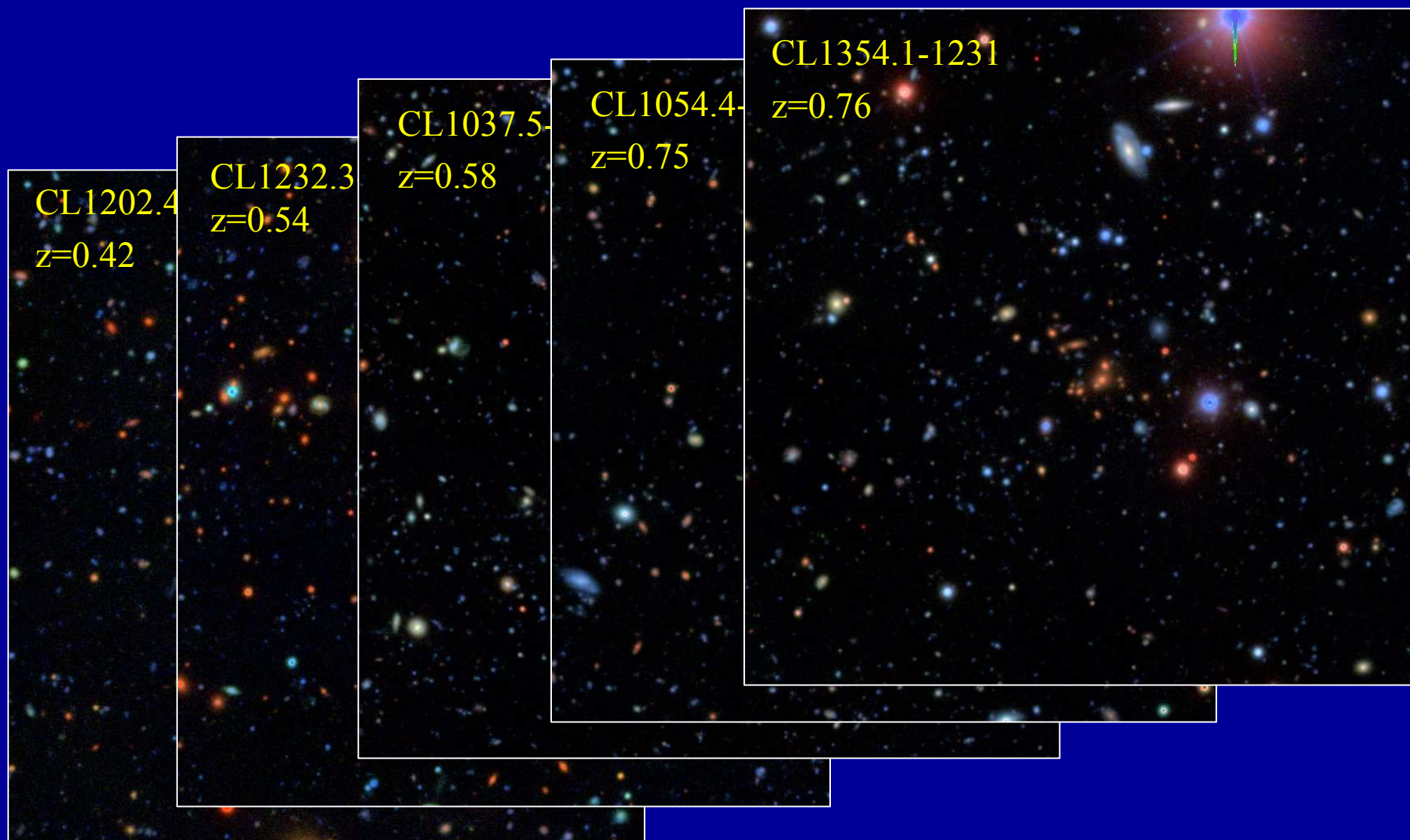
Gonzalez et al. 2001

Uniform selection in the optical (130 square deg)



EDisCS Imaging

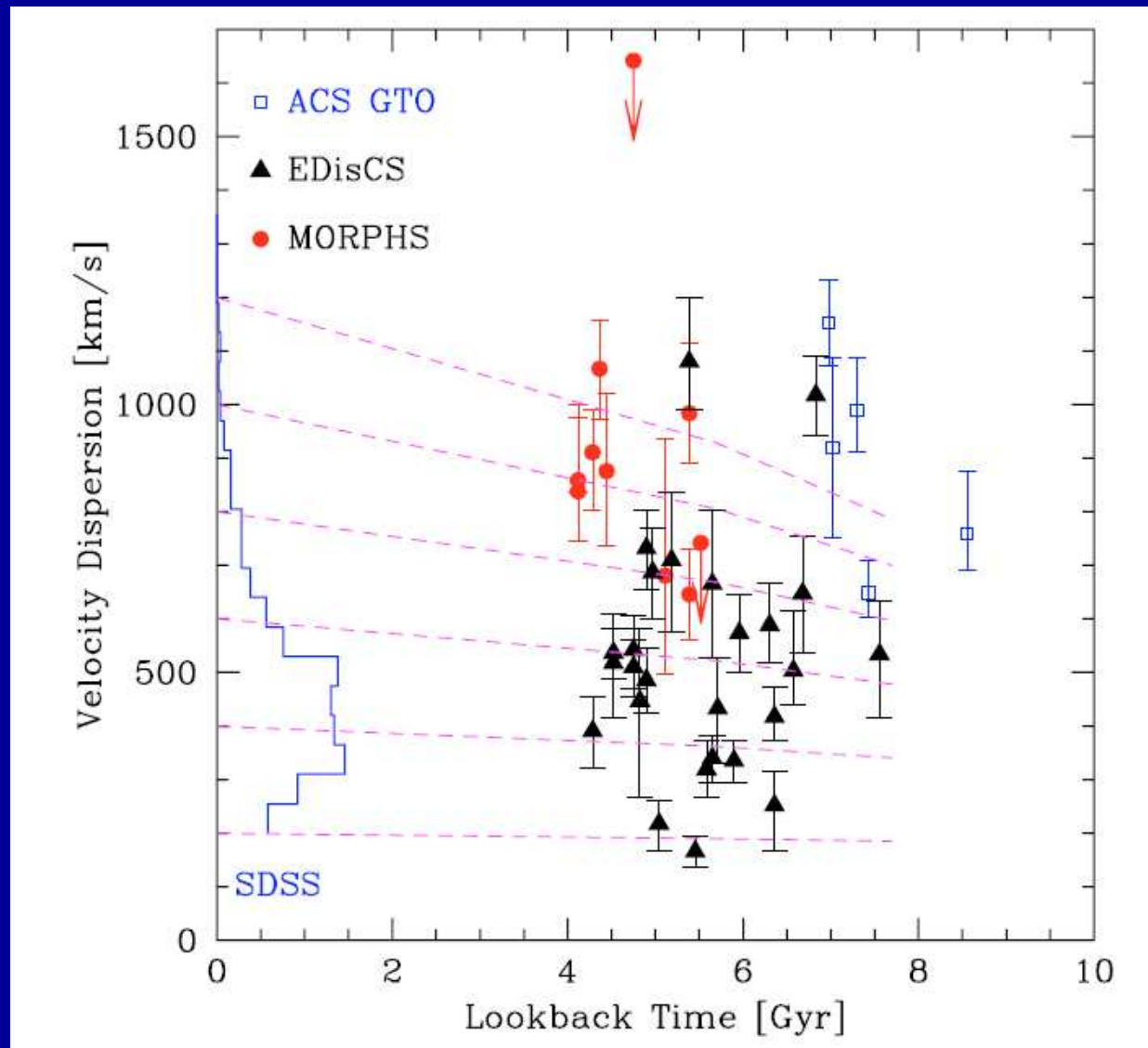
10 "high- z " fields in VRIJK, 10 "low- z " fields in BVIK



FORS2 MXU spectroscopy

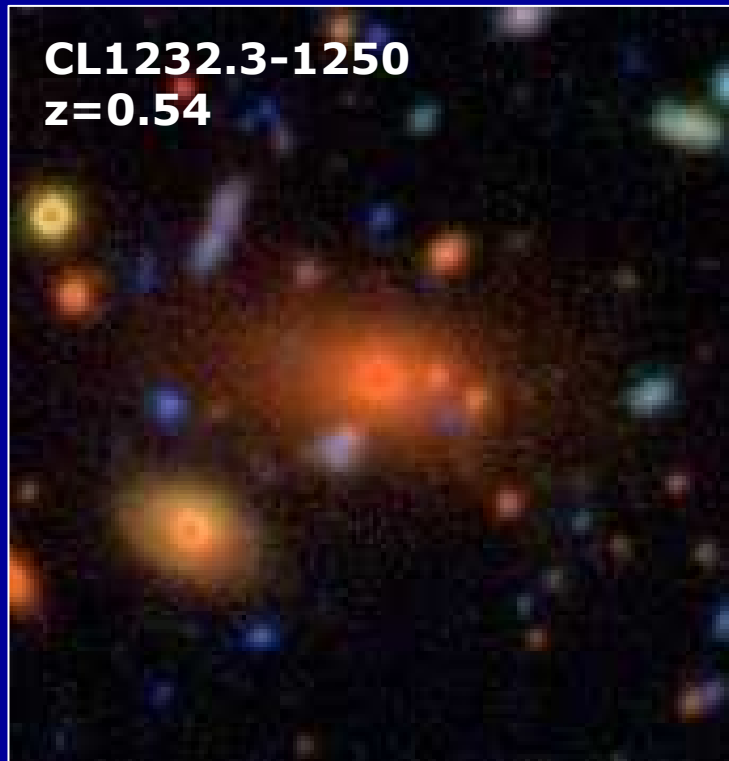
Claire Halliday, Bo Milvang-Jensen et al., 2004, 2008

~20-50 members
per cluster



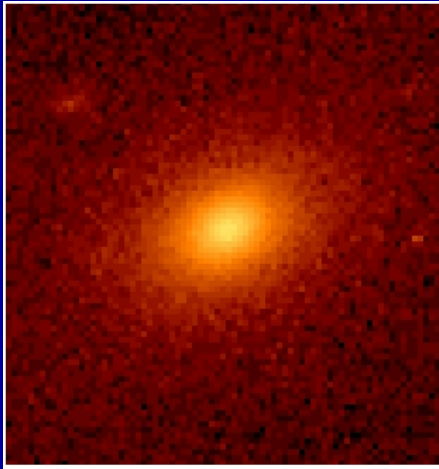
BCG photometry

Ian Witley, Alfonso Aragón-Salamanca, et al. 2008

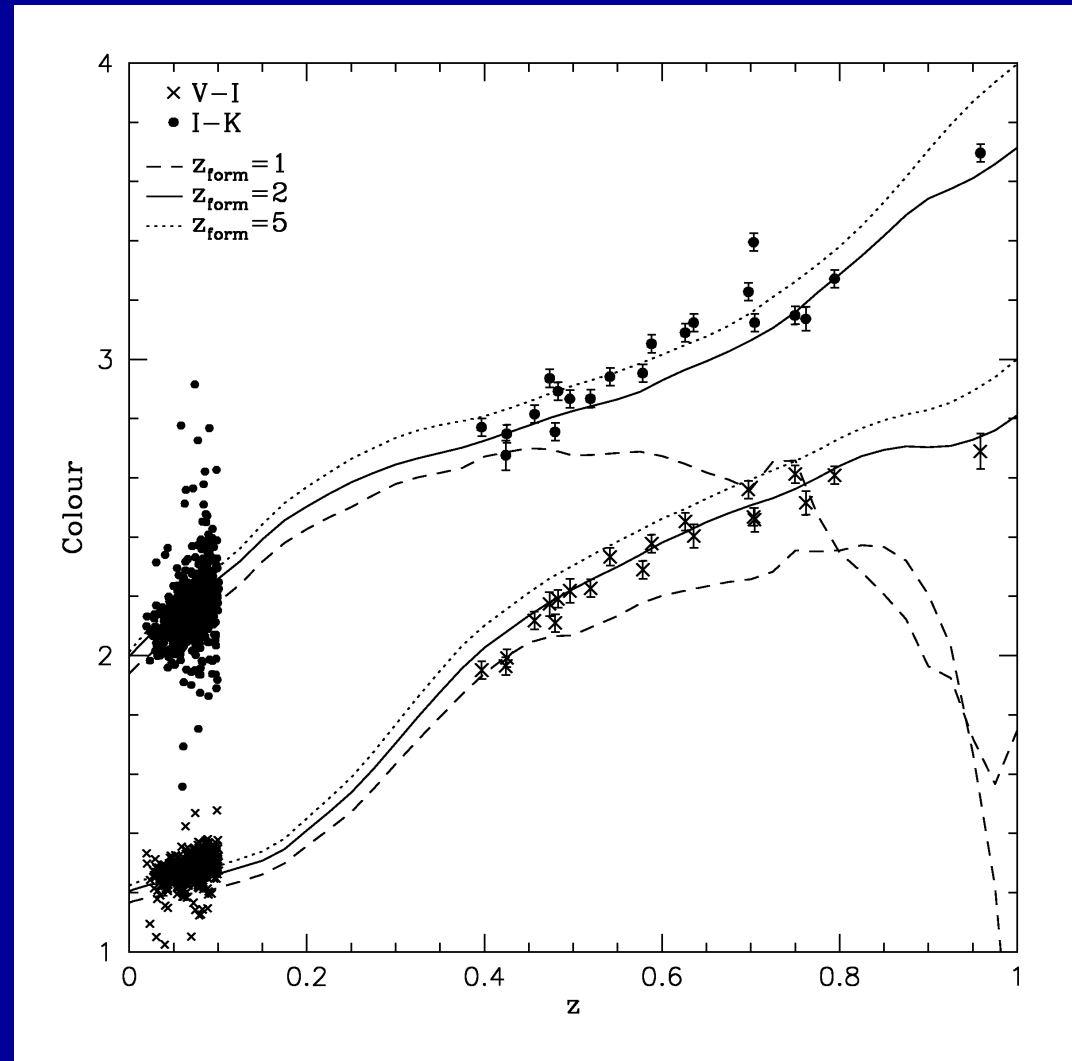


BCG colours

Ian Witley, Alfonso Aragón-Salamanca, et al. 2008

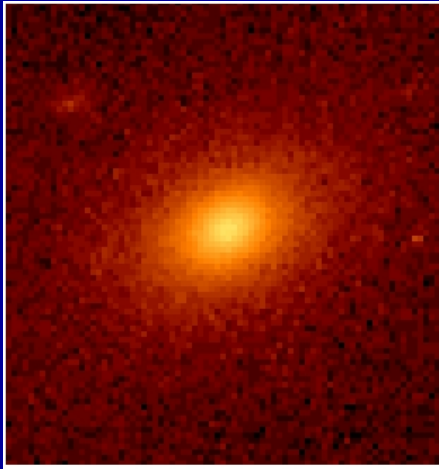


Passive colours $\Rightarrow$ old stars

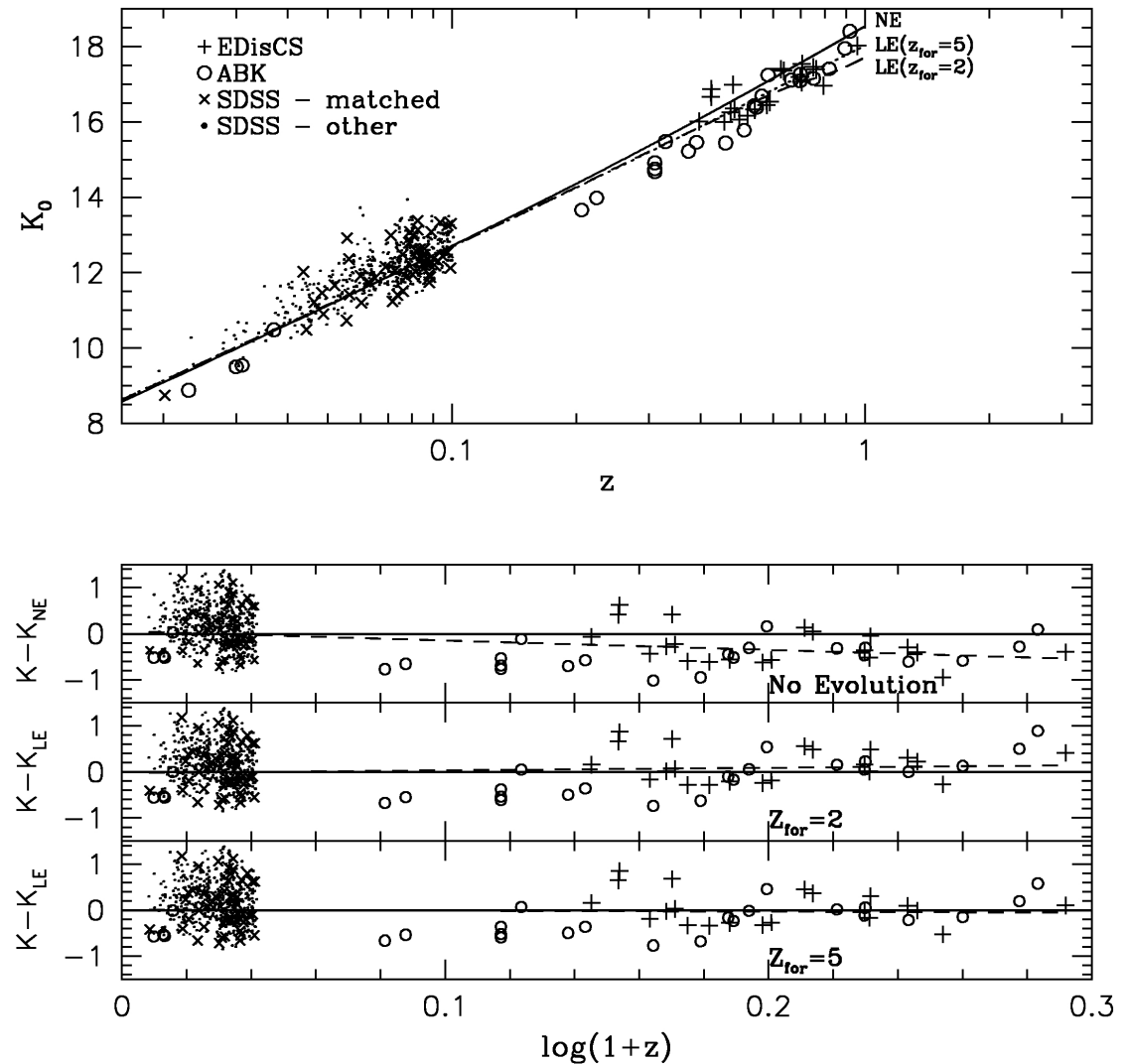


BCG luminosity and stellar mass

Ian Witley, Alfonso Aragón-Salamanca, et al. 2008

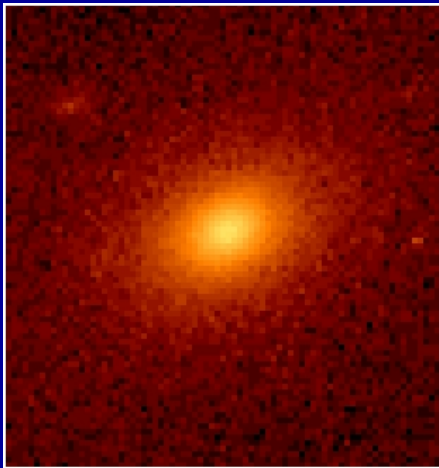


Mild mass growth



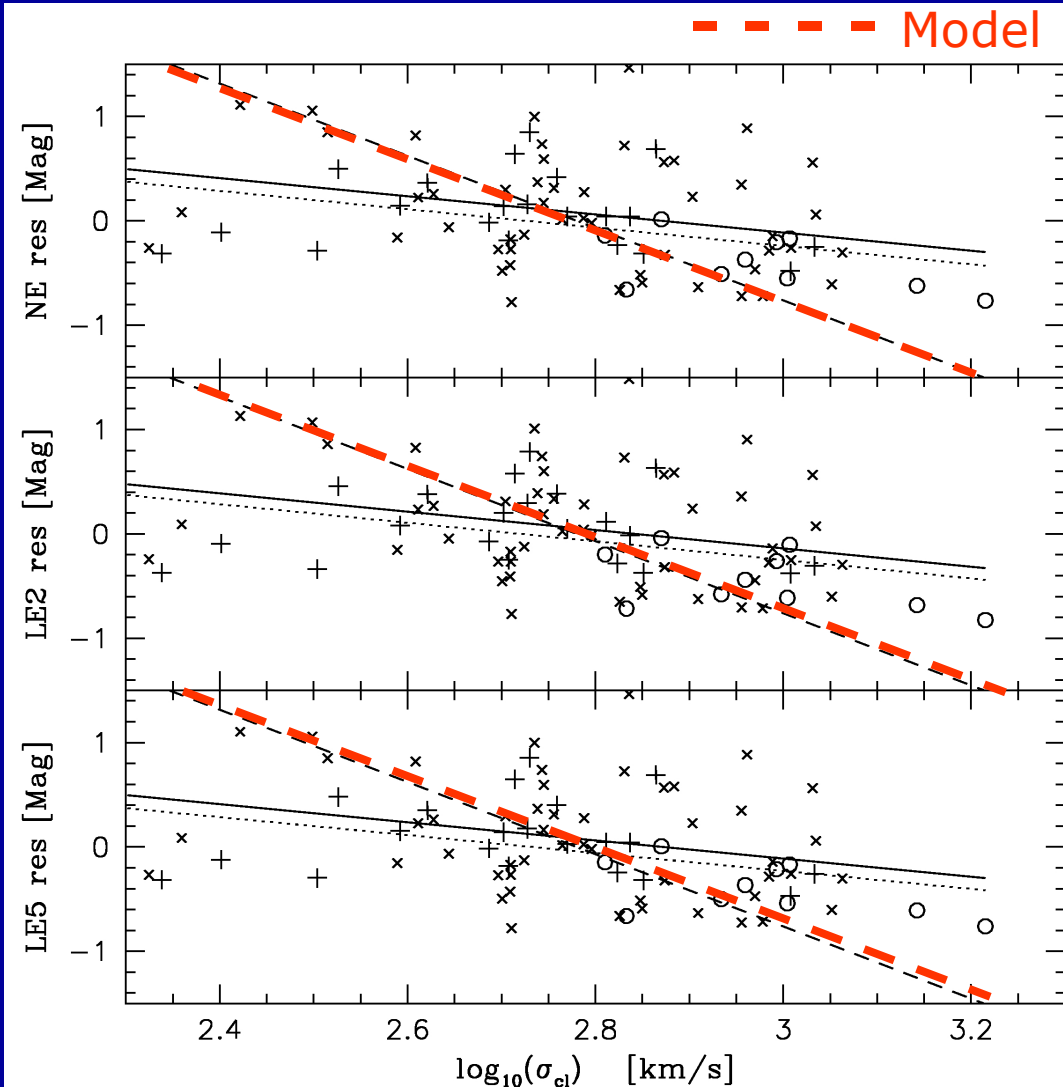
BCG stellar mass

*Whiley,
Aragón-Salamanca,
et al. 2008*



Stellar mass depends
weakly on cluster mass:

$$M_{\text{BCG}}^* \propto \sigma_{\text{cl}}^{0.35} \quad \Rightarrow \quad M_{\text{BCG}}^* \propto M_{\text{cl}}^{0.12}$$

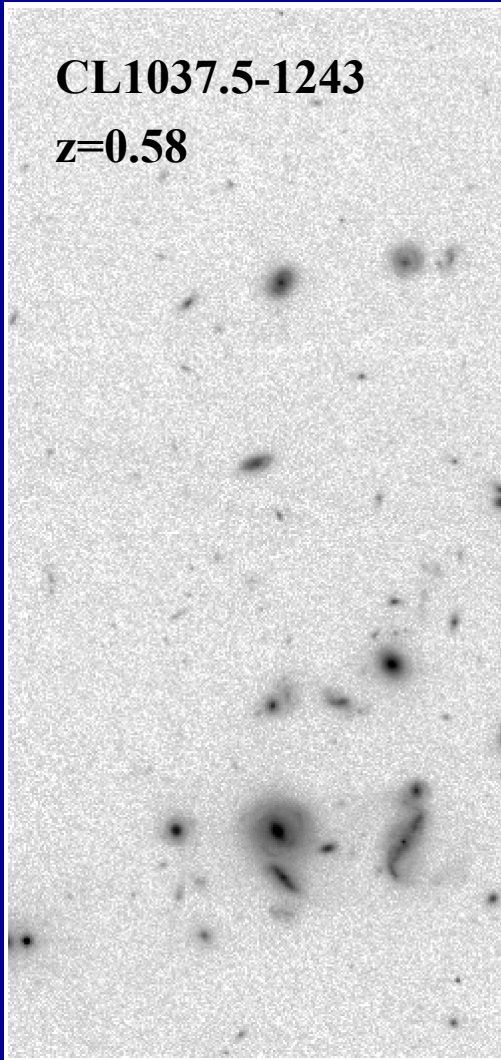


HST Morphology

Vandana Desai et al. (2007)

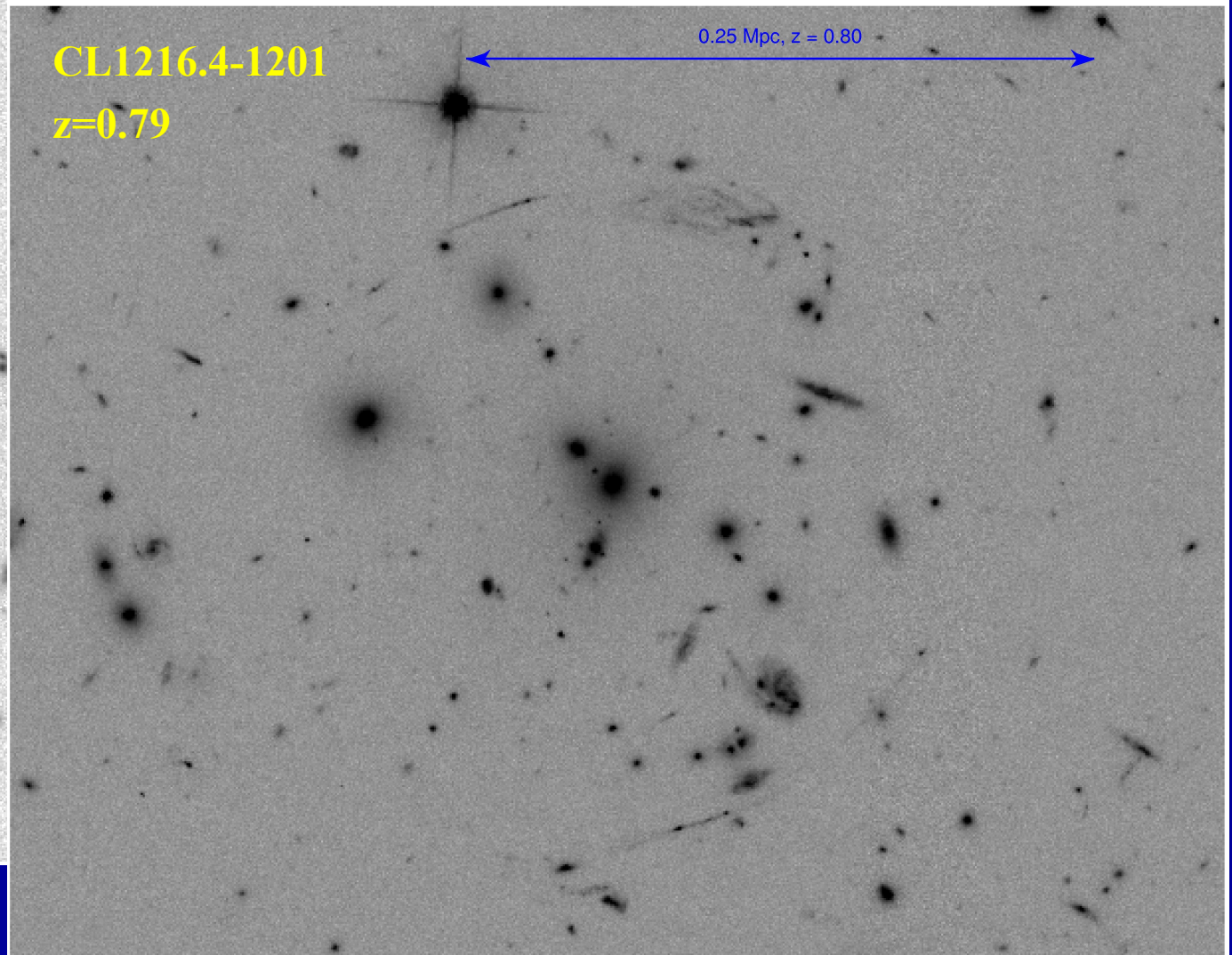
CL1037.5-1243

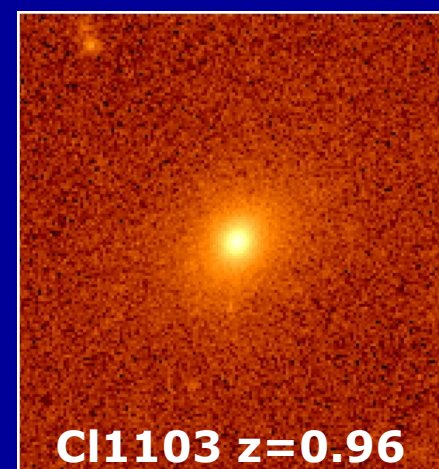
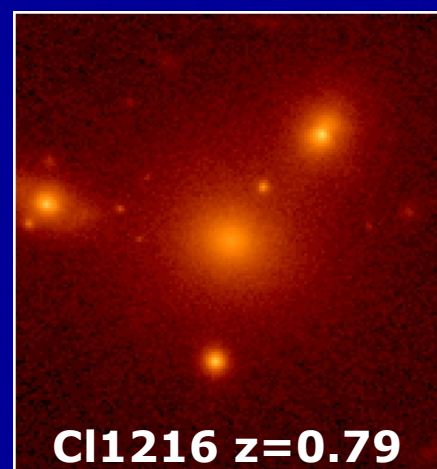
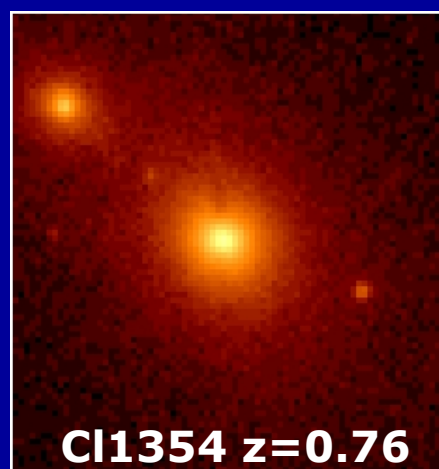
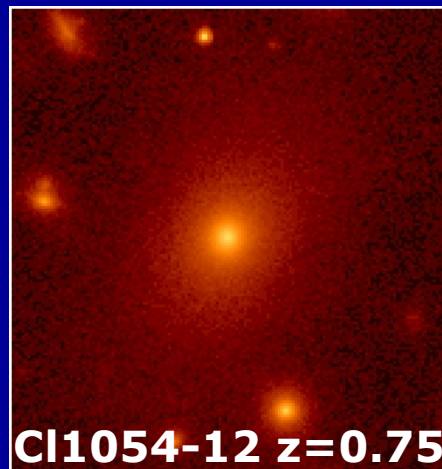
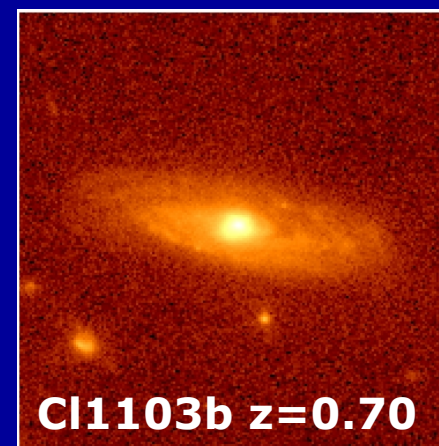
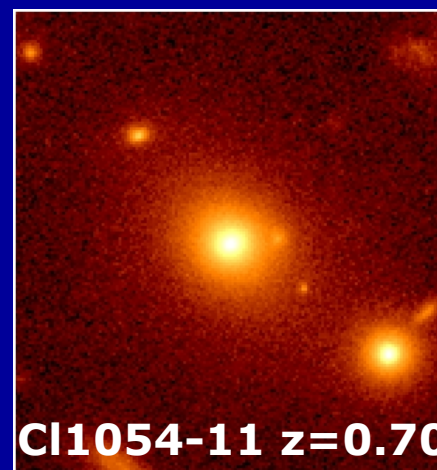
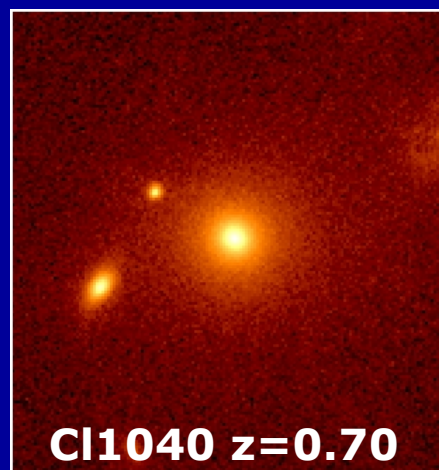
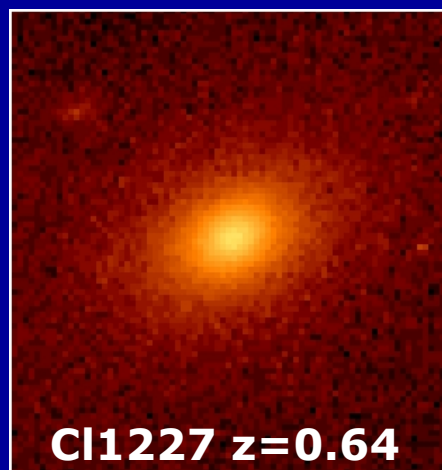
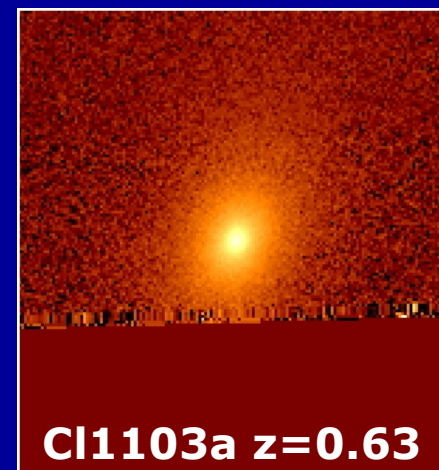
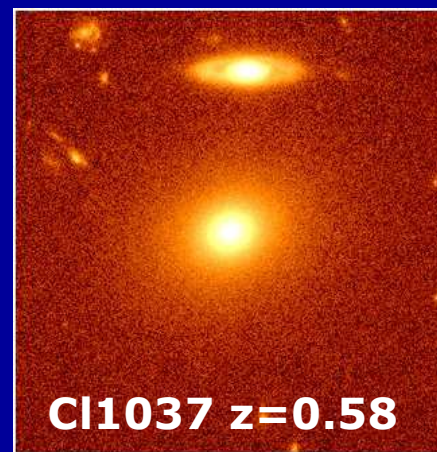
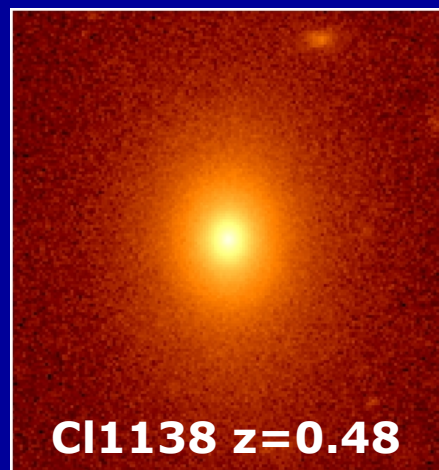
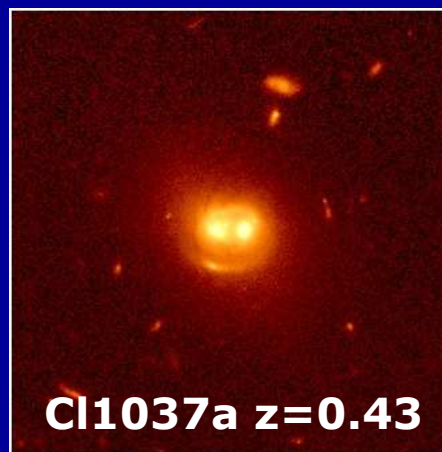
$z=0.58$



CL1216.4-1201

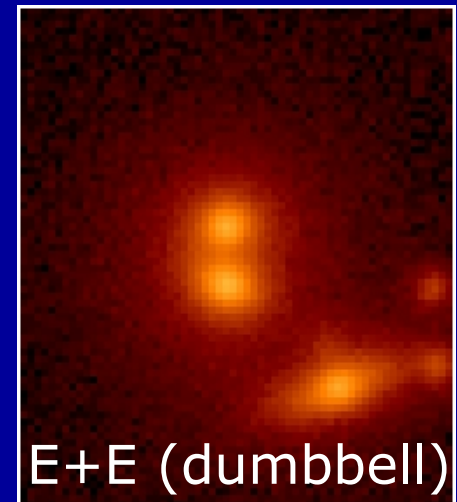
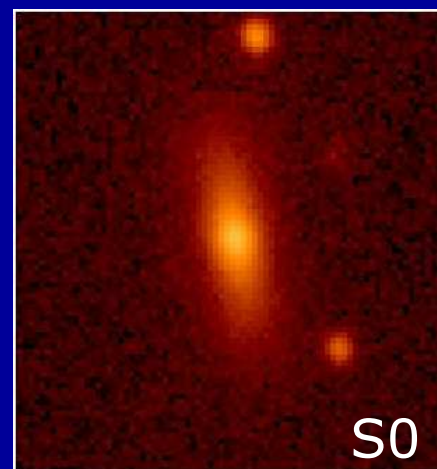
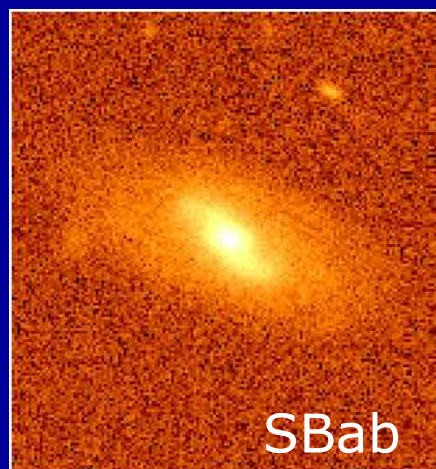
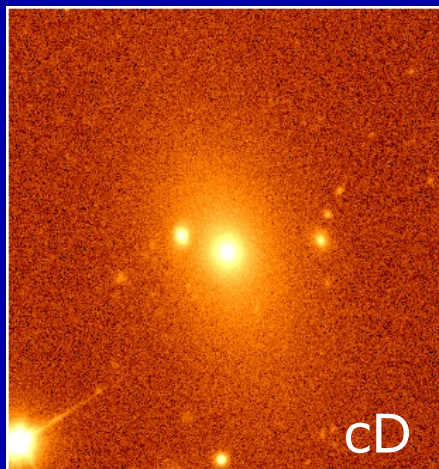
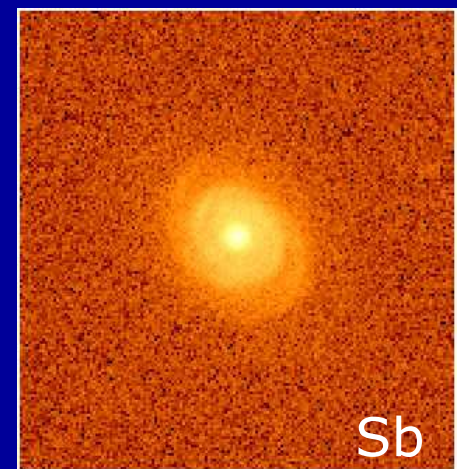
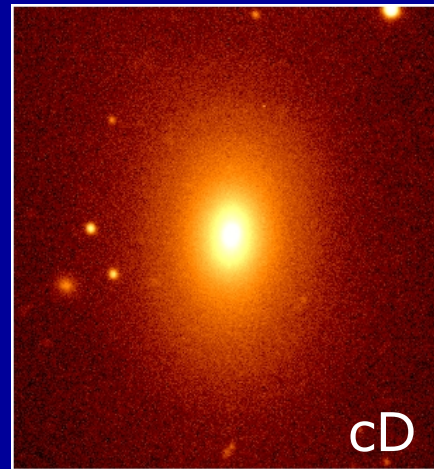
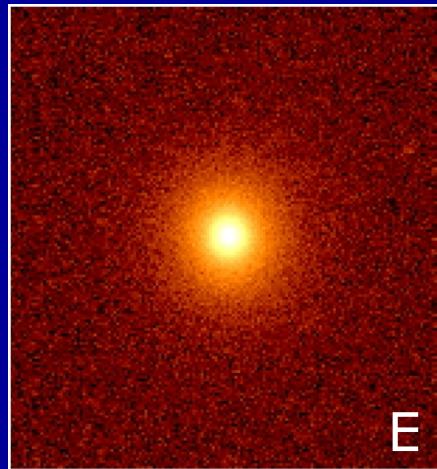
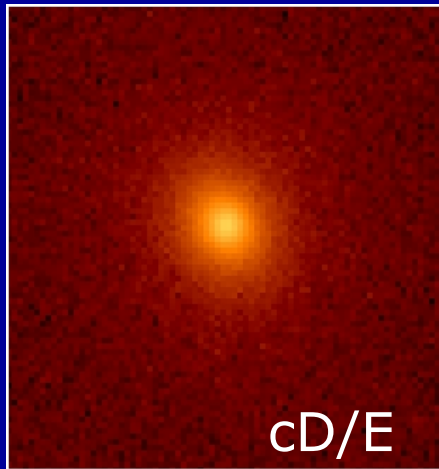
$z=0.79$





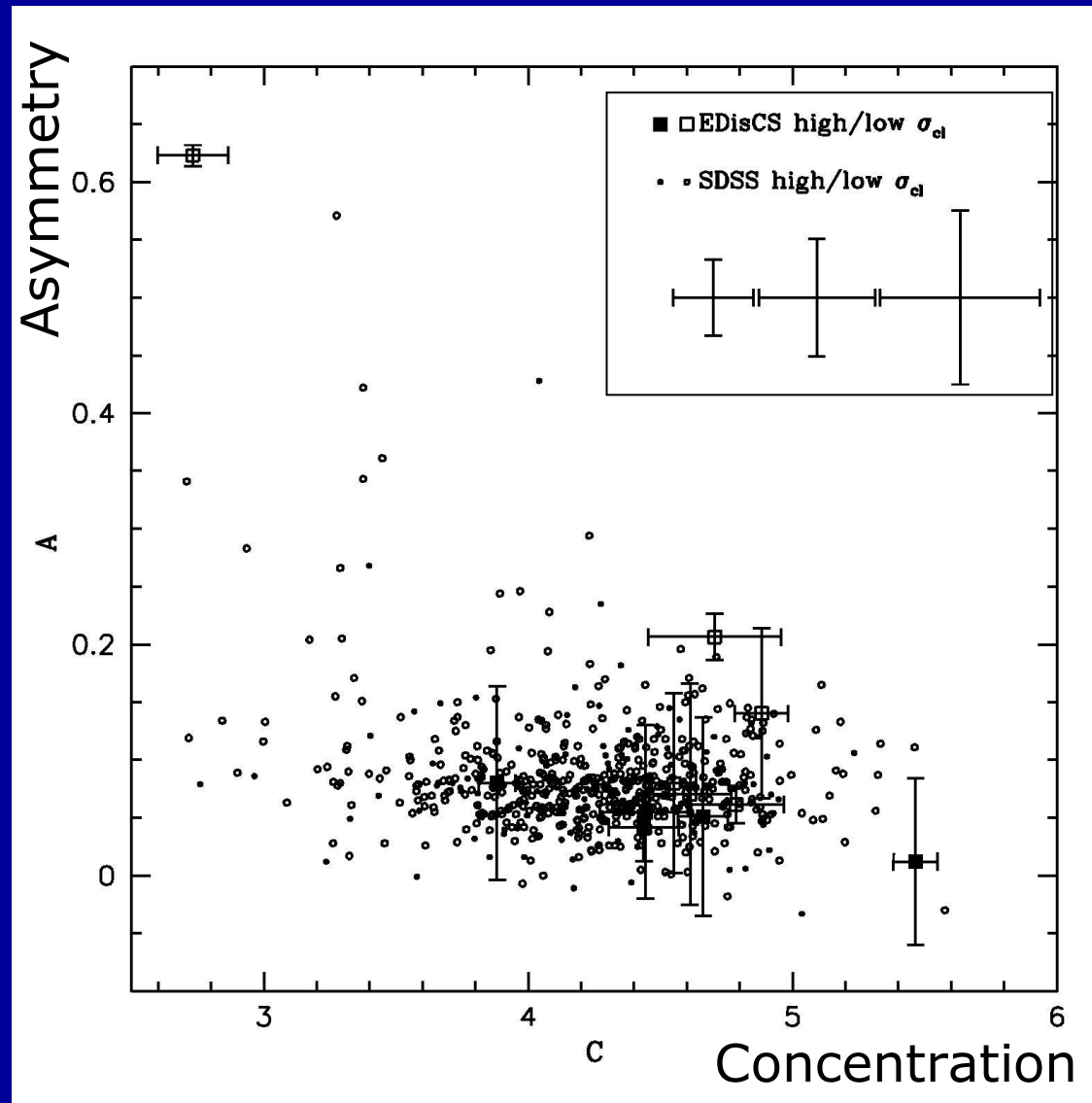
SDSS clusters BCGs

von der Linden et al. (2007)



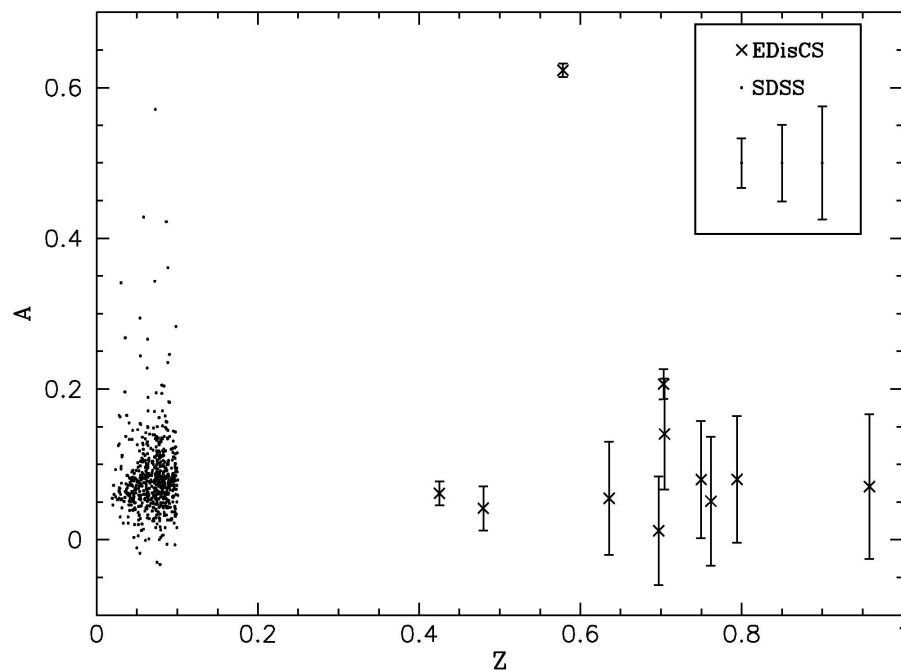
BCG CAS analysis

Ian Witley, Alfonso Aragón-Salamanca, et al. 2009

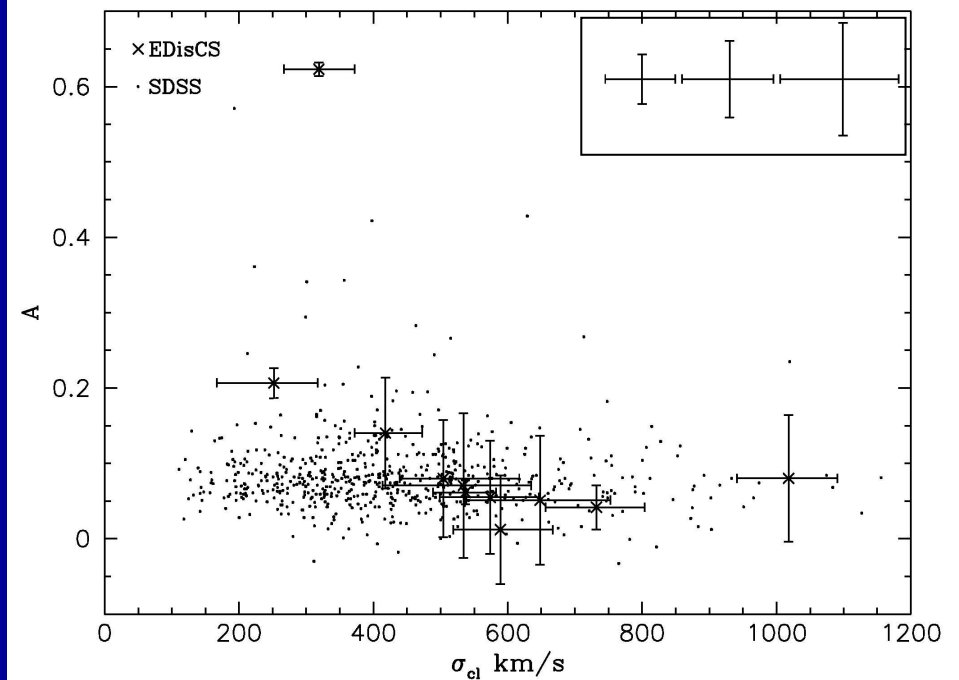


BCG CAS analysis

Ian Witley, Alfonso Aragón-Salamanca, et al. 2009



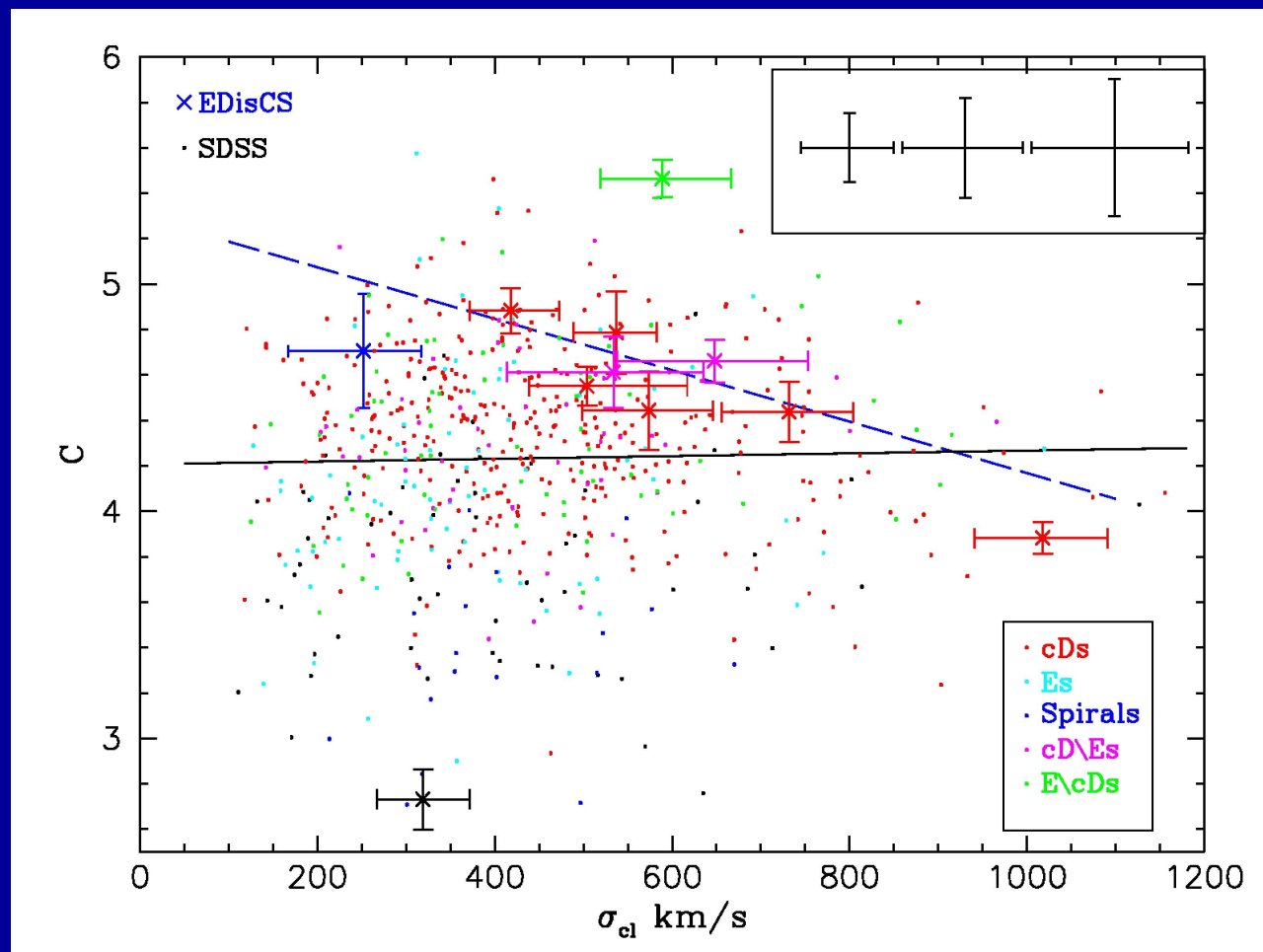
Asymmetry vs redshift



Asymmetry vs σ_{cl}

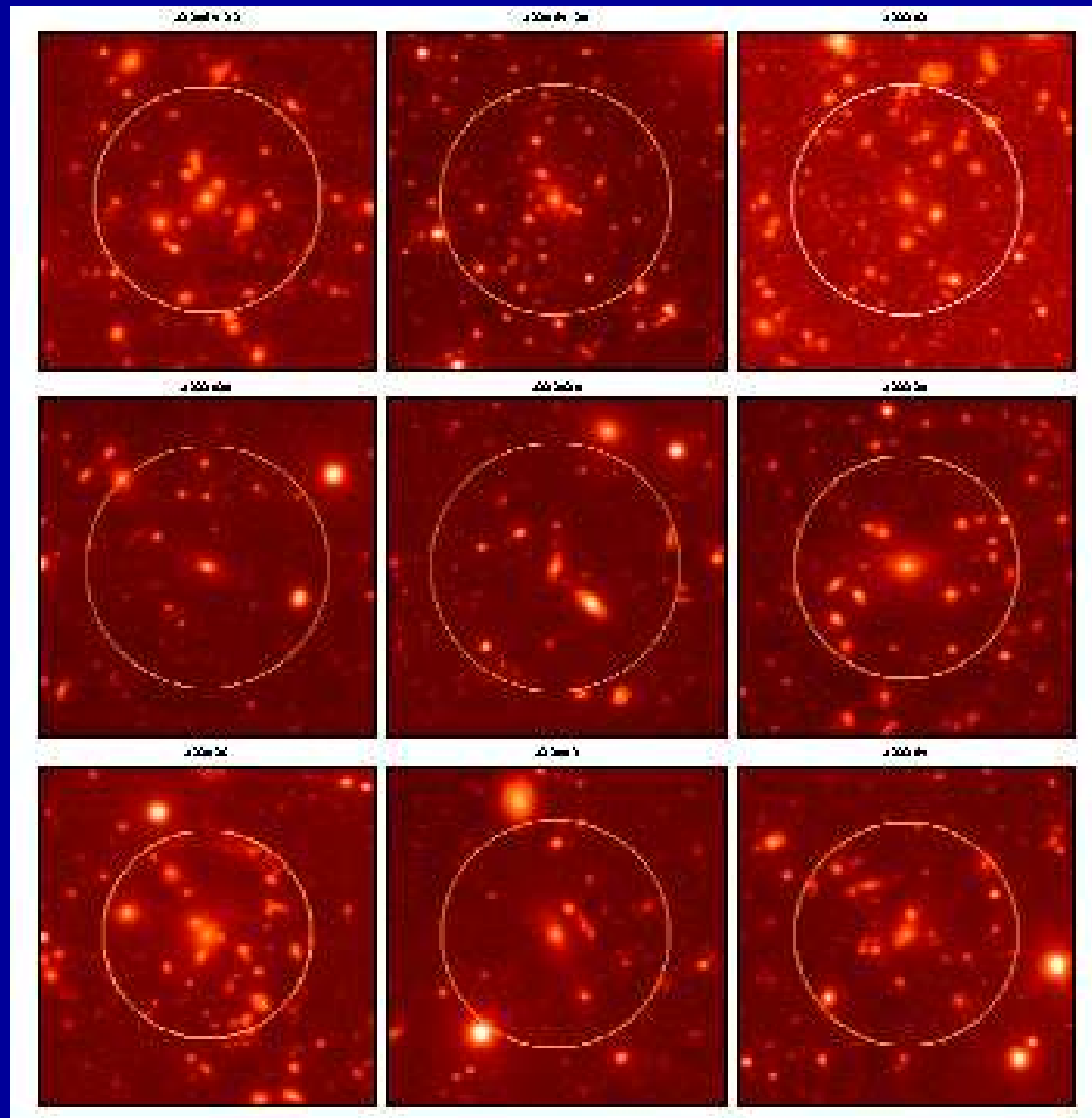
BCG CAS analysis

Ian Witley, Alfonso Aragón-Salamanca, et al. 2009



Concentration vs σ_{cl}

Dynamical
friction radius



Conclusions

- The colours of BCGs imply old ages and passive evolution for their stellar populations.
- The BCGs' stellar masses experience little growth since $z \sim 1$.
- The stellar masses of BCGs correlate weakly with the mass of their parent clusters.
- BCGs were more compact at $z \sim 0.4-1.0$ than their present-day counterparts, specially those living in low-mass clusters.