Estallidos IV

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# Physical Properties

## of Nearby Galaxy Clusters in the SDSS

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# Outline

1) Introduction
2) Sample selection
3) Consistency checks
4) Preliminary results
5) Still to be done…

# 1) Introduction

- Galaxy clusters are the largest gravitationally bound objects in the Universe.
  - Their dynamical state provides important constraints on cosmological scenarios.
  - High-density laboratories for the study of galaxy formation and evolution.

- Previous studies lack of large, complete, homogeneous samples.
  - ENACS (Katgert et al. 1996), 2dFGRS (DePropris et al. 2002)…SDSS

# 1) Introduction

## Sloan Digital Sky Survey (SDSS)

- $2 \times 10^8$ photometric and $9 \times 10^5$ spectroscopic measurements in ~6700 sq. deg.
- Multicolour (*ugriz*) imaging and photometric properties.
- Redshifts and spectroscopic features.

*Aim*: to provide further insight into the dynamical status of nearby galaxy clusters and its influence on galaxy evolution, extending the study to their outskirts

# 2) Sample selection

Criteria:

- Catalogued (*Abell*, *Zwicky*, *ROSAT*) nearby ($z < 0.1$) galaxy clusters.
- Available redshifts in the SDSS-DR4, complemented with the literature (bright galaxies).
- At least 15 member galaxies and 70% completeness ($N_{spec}/N_{phot} > 0.7$) within a radius of $4.5h^{-1}$ Mpc.

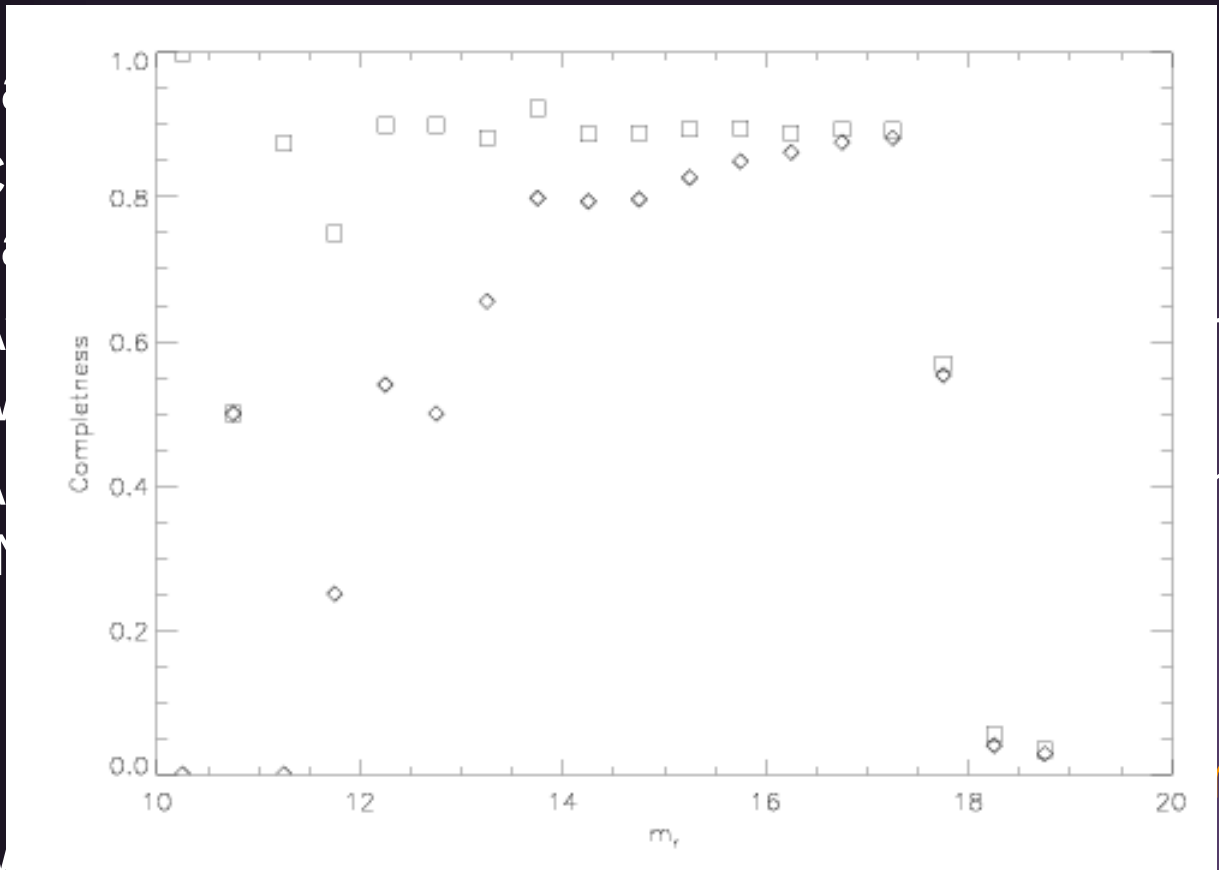
Final sample consists of 127 nearby clusters with the most homogenous data to date.

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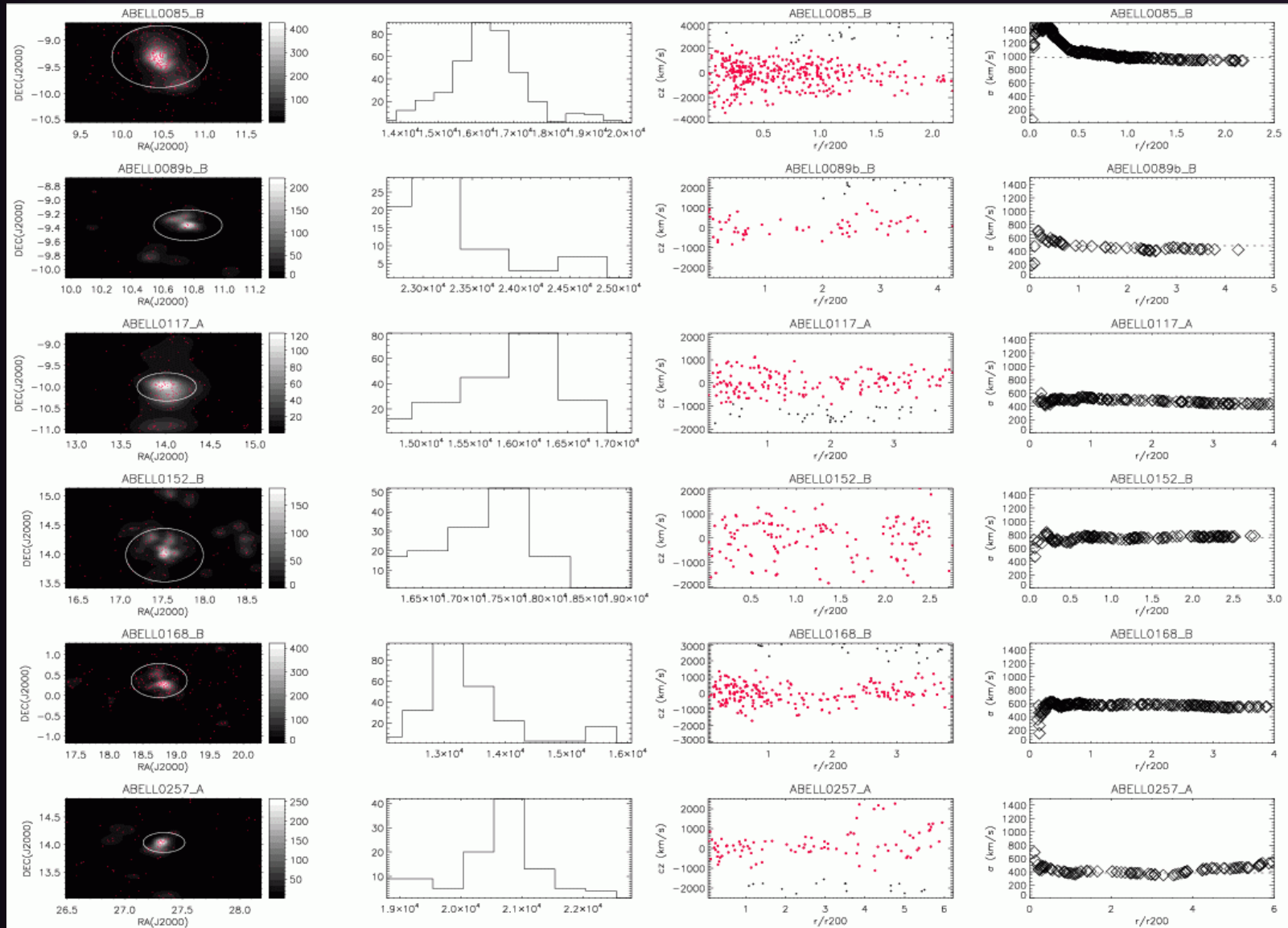
# 2) Sample selection

Cluster membership:

1. Isolation of predominant peak in velocity space using a *gapping* algorithm (500 $kms^{-1}$).
2. Modified $3\sigma$-clipping algorithm using KMM (Ashman et al. 1994).
3. Cluster center determination (*X-rays* or maximum of surface density distribution).
4. Computation of robust $\sigma$ (Beers et al. 1990) and $r_{200}=\sigma\sqrt{3}/10H(z)$ (Carlberg et al. 1997).
5. Recomputation of $\sigma$ and $r_{200}$ in an iterative fashion until stability is reached.

Final sample contains ~15000 galaxies extending out to several $r_{200}$.

# 2) Sample selection



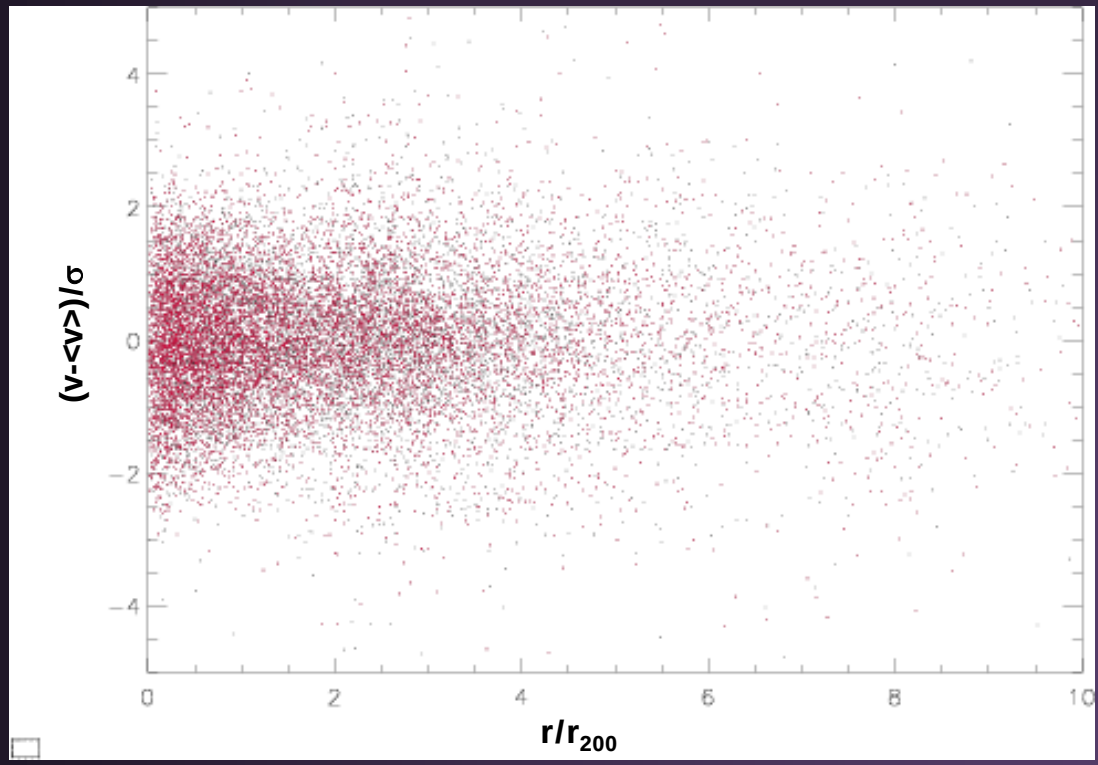
# 3) Consistency checks

Comparison with other methods:

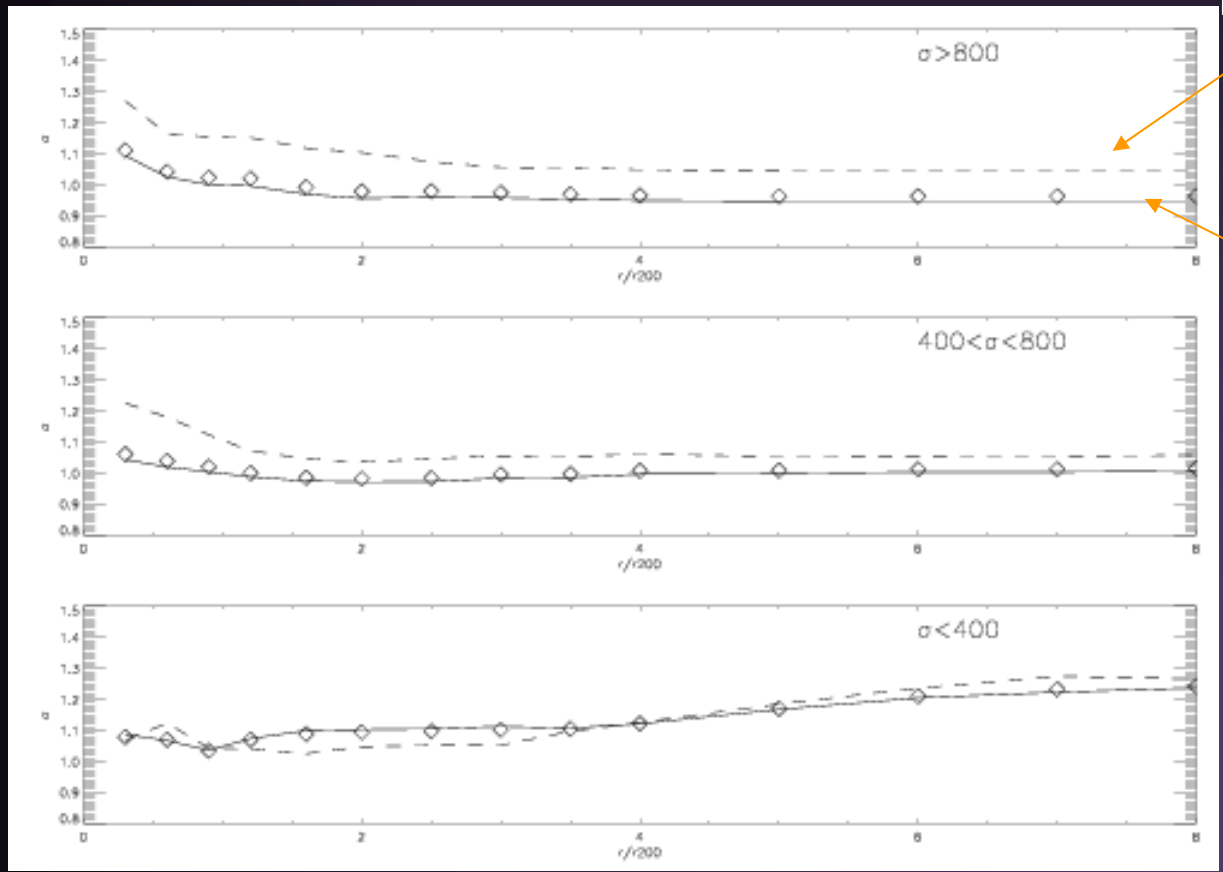
- Classic $3\sigma$-clipping $\rightarrow$ 86% of $\sigma$'s agree within 20%.
- Mean $\sigma$ quite similar to that obtained by Biviano & Girardi (2003) based on 2dFGRS clusters.

# 4) Preliminary results

Through appropriate scaling ($\sigma$, $r_{200}$) we built an ensemble cluster.



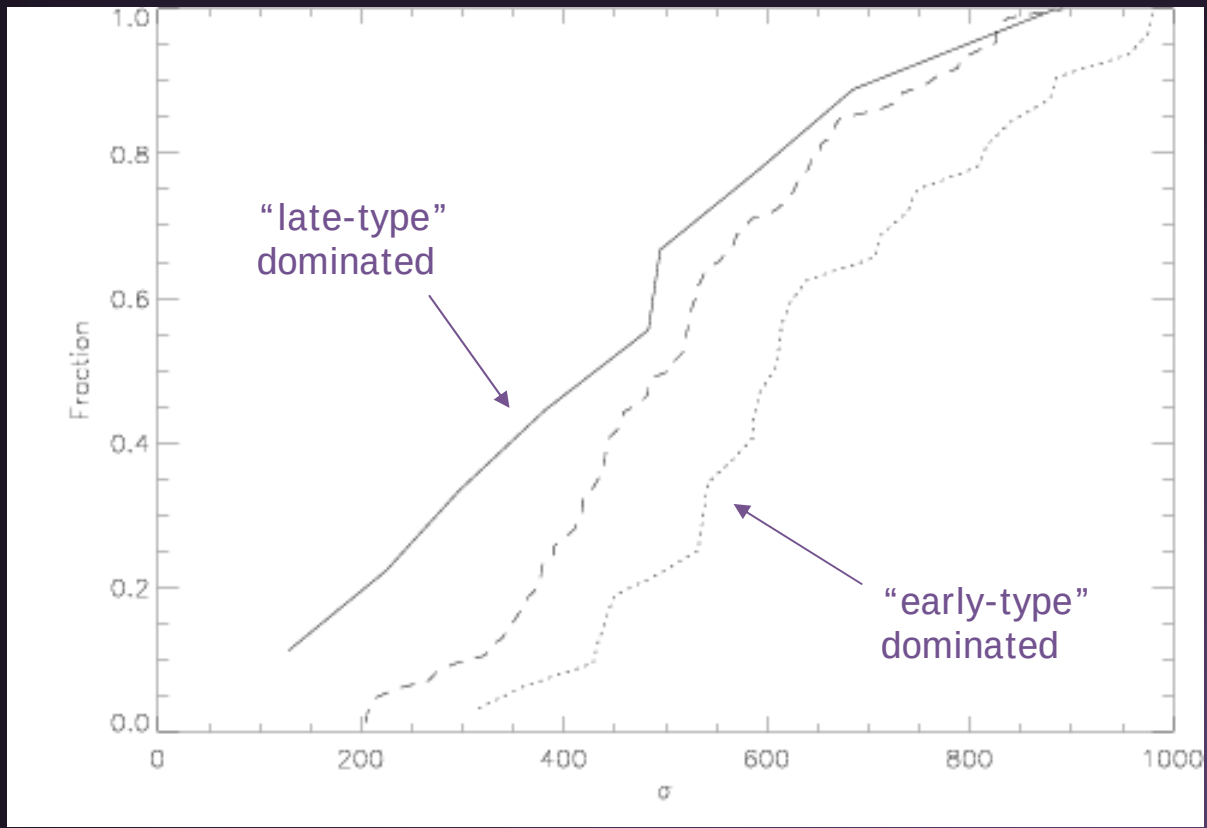
# 4) Preliminary results




"late-types" ≡ $r_{50}/r_{90}>0.4$

"early-types" ≡ $r_{50}/r_{90}<0.4$

# 4) Preliminary results



# 5) Still to be done…

A lot! but, for sure…

- Finish the study of VDPs and determination of the $L_x$-$\sigma$ relation.
- Substructure analysis of the selected sample.
- Detailed study of the composite *spectroscopic* luminosity function of galaxies (clustercentric dependence, SF and passive galaxies…).

…find out in next *Estallidos*!!