Growth of Massive Galaxies Based on Outer Stellar Populations

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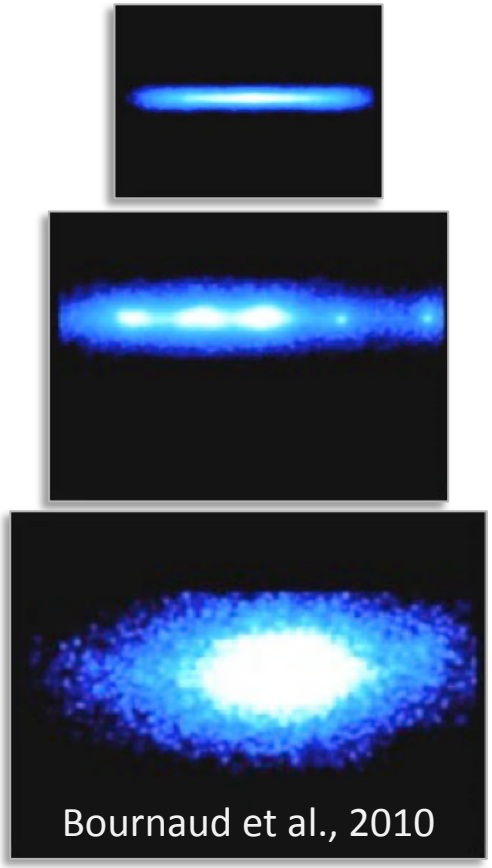
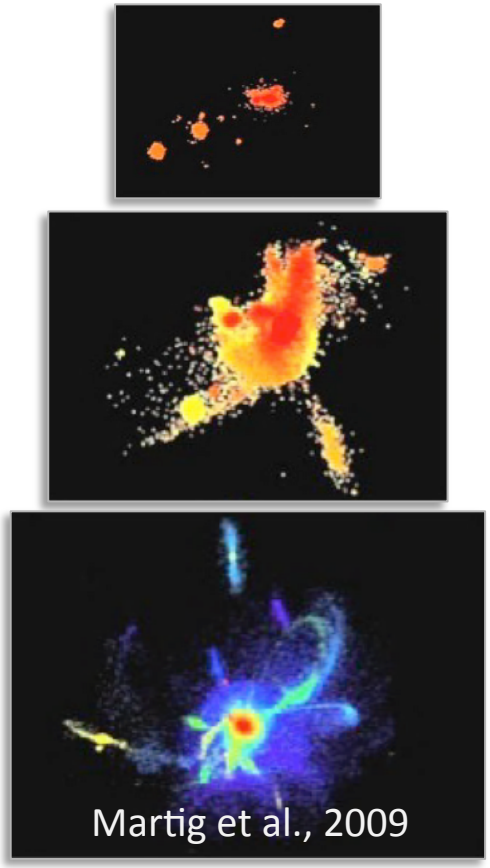
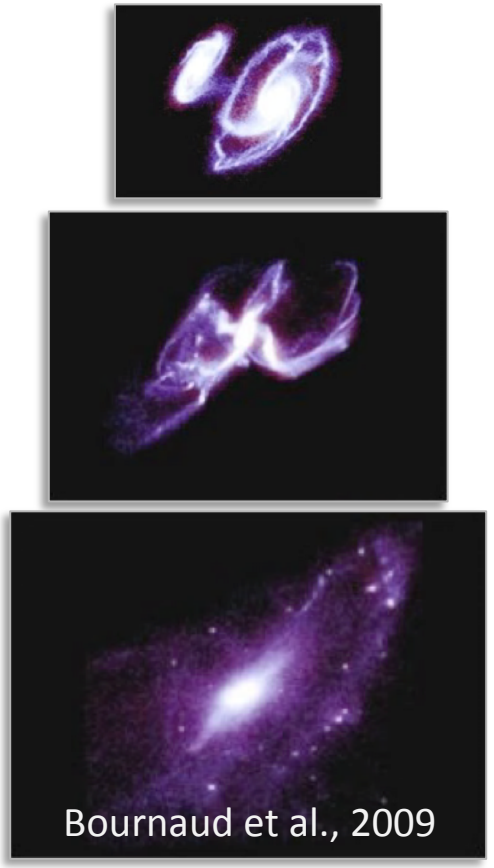
Mass Growth of Galaxies

- Outer stellar populations as indicators of collision history.
- Aim: tracing in-situ or merger growth for each galaxy.

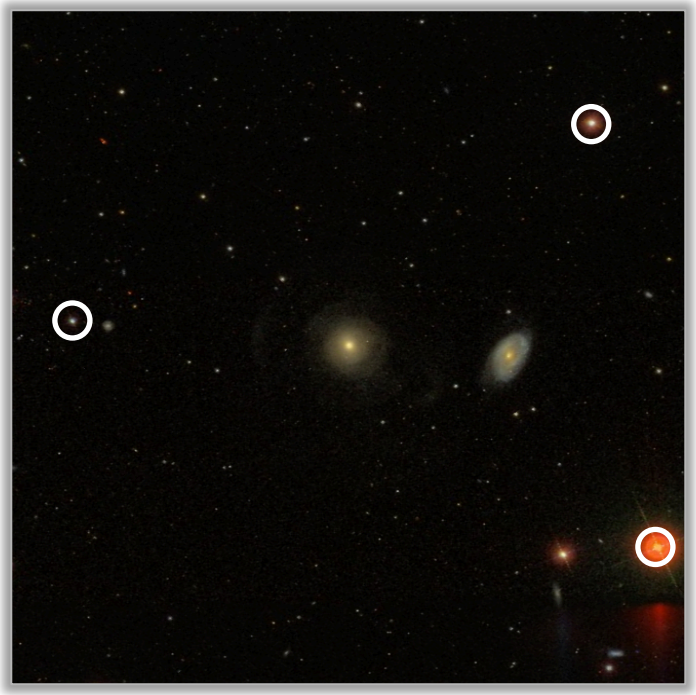






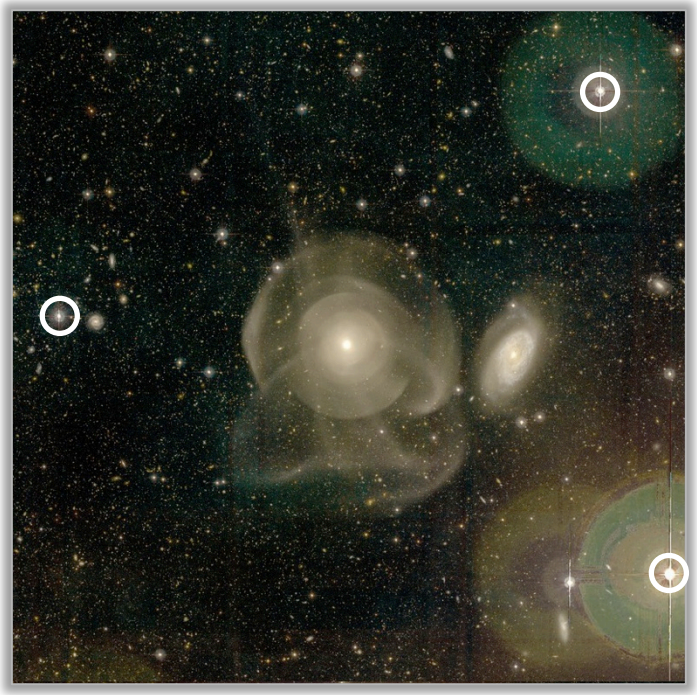
MegaCam Data: Deep Images

- 260 ATLAS3D ETGs (D < 42 Mpc) – g, r, i bands
- Reaching brightness limit 29 mag.arcsec^{-2}
- Complete Sample: ~ Late 2015



SDSS

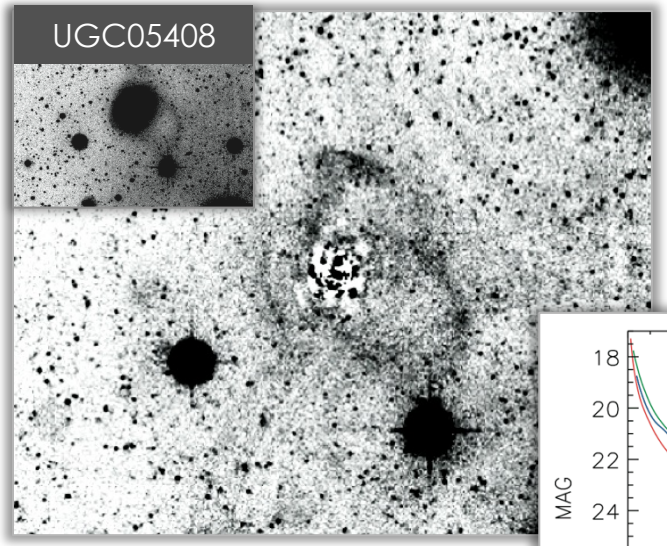
NGC474

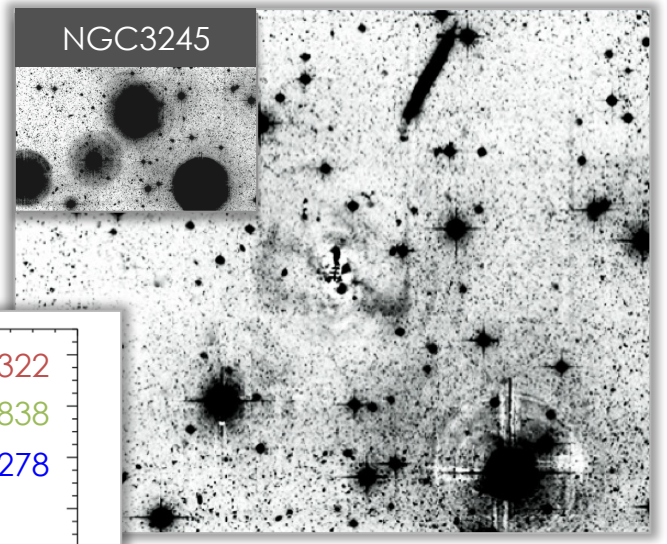


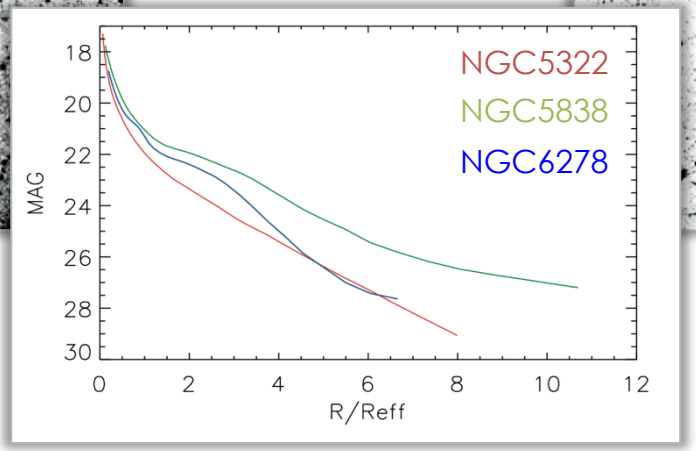
MegaCam

Global Analysis : Light Profiles

- **92 galaxies** as part of our preliminary work.
- Fine structures in residual images.
- Single or multiple Sersic profiles with/without bumps.

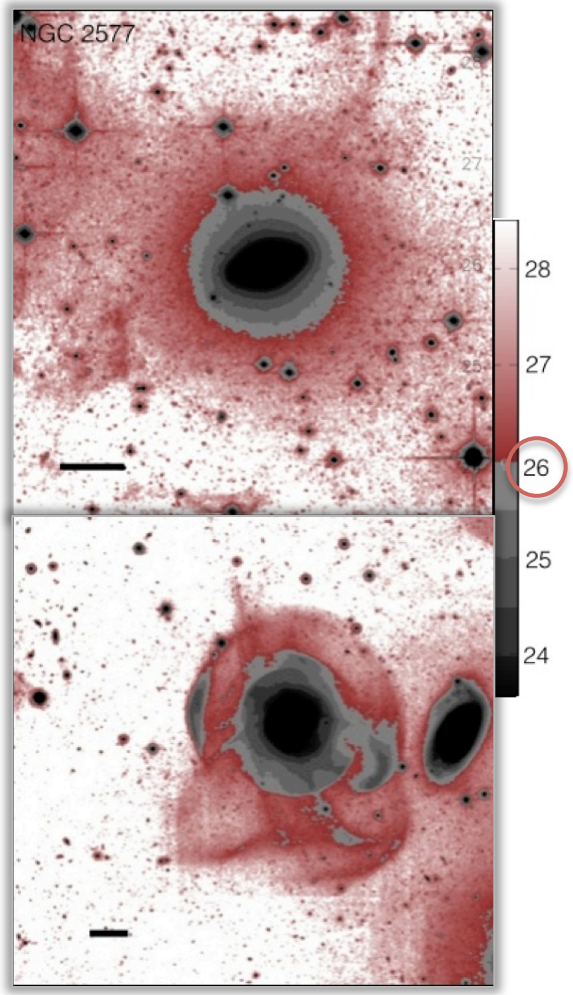




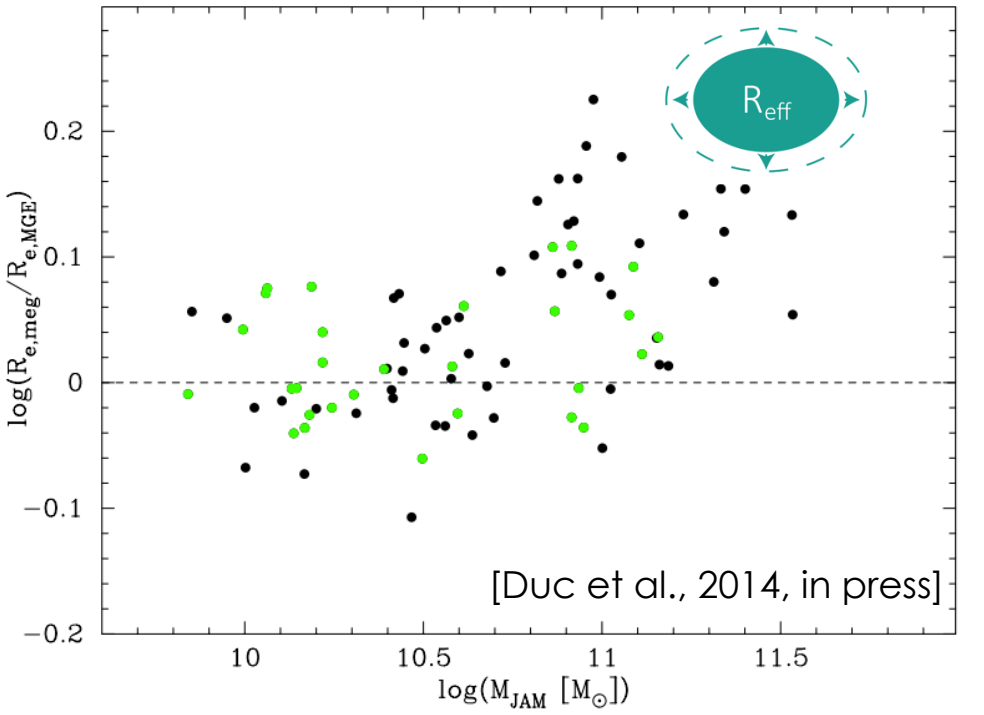


Global Analysis : Extra Flux

~ 6% of total flux > 26 mag.arcsec^{-2}

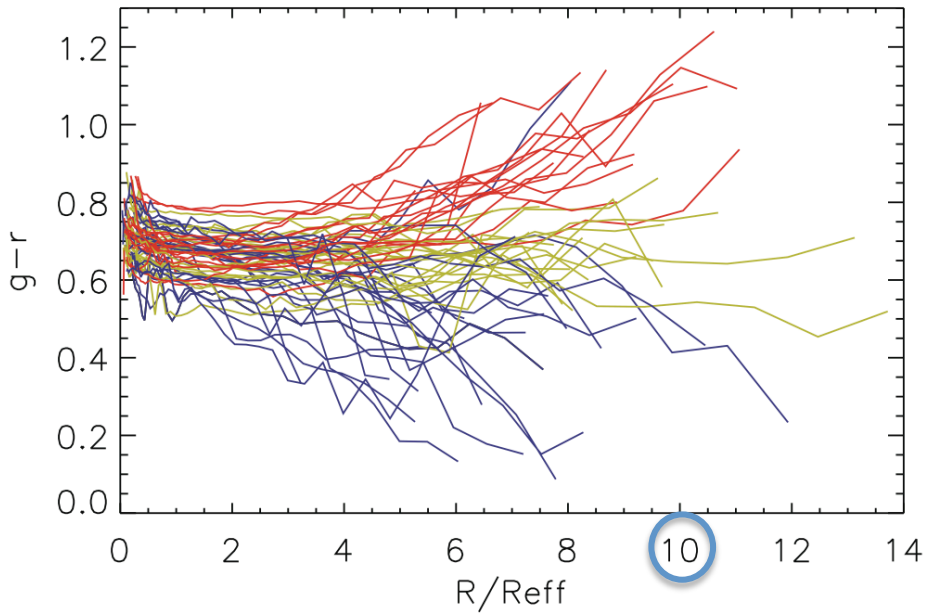


R_{eff} excess compared to values derived from shallower images.

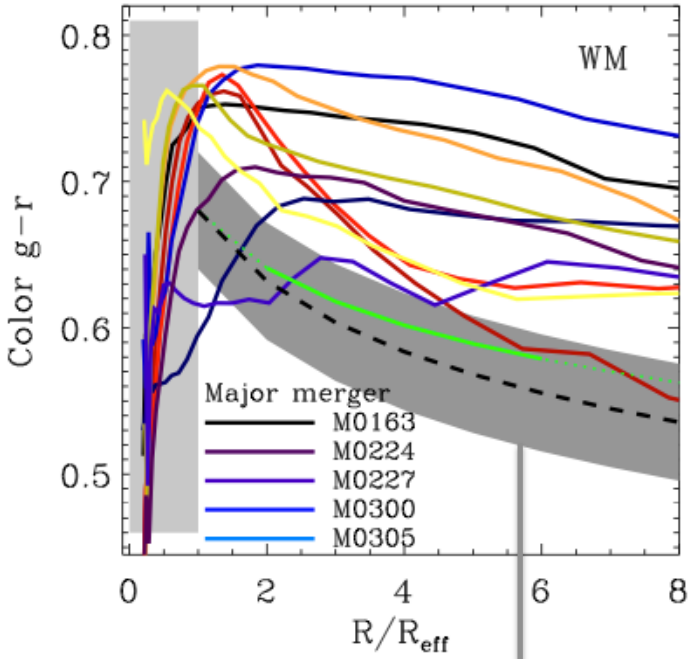


Color Profiles

- Ellipse fitting, multi-band analysis.
- Three groups: reds, flats and blues.
- **Suspicious red ones… Are they real?**



[Hirschmann et al. 2014, submitted]



La Barbera et al., 2012

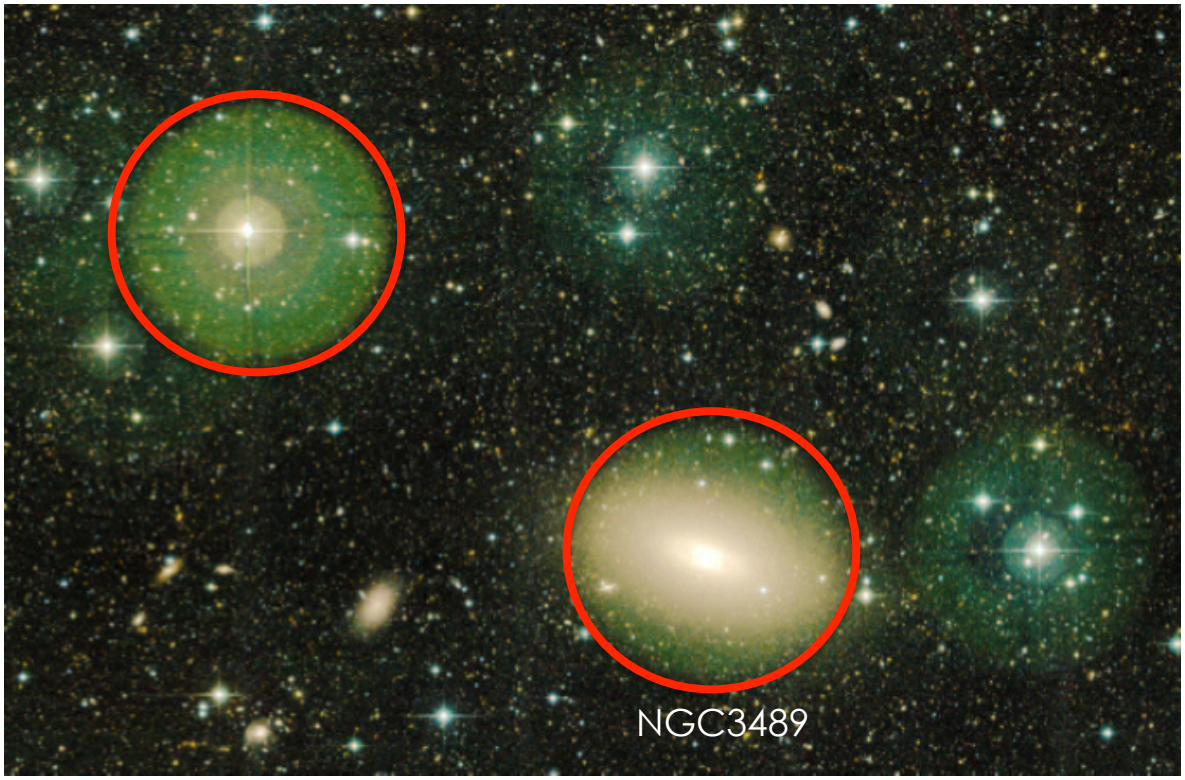
Contamination: meet the enemies

- Fundamental problem of deep imaging: **galactic cirrus**.

Contamination: meet the enemies

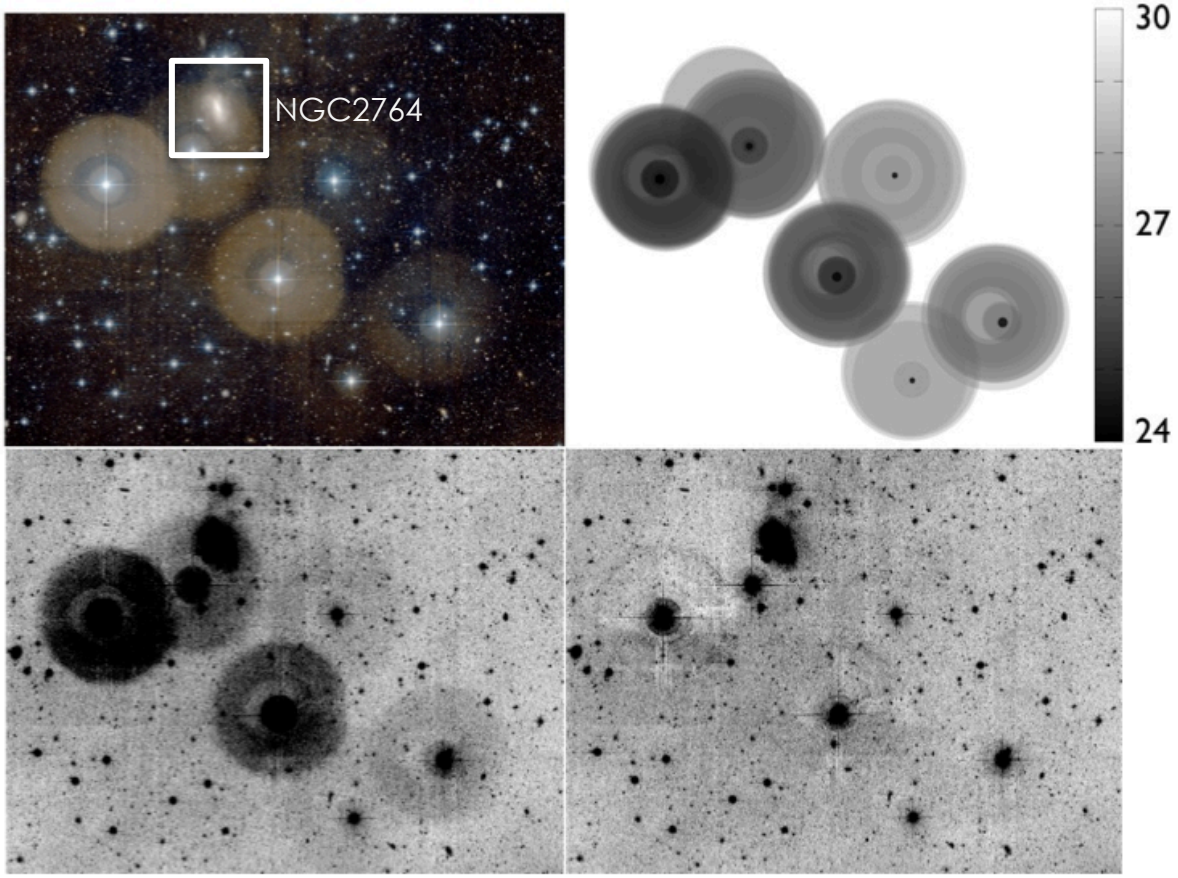
- Bright objects (stars and galactic nuclei) produce **artificial halos**.
- They are about same size!

[Duc et al., 2014, in press]



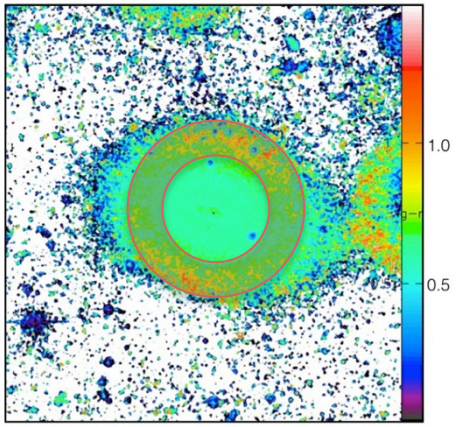
Contamination: meet the enemies

- Stellar ghosts are empirically modeled and removed. Instrument model?
- Galactic ghosts cannot be easily modeled! Instrument model can help.

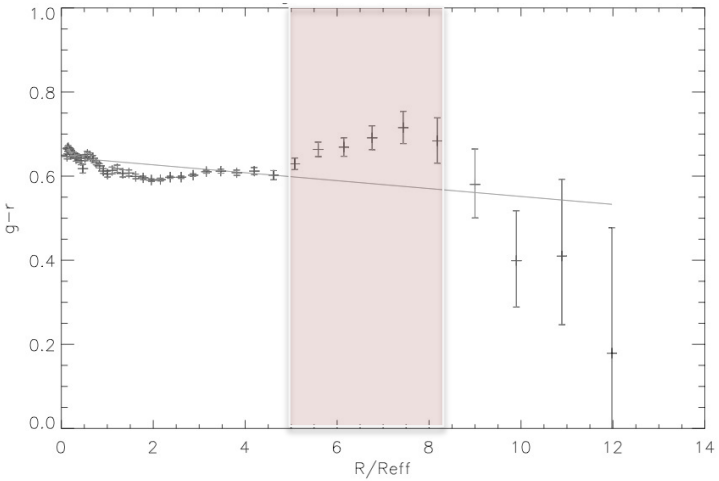


Reddening

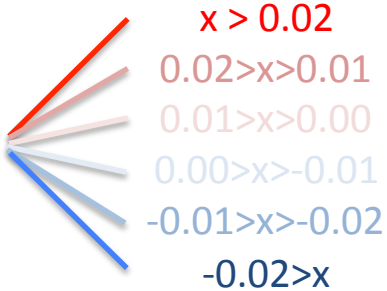
- Galactic ghosts have a fixed angular size! Their importance thus depends on the galaxy size.

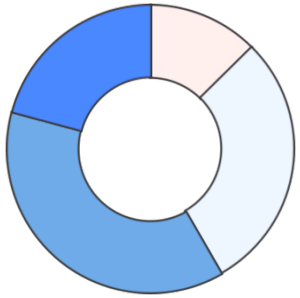


NGC3489

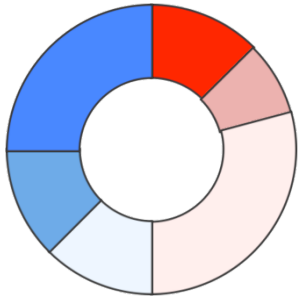


Slope distribution of subsample of 24 "clean" objects.





Whole range.
[x=-0.013]

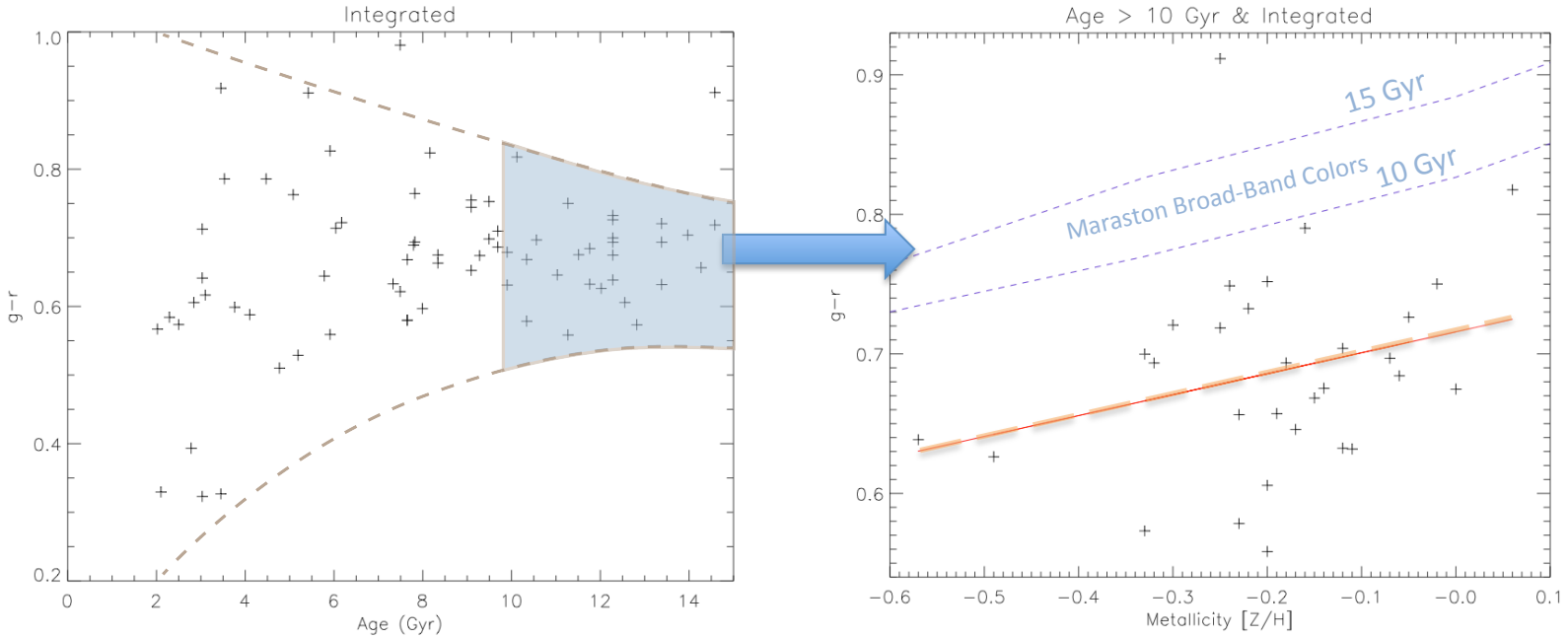


2-6 R_{eff} range.
[x=-0.005]

Strong variety!!!

Age and Metallicity vs Color

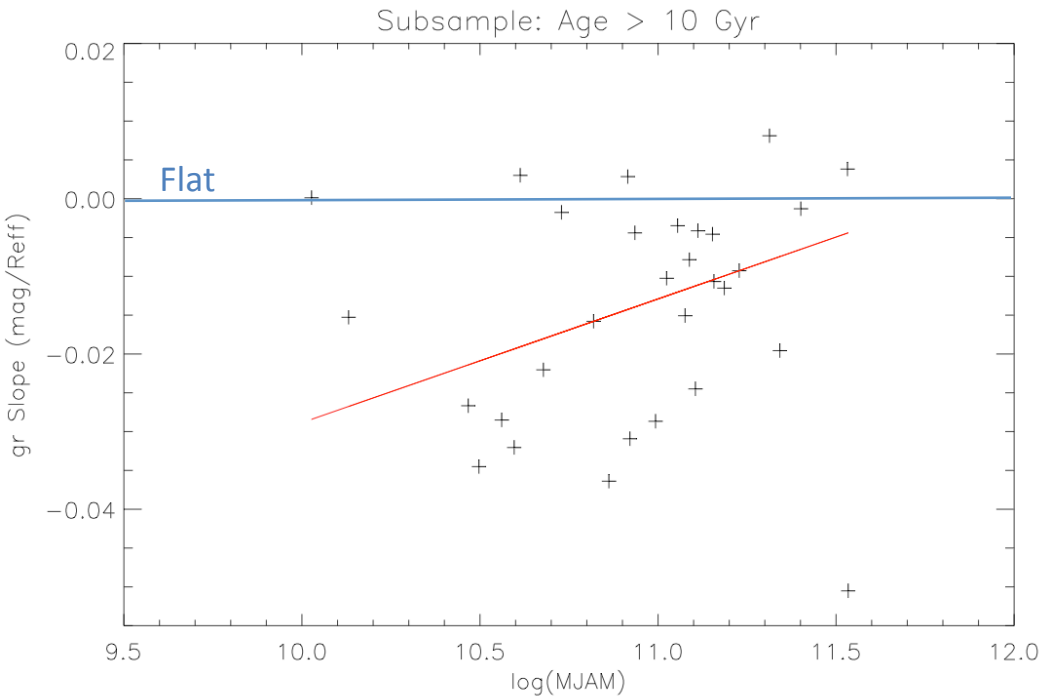
- Integrated color vs IFU data from ATLAS3D within 1 R_{eff}. [McDermid et al. 2014, submitted]
- Age has less impact on color for populations older than 10 Gyr.
- Color map into metallicity.



The influence of galactic ghost is negligible within 1 R_{eff}!!

Gradient vs Mass

- On average, slightly flatter profiles than predicted from simulations.
- Evidence for more massive galaxies having flatter profiles.
- Simulations: minor mergers > strong gradient.



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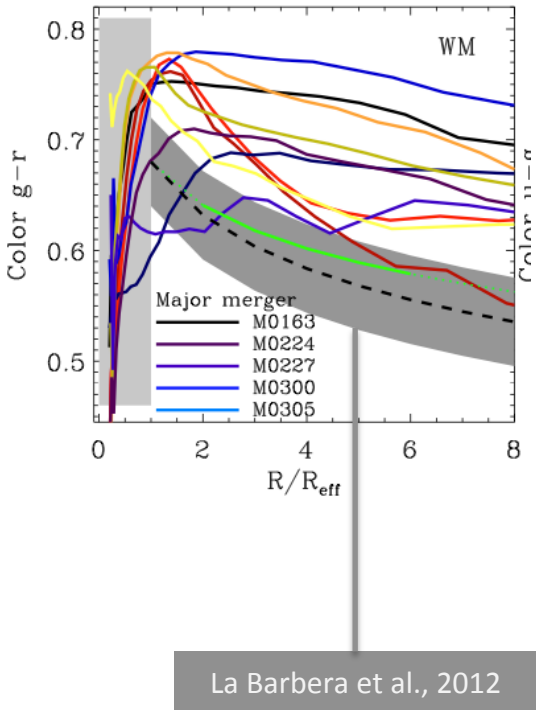

La Barbera et al., 2012

Conclusions

- Color gives information at large R_{eff} where we lack spectroscopic data.
- Preliminary result: a variety of color profiles with slopes depending on galaxy mass.
- Analysis on not stacked but individual profiles of galaxies!
- Galactic ghost induces a reddening: a better correction is needed.

See Duc et al., 2014 for more true color images of our ETG sample.

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