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The BCG-cluster connection

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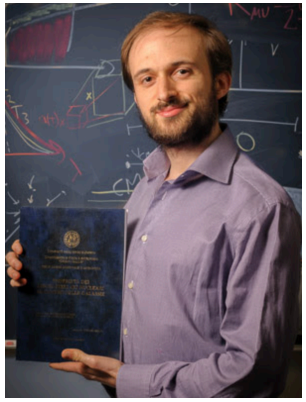
Collaborators



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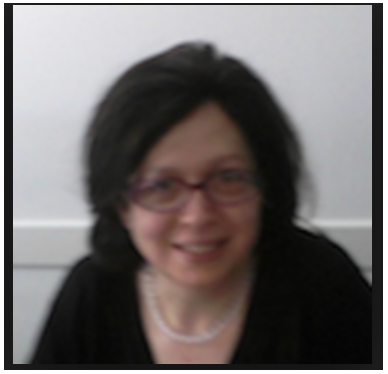

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Properties of BCGs

The brightest cluster galaxies (BCGs) are stellar systems that:

- **Lie at the center of the cluster potential well**
- **Might account of 5-10% of the total stellar light of a cluster**
- **Are huge in size (Re of 30-100 kpc)**
- **Tend to riside close to the peak of the X-ray emission**
- **They have Sersic profiles**
- **Many of them are cD galaxies**
- **The envelope luminosity correlate with cluster richness and X-ray luminosity**
- **Their major axes seems aligned with that of clusters**

Their origin and evolution must be connected with that of the cluster

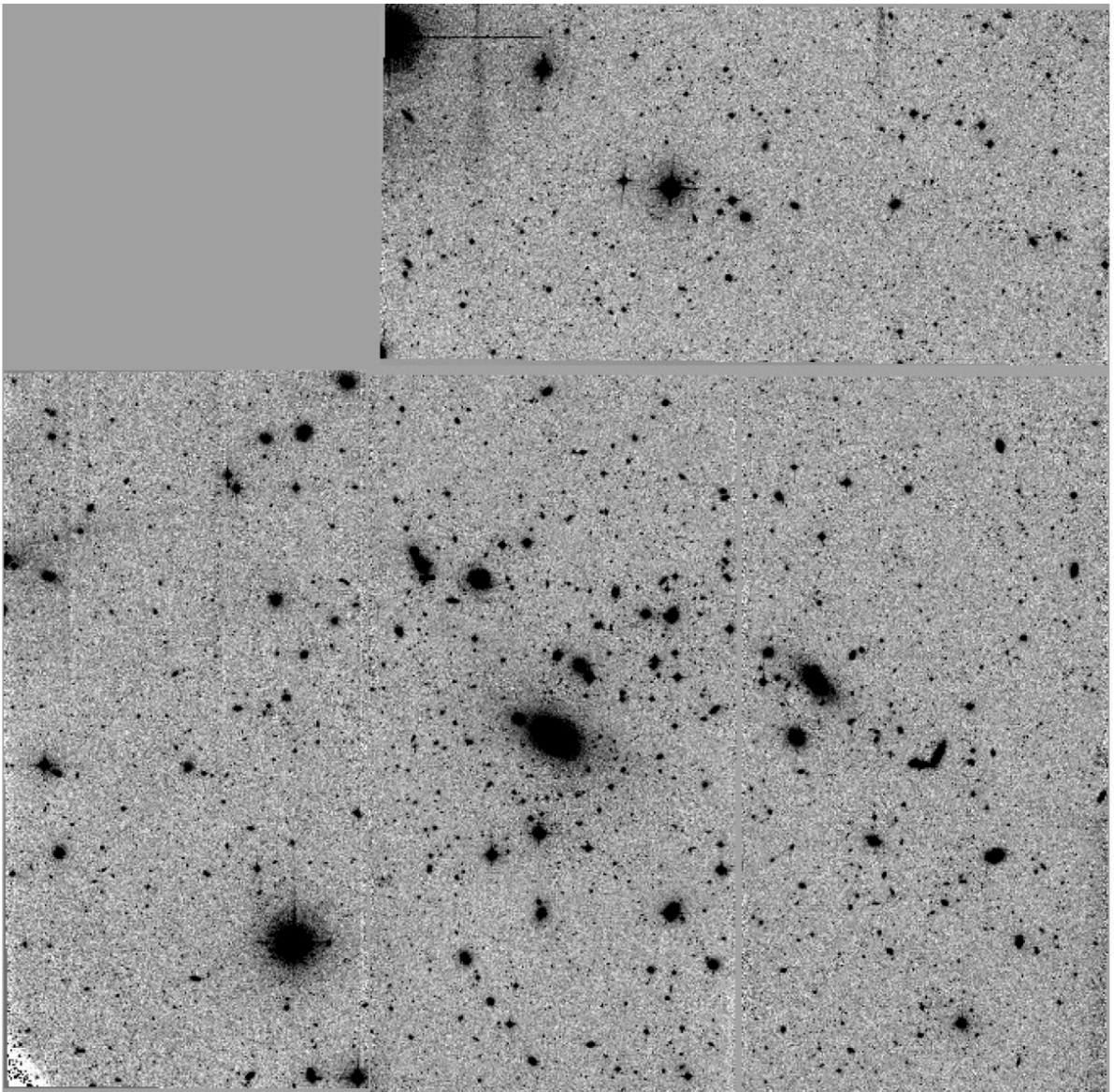
Formation of BCGs

Proposed models for the origin and evolution of BCGs:

- **Galactic cannibalism (dynamical friction)**
- **Cooling flow of cold gas into the cluster center**
- **Tidal stripping and merging during cluster collaspe**
- **Late assembling of gas-poor red galaxies in a hierarchical scheme**

THE WINGS-OMEGAWINGS SAMPLE

The data



THE WINGS-OMEGAWINGS DATABASE

BV 34'X34' IMAGES OF 77 CLUSTERS 0.04<Z<0.07

Bvu OMEGACAM 1x1 deg IMAGES of 46 CLUSTERS

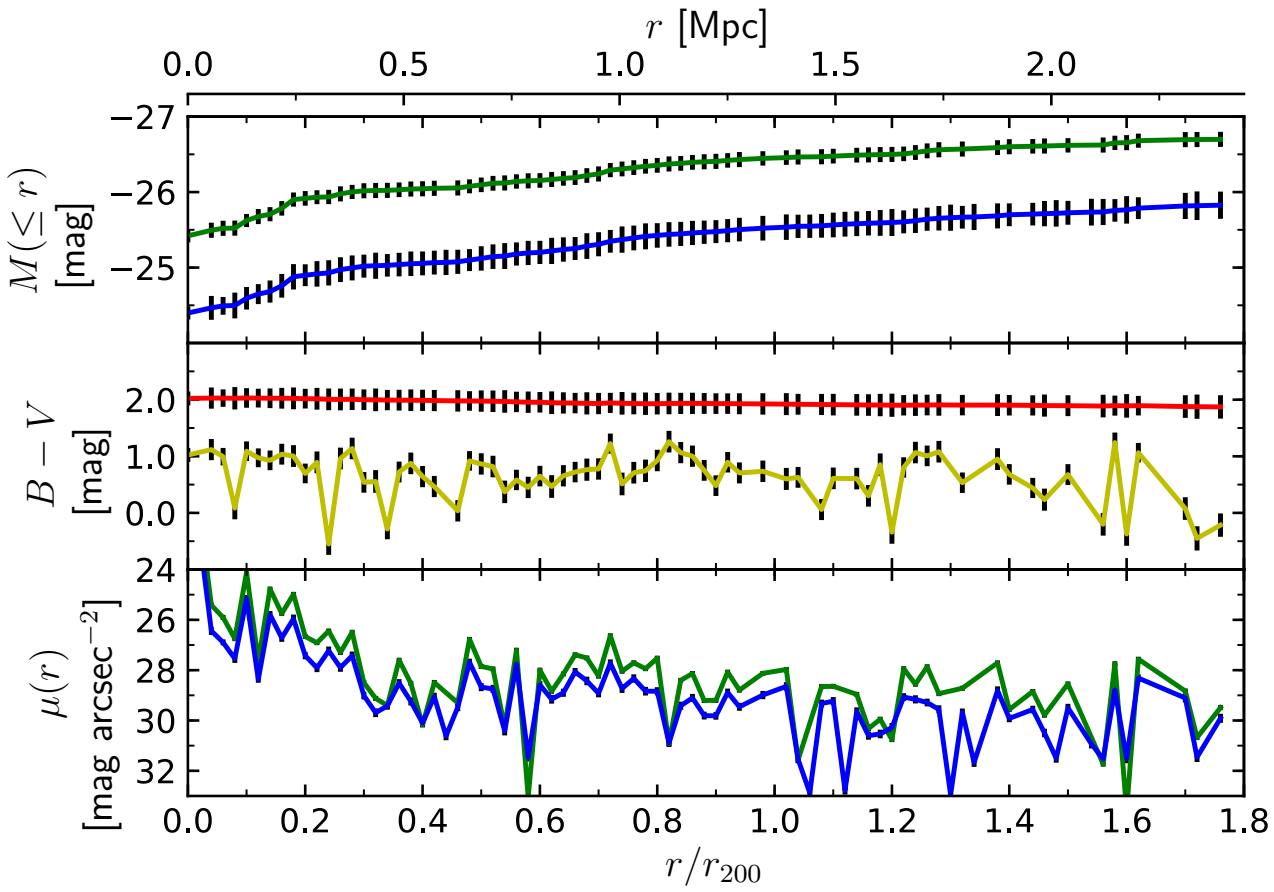
GASPHOT AND MORPHOT ANALYSIS (Re, n, T, etc…)

MED-RES SPECTROSCOPY DATA FOR THOUSAND OF GALAXIES

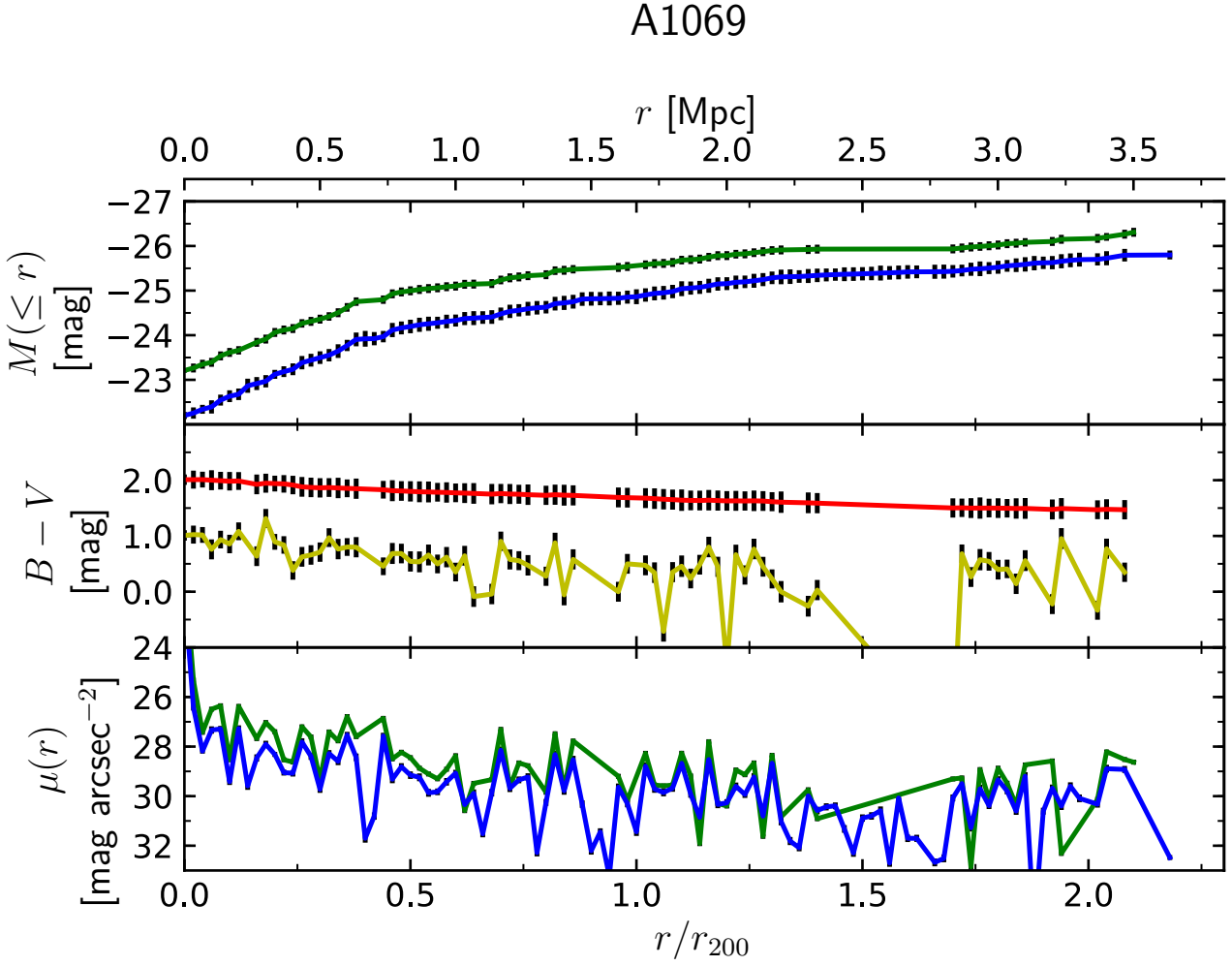
The cluster growth curves

$$I(r_n) = \sum_{i=1}^{n} (cc_i \cdot 10^{-0.4 m_i}) - \pi r_n^2 \cdot I_{field}$$

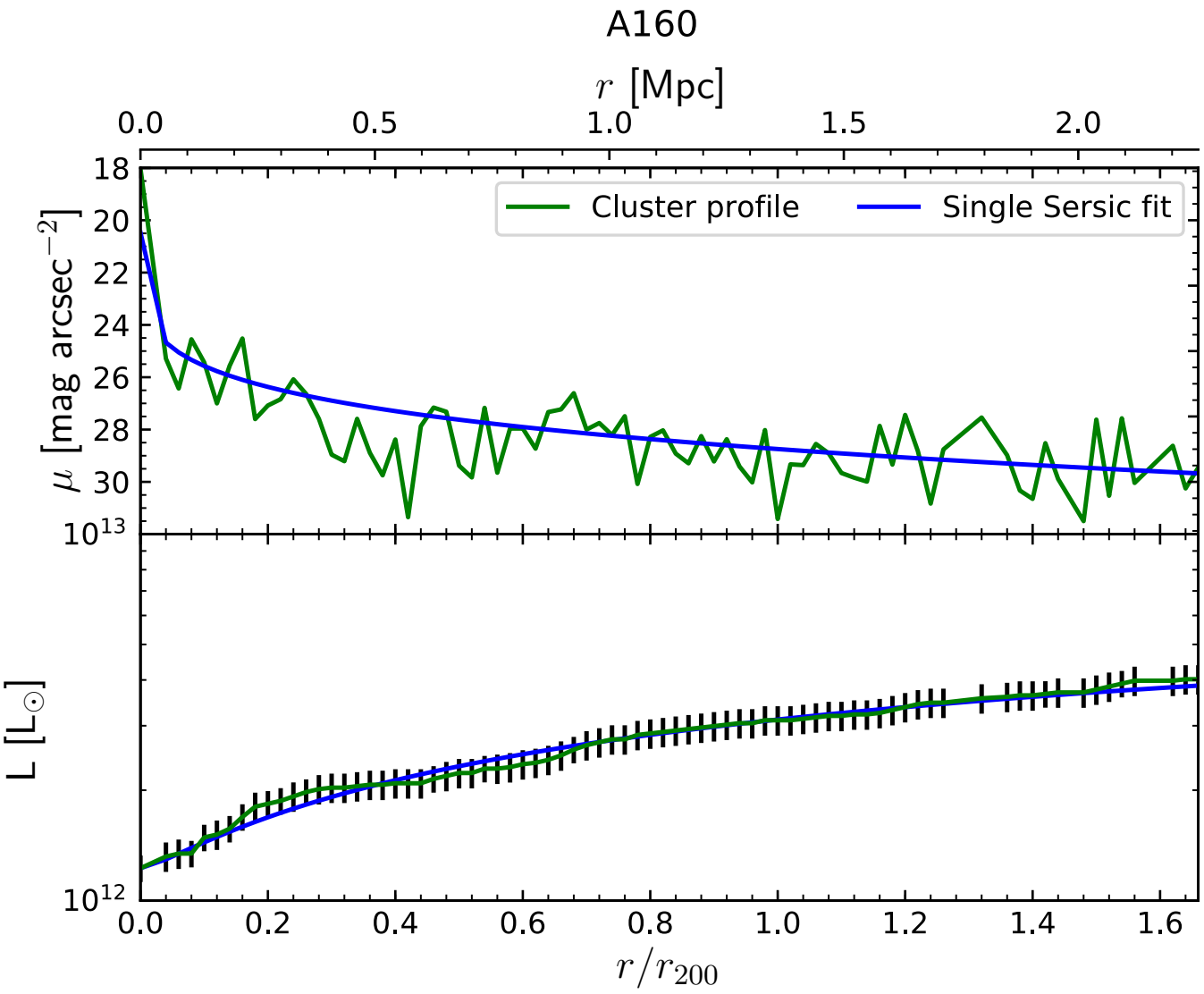
A160



The cluster growth curves



The fit with the Sersic law



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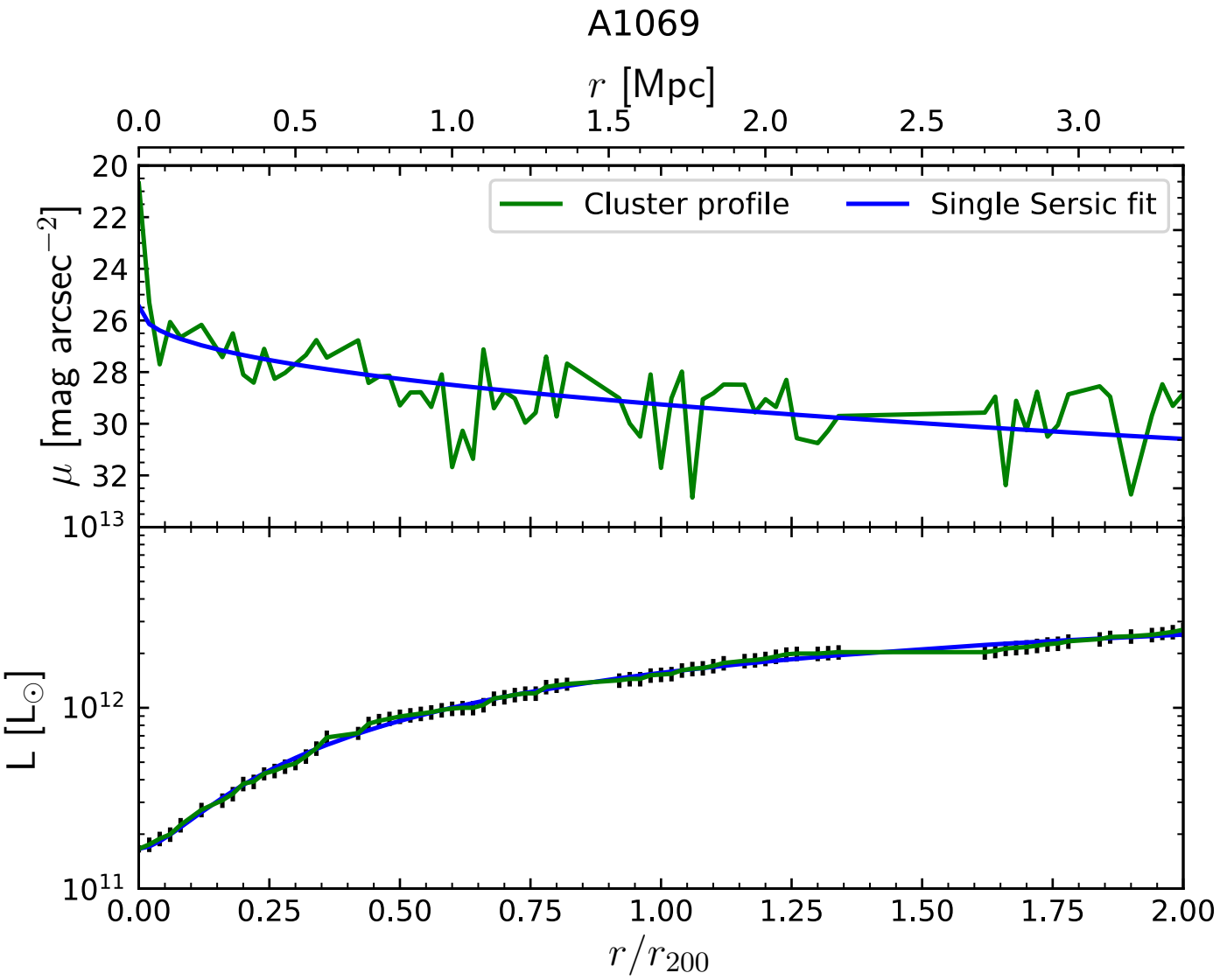

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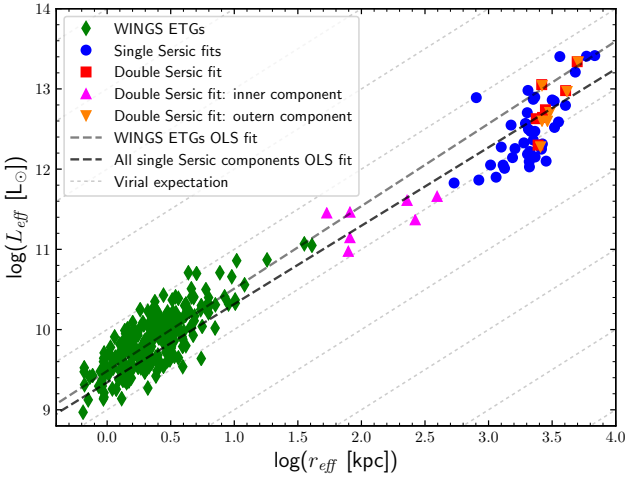
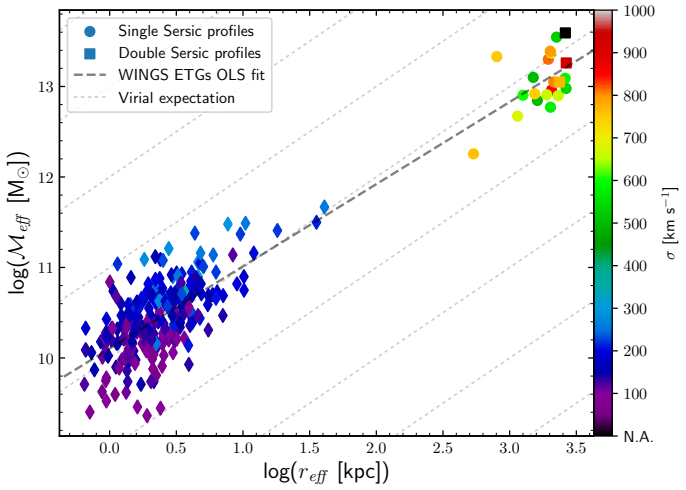
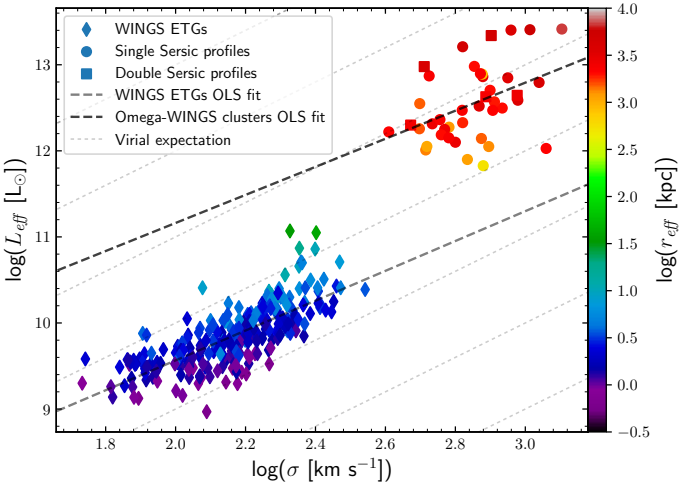
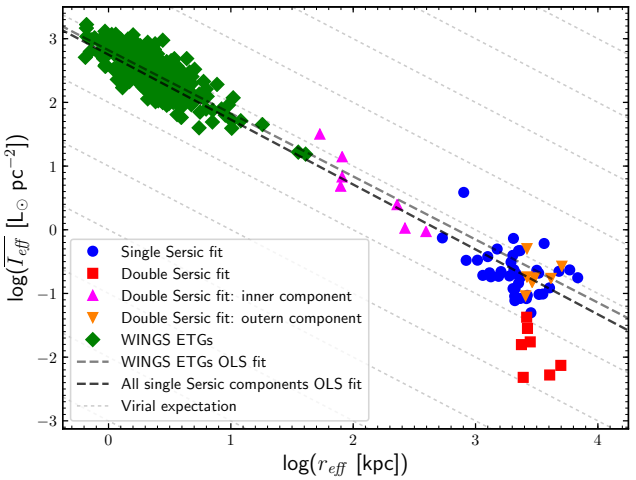
Scaling relations of galaxies and clusters

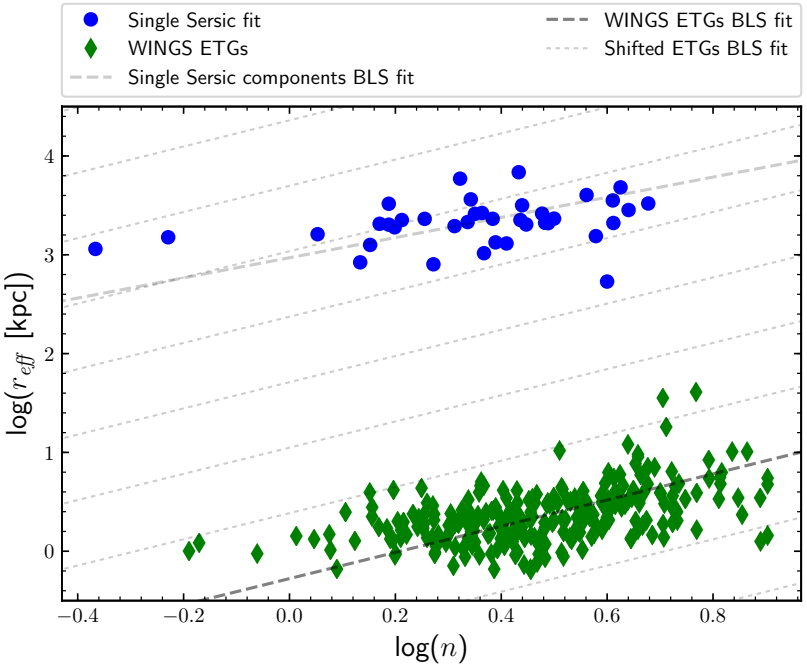


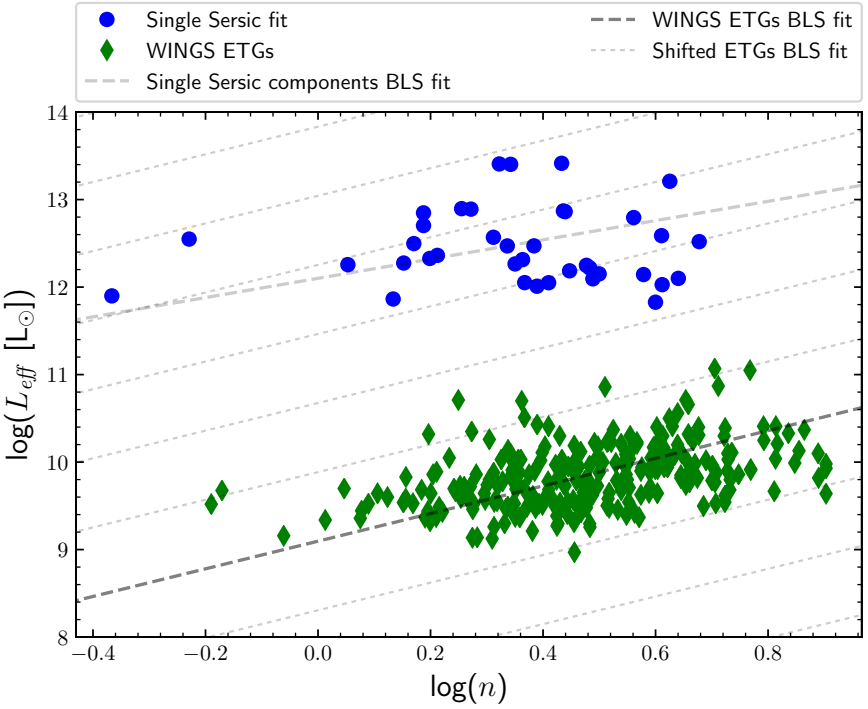




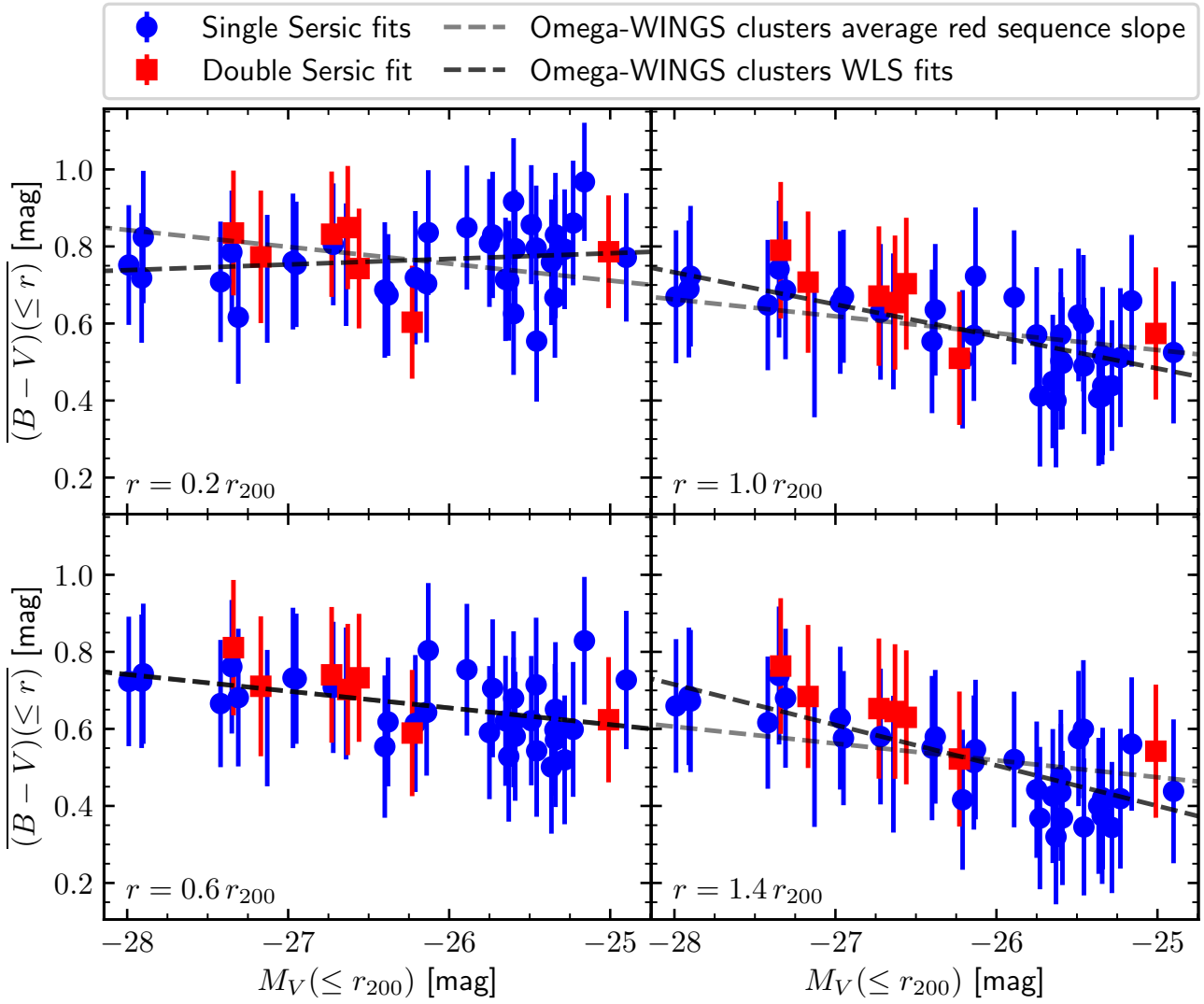


The non-homology of clusters

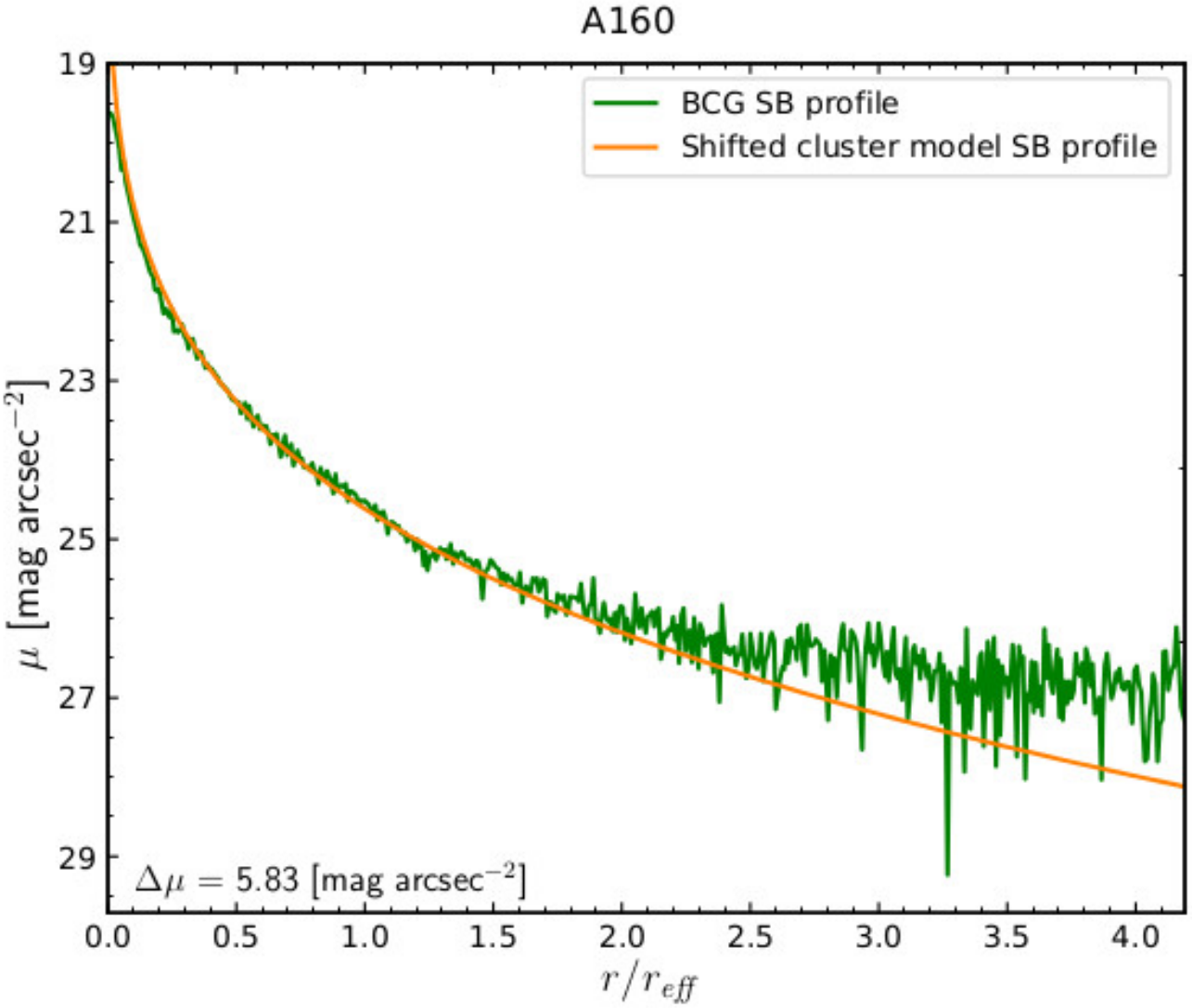




The c-m relation of clusters



The BCG-cluster connection



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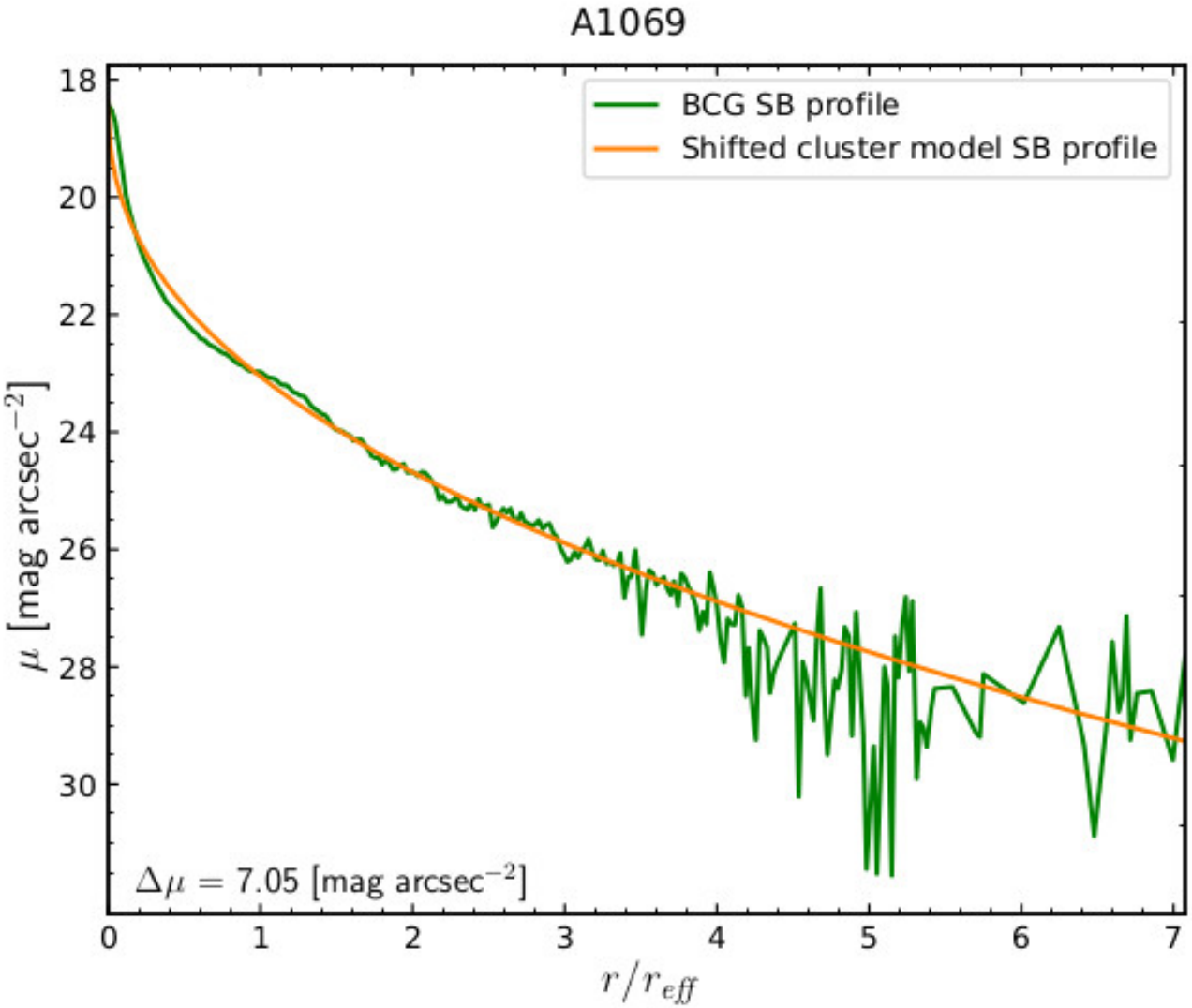

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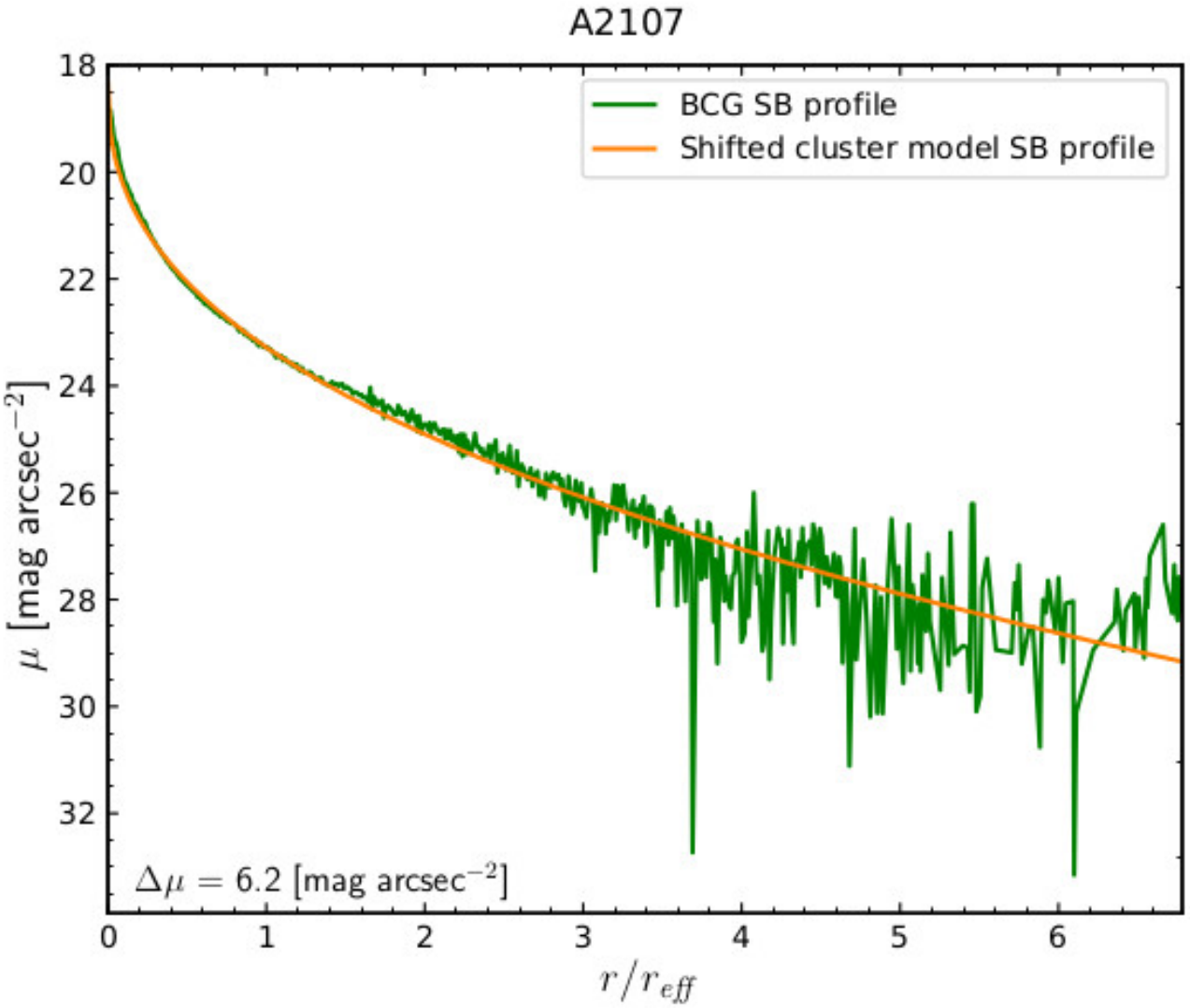

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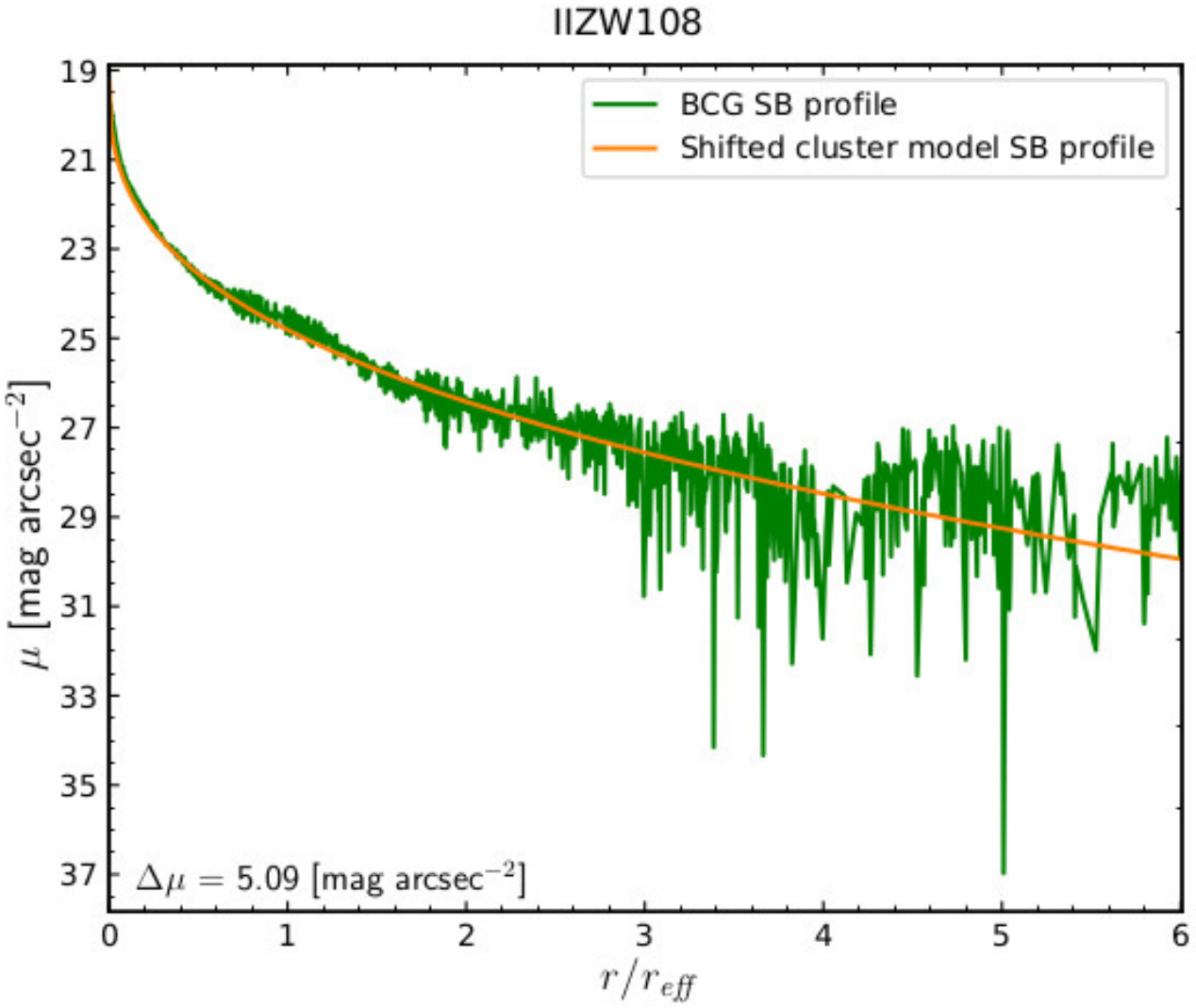
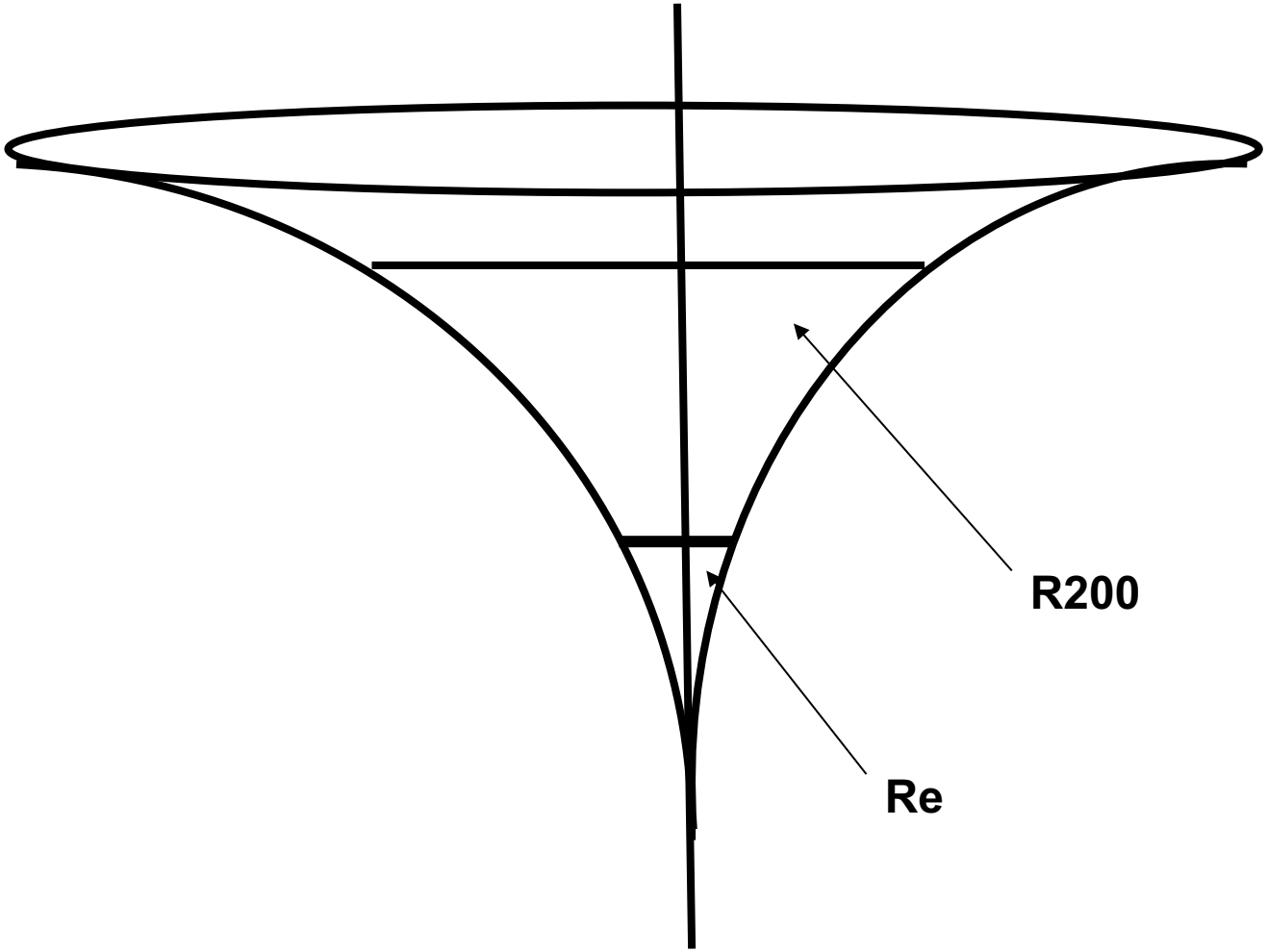


THE WINGS BCG-CLUSTERS

Heuristic interpretation



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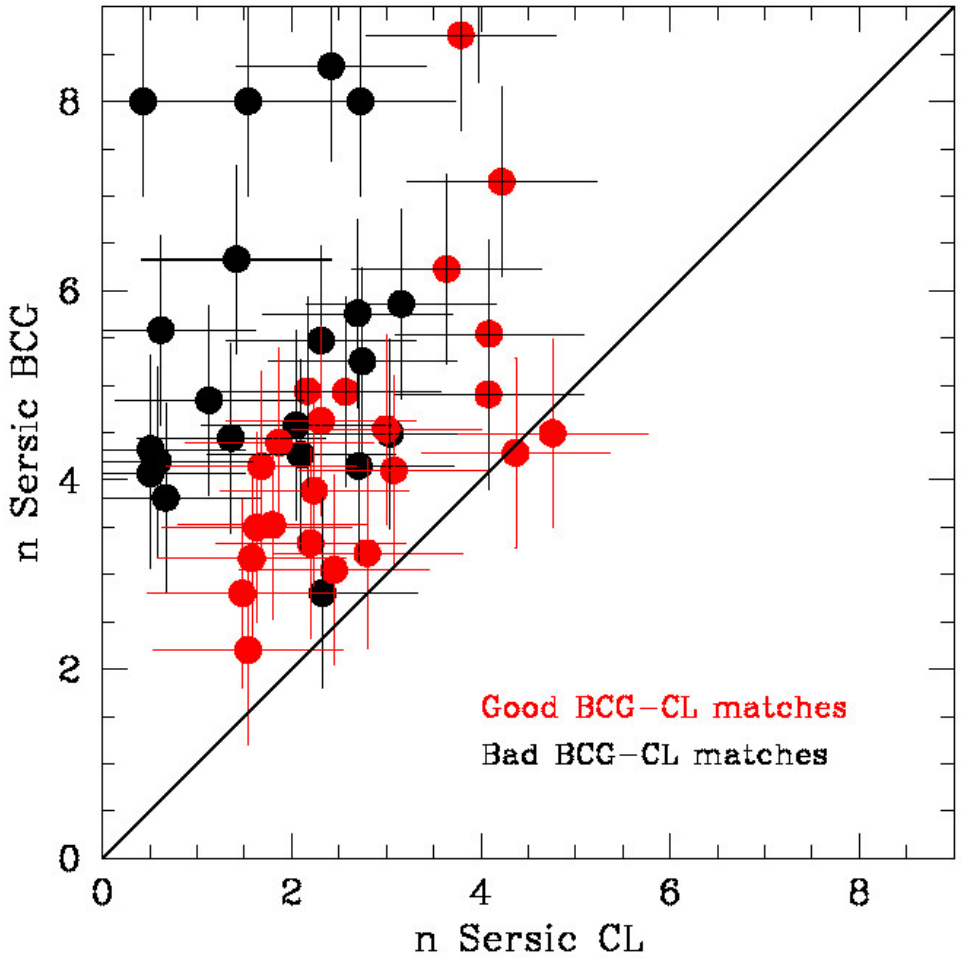

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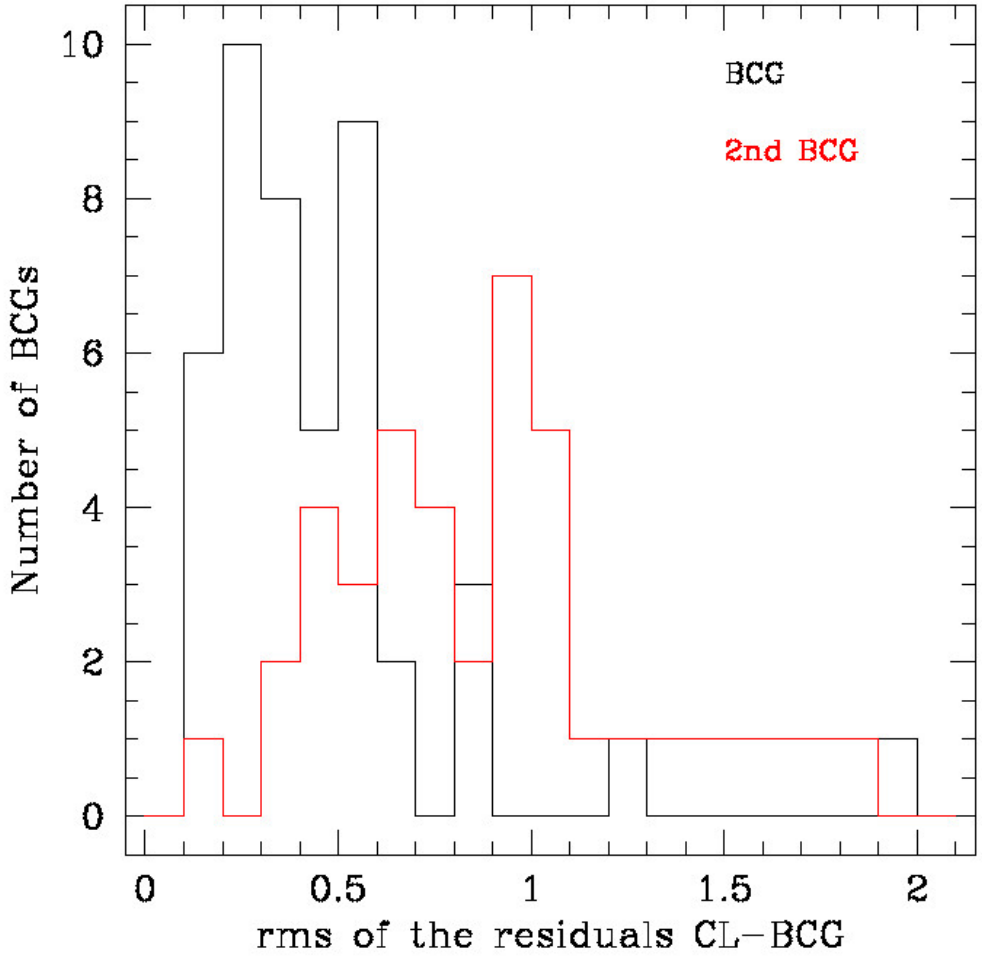

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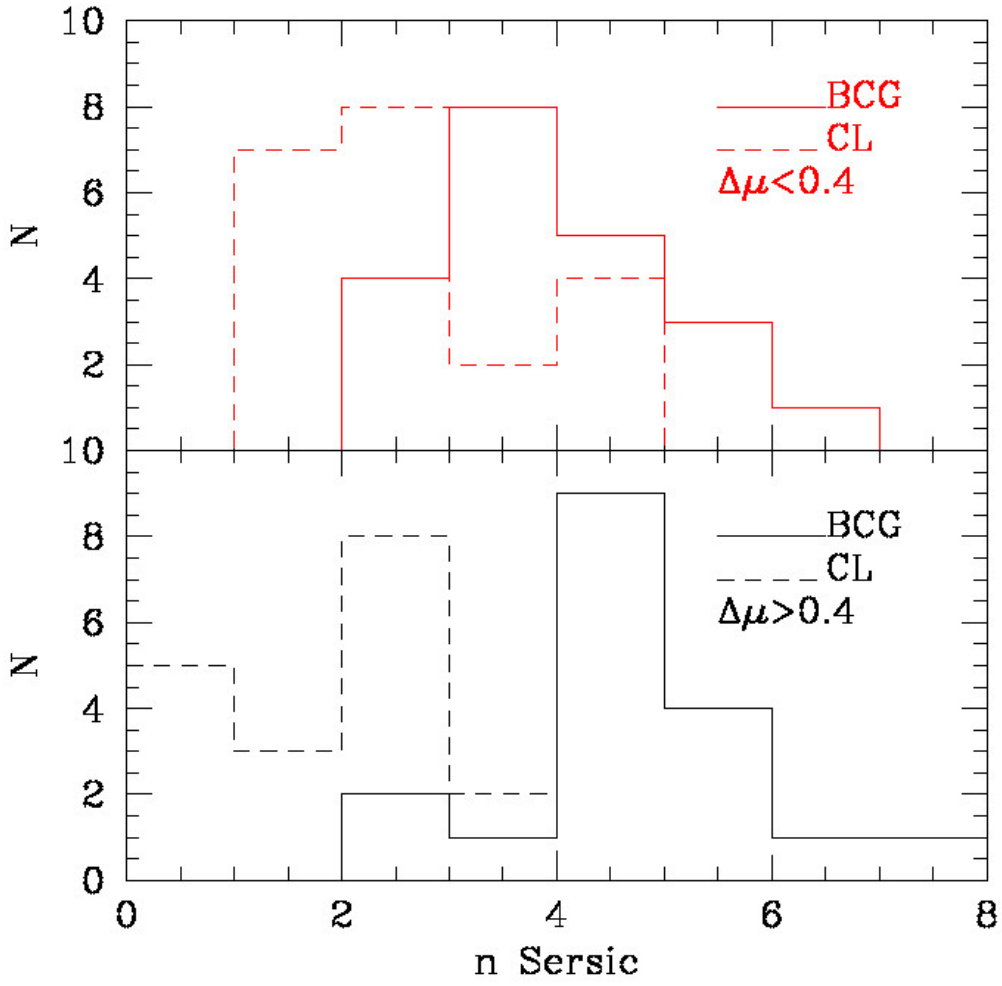

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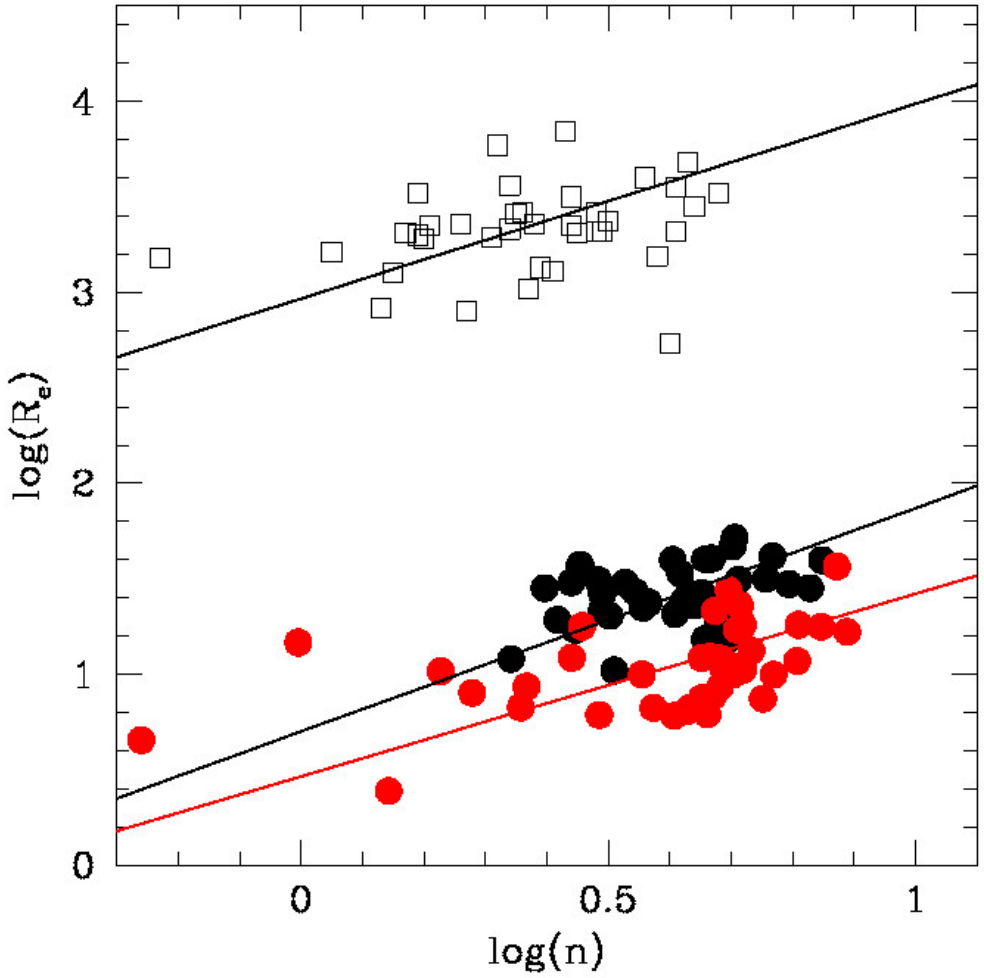

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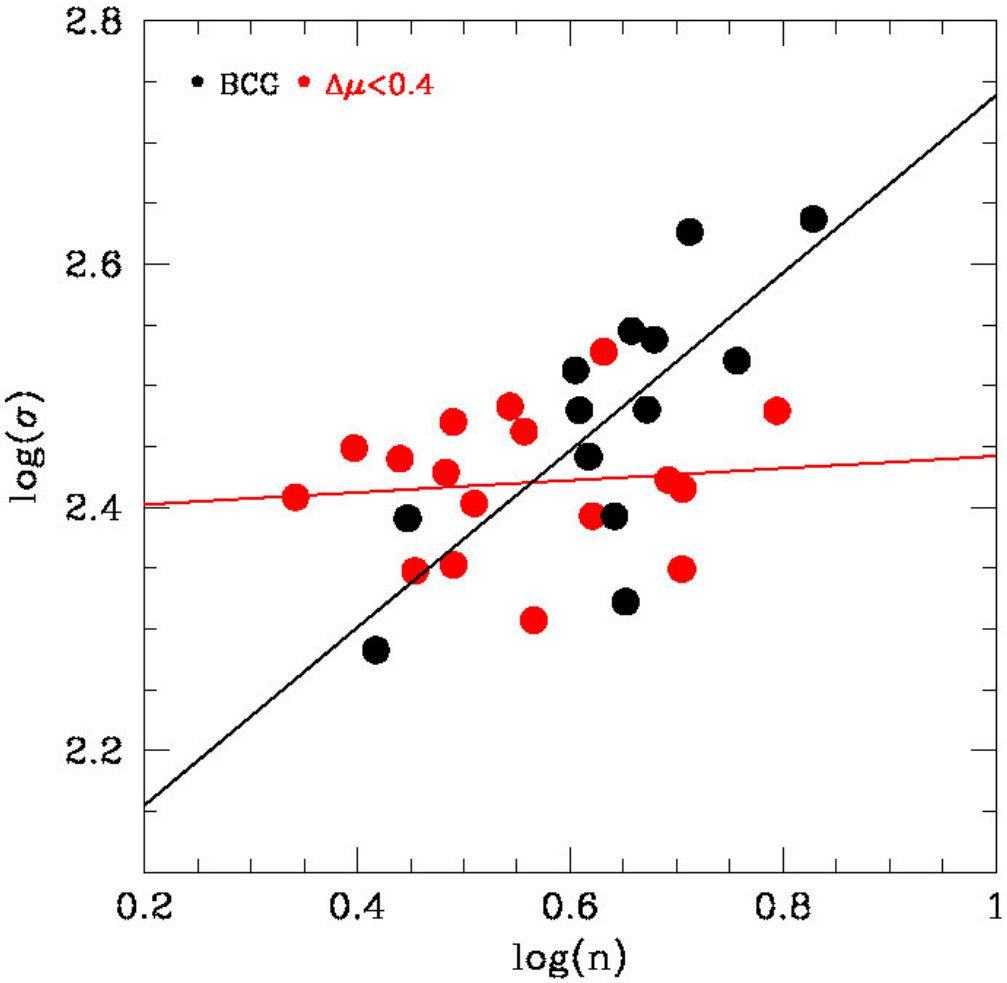
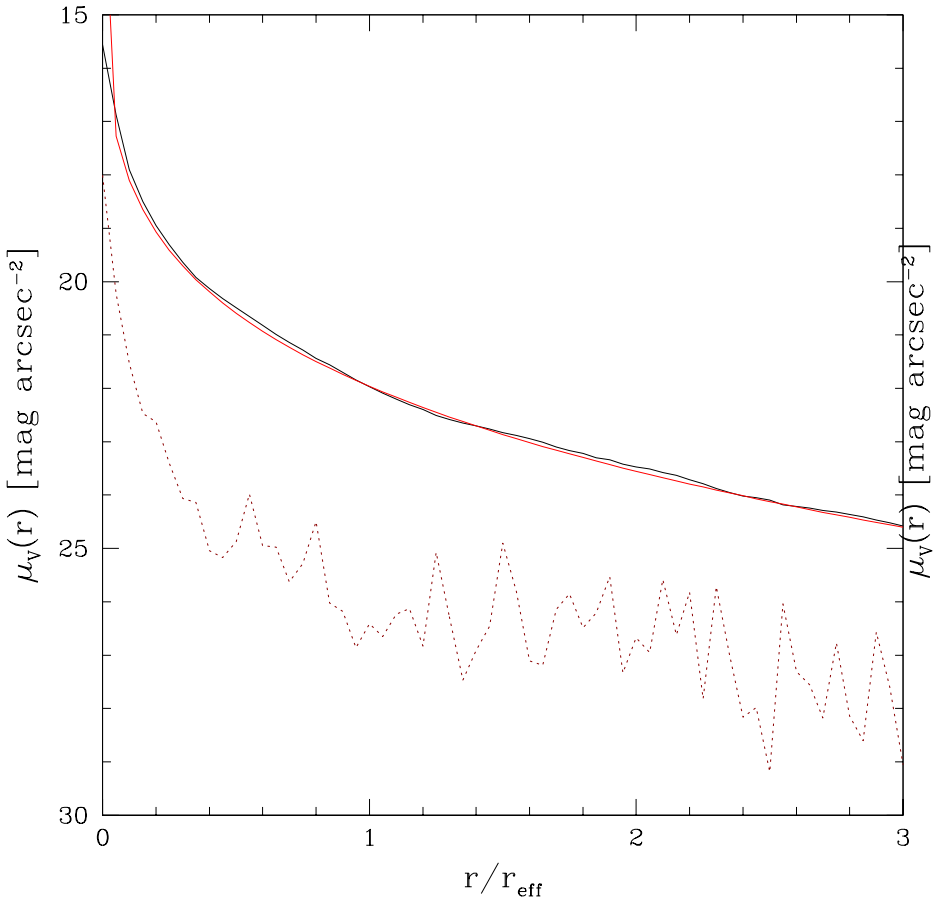
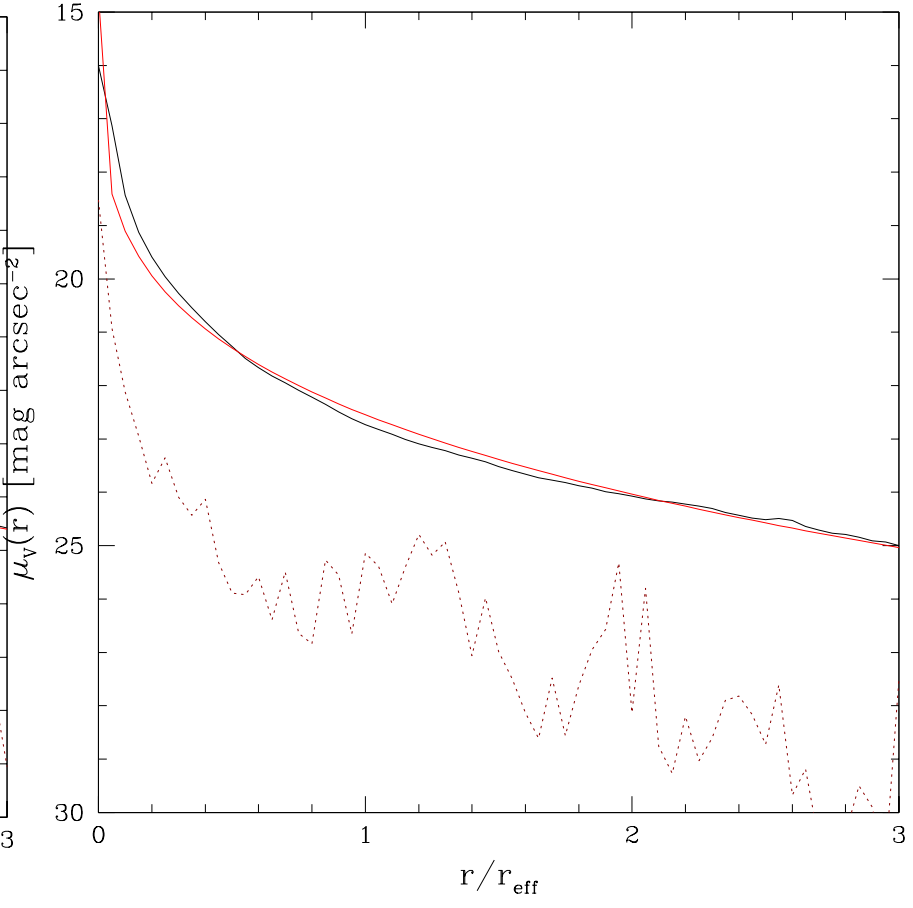


The BCG-cluster connection
The Illustris prediction





Conclusions

The WINGS-OMEGAWINGS data provide a direct evidence that up to 50% of the BCGs have the same Sersic index of clusters when we look at the normalized circular growth curves.

The correlation between n and sigma found for the BCGs that do not match the cluster profiles suggests that the evolution of the BCG and the cluster are strongly coupled.

Further studies should address the main mechanisms responsible of such behavior.

The existence of such match between the BCG and cluster profiles could be a powerful tool to investigate the evolution of structures in the Universe.