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## Introduction

**CONTEXT:** Early Type Galaxies (ETGs) represent most of the massive galaxies today. To have a better understanding of their formation and evolution, their environment is one of the key properties that needs to be investigated. A significant dependence of the star formation histories of galaxies with their environment has been observed.

**GOAL:** We aim to characterize local ETGs within 2 clusters at a different stage of their evolution, Virgo, a young cluster still in formation, and Coma, an older and more virialized cluster.

**METHODS:** We first seek potential differences in physical parameters (such as L24/LK, SFR, optical colors, R/R200, etc.) among ETGs in Virgo and Coma. This leads us to select a subpopulation of sources with an extreme L24/LK ratio. In a second phase, we study these "excess sources" in details (color diagrams, nature of these sources [AGN or star-forming], spatial distribution inside their clusters, ...)

## Data

We select ETGs (T-parameter less than 0) detected at 24 μm and in the K-band that reside in the Virgo and Coma cluster:

**Virgo Cluster:**  
 66 sources (Amblard et al. 2013 and Leipski et al. 2012)  
 34 E and 32 S0  
 14 AGN (21%): 11 E and 3 S0

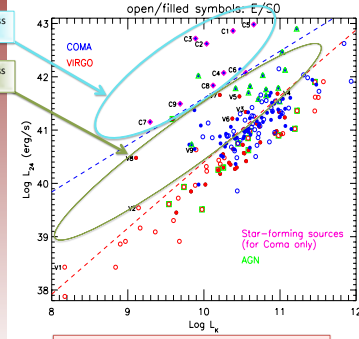
**Coma Cluster:**  
 124 sources (Mahajan et al. 2010)  
 49 E and 75 S0  
 16 AGNs (13%): 2 E and 14 S0

## Motivations

A tight correlation between the 24μm luminosity and the K-band luminosity is expected for Ellipticals (Temi +07,09,Young+09).

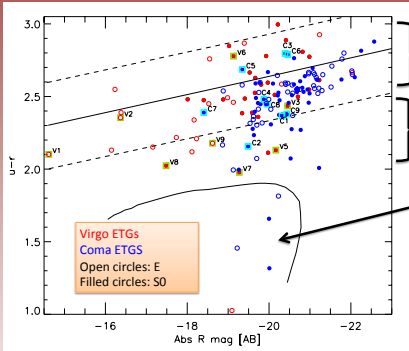
For Coma and Virgo we see some scatter in this relation: the blue and red dashed lines show the « excess sources » limit.

The Coma excess sources are all lenticulars while 3 sources out of the 10 Virgo excess sources are ellipticals.

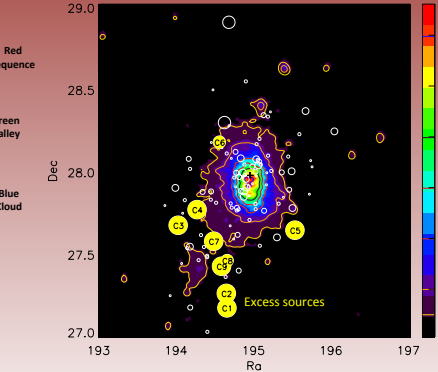


We want to explore the nature of these excess sources.

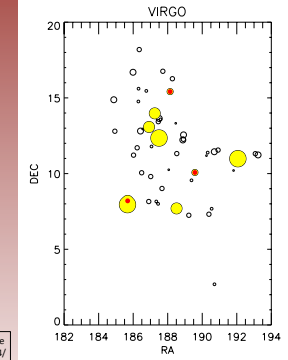
## Comparison between the Virgo and Coma cluster



Red sequence vs Blue Cloud diagram: Coma excess sources are mainly located on the red sequence (except for C2) while the Virgo excess span the whole u-r color range for this cluster and are half on the red sequence and half in the green valley. The Coma excess sources and the Virgo ones are different by nature.



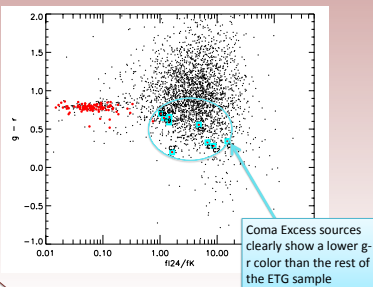
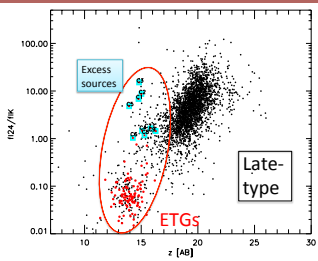
The excess sources in Coma are mainly located in the **South-West part** of the cluster (except for C5 and C6), a region known to **undergo a merger**. This could enhance the star formation in these lenticular sources. For Virgo, the excess sources are located randomly throughout the cluster. In the rest of our study, we will focus on the Coma excess sources only.



N.B.: the circles are proportional to L24/LK (i.e. star-forming activity)

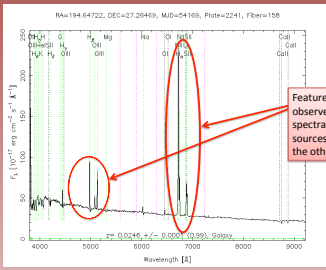
## Study of the Coma Excess Sources

Comparison with the late-type



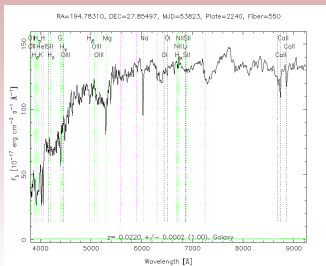
Coma Excess sources clearly show a lower g-r color than the rest of the ETG sample

Typical spectra of a Coma excess source



Features that we observe on the spectra of excess sources but not the other ETGs

Typical spectra of a Coma non-excess source



## Conclusions

- Coma and Virgo are two clusters at two different stages of their evolution. We observe sources with extreme L24/LK ratio only for Coma. These « excess sources » appear to lie in the SW region of the Coma cluster, where a substructure is infalling on the main cluster (e.g. Caldwell et al. 1993).

- These excess sources present L24/LK ratio similar to the late-type sources, unveiling a high star-forming activity.

- They have a rather normal u-r color compared to the rest of the ETG sample, but a substantially lower (g-r) color. This might be explained by strong OII/OIII features present in their spectra (particularly C1, C2, C3 and C7) that we do not observe in the rest of the ETG sample.

## References

- Amblard et al. 2013
- Caldwell et al. 1993, AJ, 106, 473
- Leipski et al. 2012, ApJ, 744, 152
- Mahajan et al. 2010, MNRAS, 404, 1745
- Temi et al. 2007 & Temi et al. 2009
- Young et al. 2009, AJ, 137, 3053