



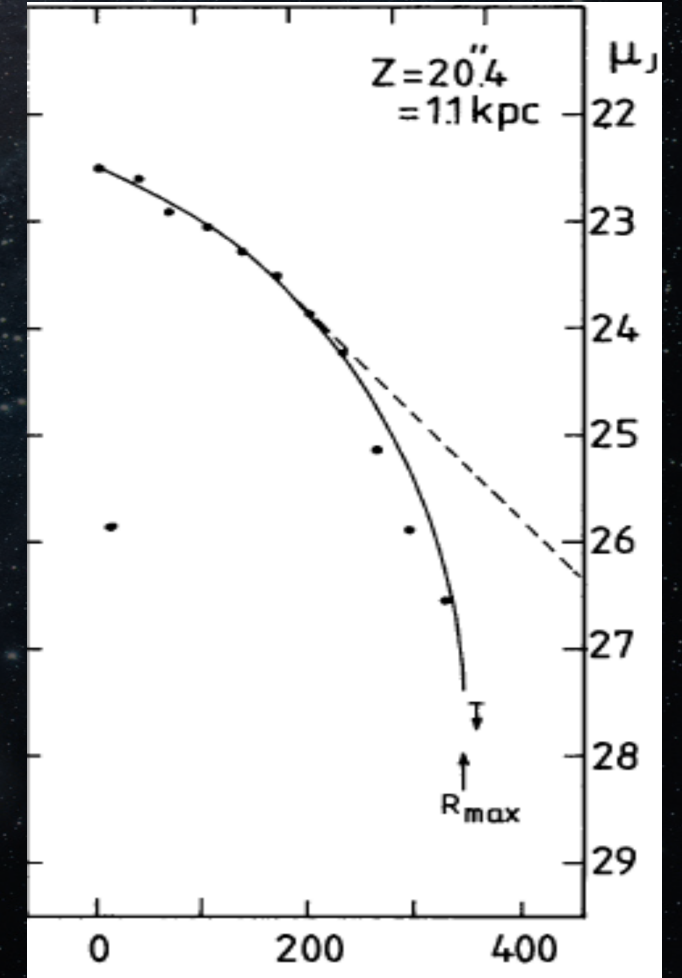
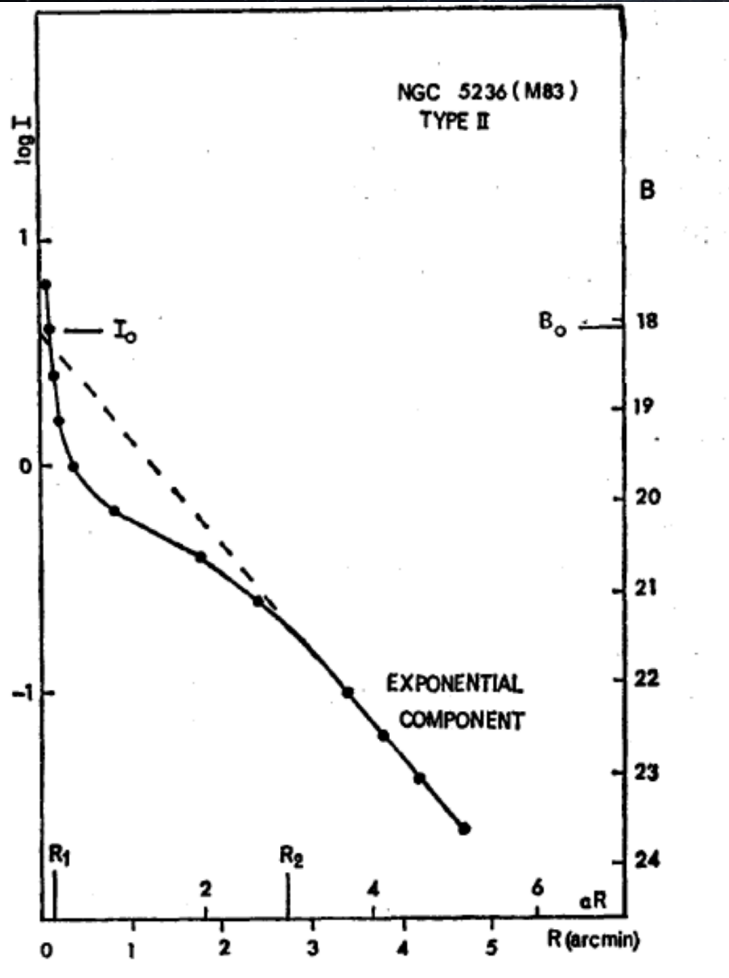
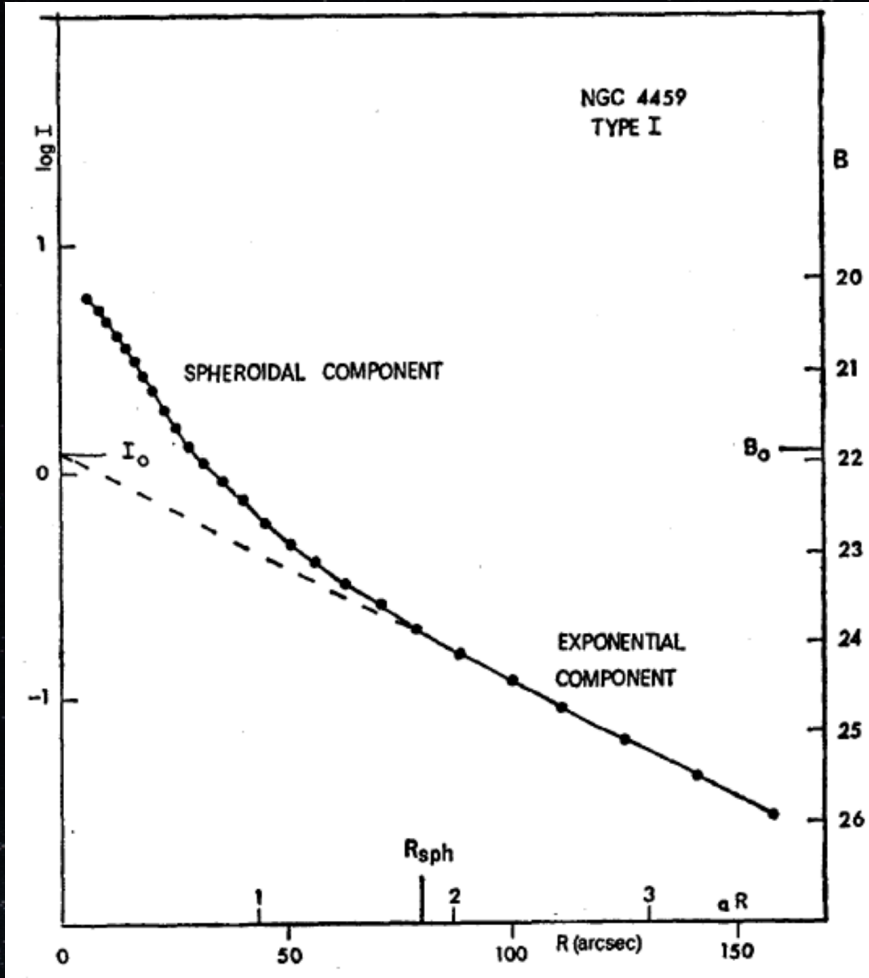
中国科学院国家天文台
NATIONAL ASTRONOMICAL OBSERVATORIES, CHINESE ACADEMY OF SCIENCES

Outskirts of Nearby Galaxies

Aug, 2024 @ 丽江

郑征 (国家天文台)

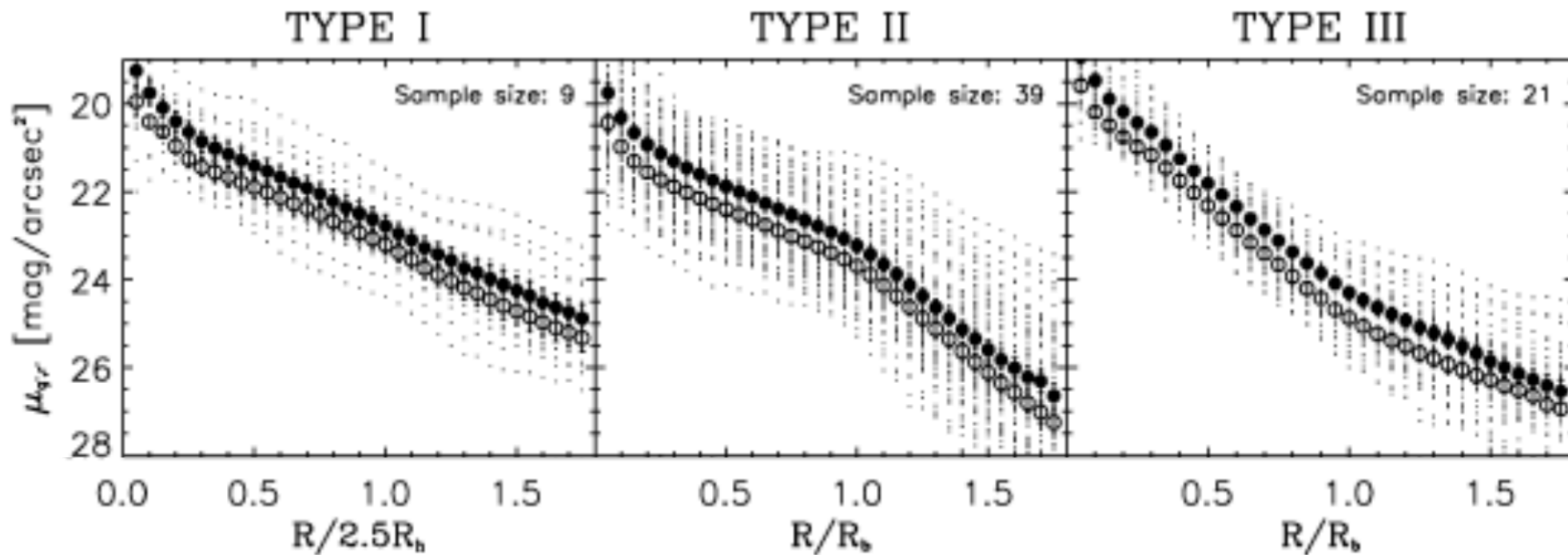
Surface brightness radial profiles



Single exponential (Freeman 1970)

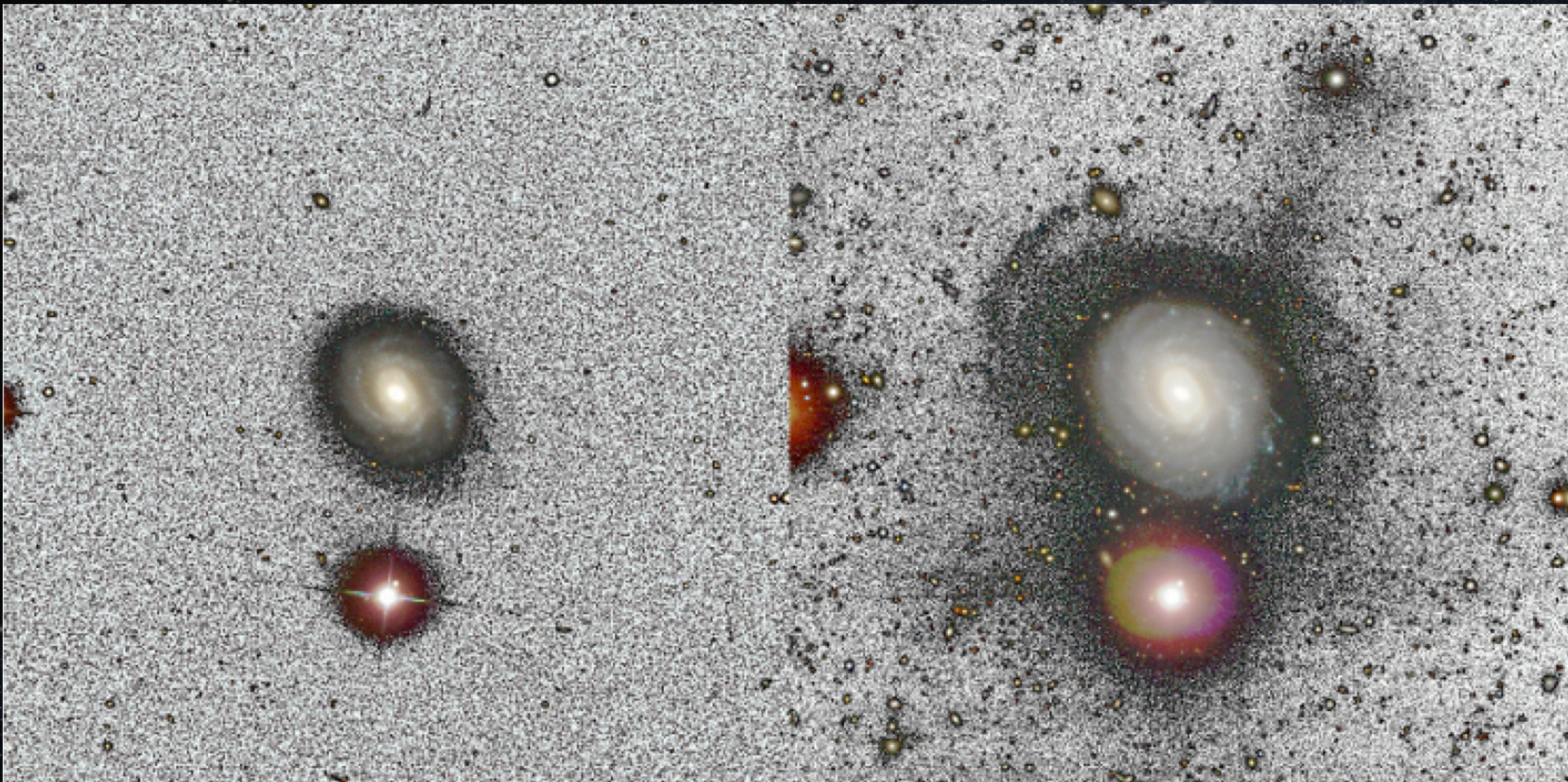
Truncated exp (van der Kruit & Searle 1981)

Outer disk

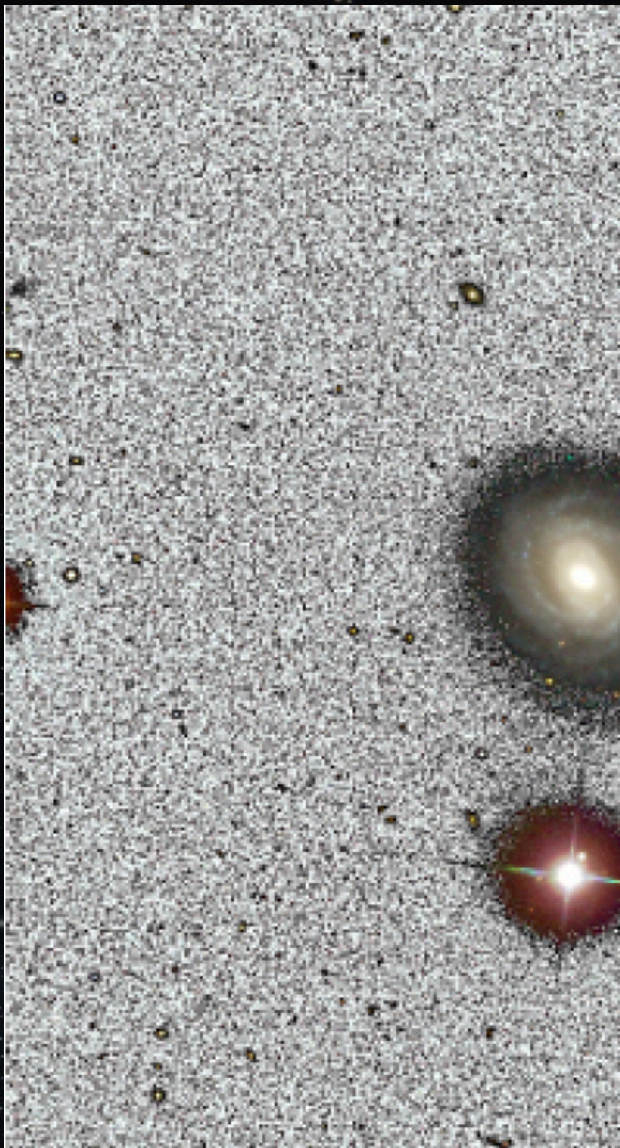


SDSS single exposure (~ 54s)

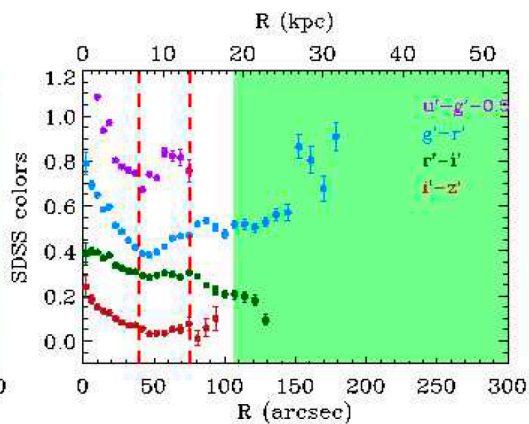
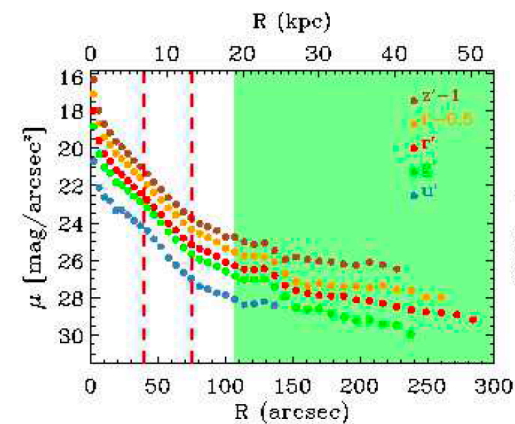
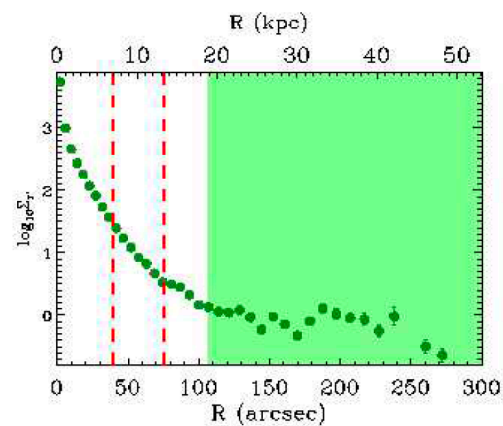
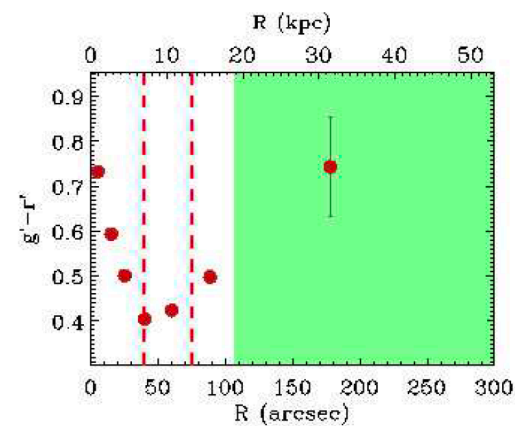
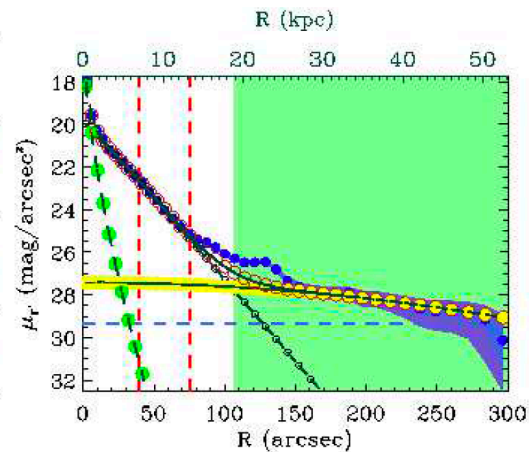
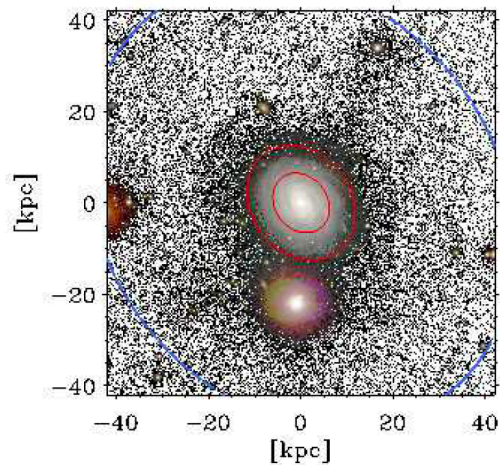
SDSS Stripe82 co-add (~ 4300s)



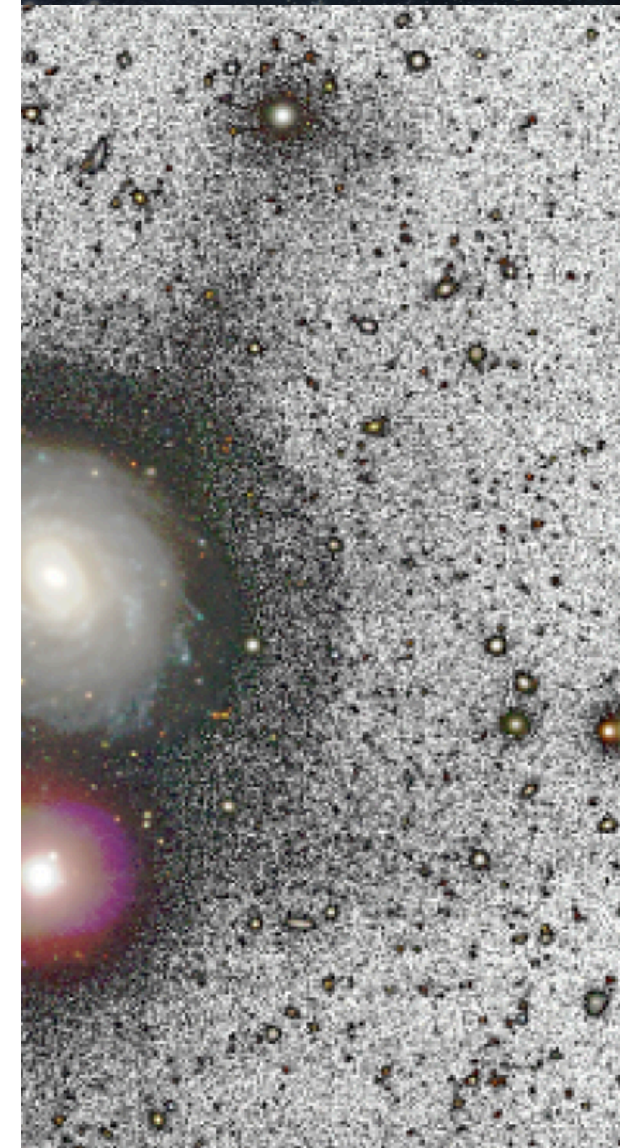
SDSS single ex



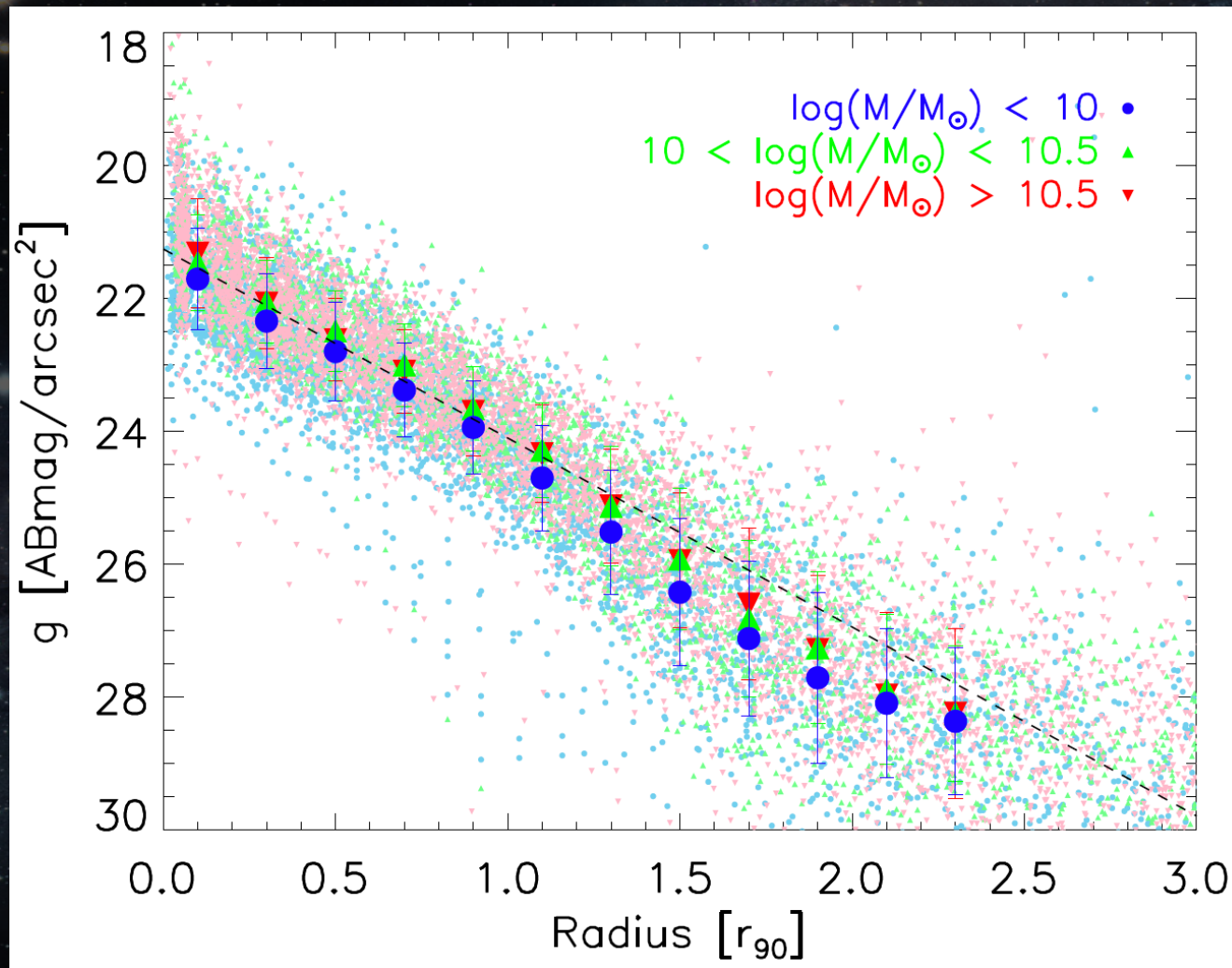
Bakos&Trujillo (2012)



o-add (~ 4300s)

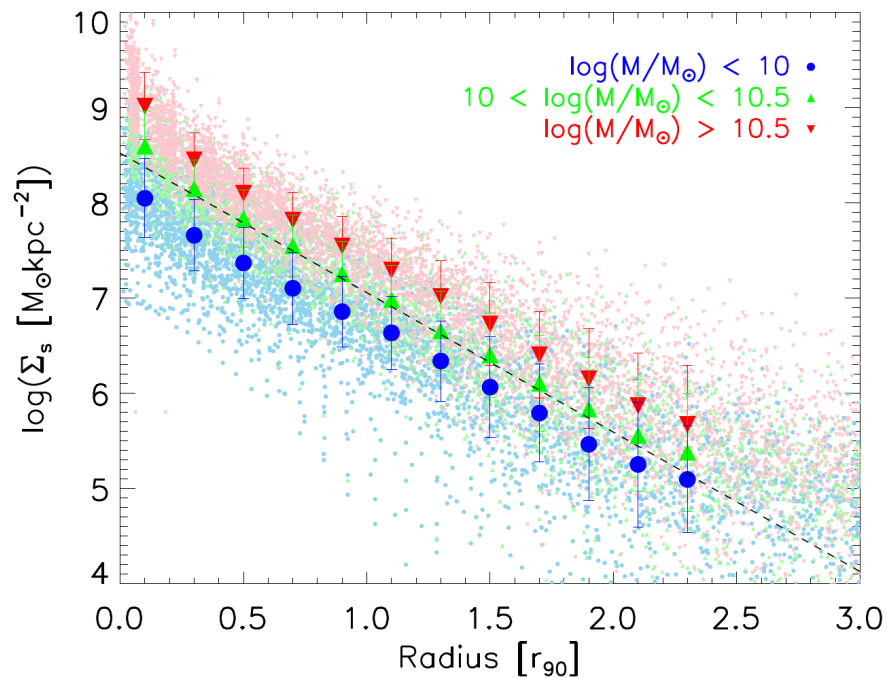
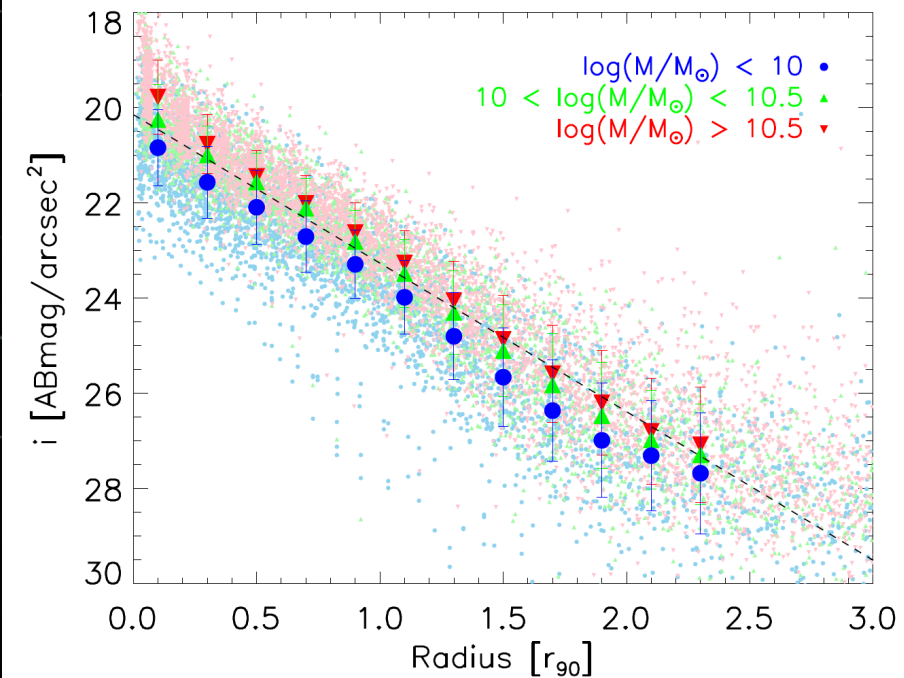
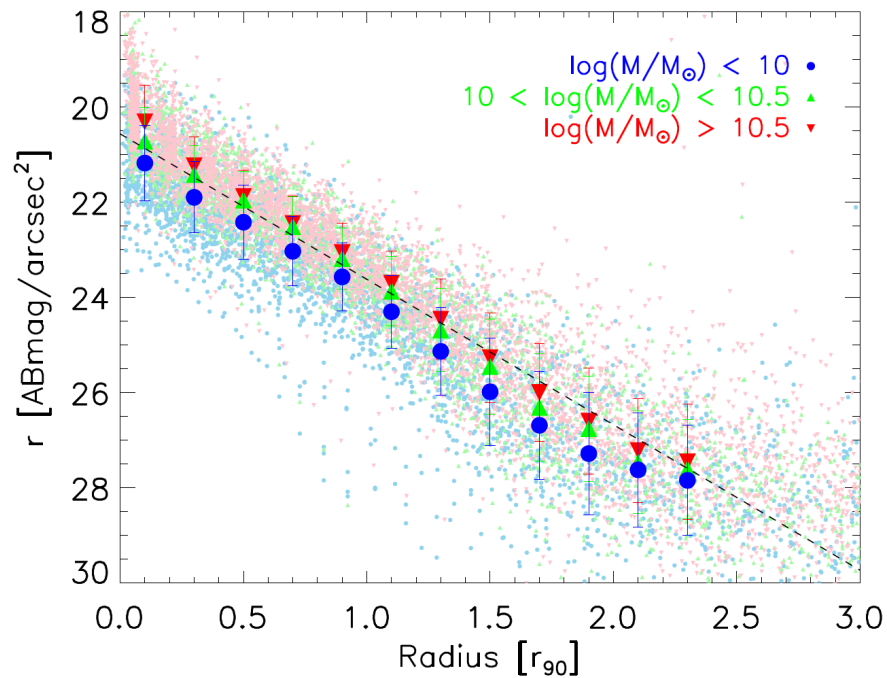
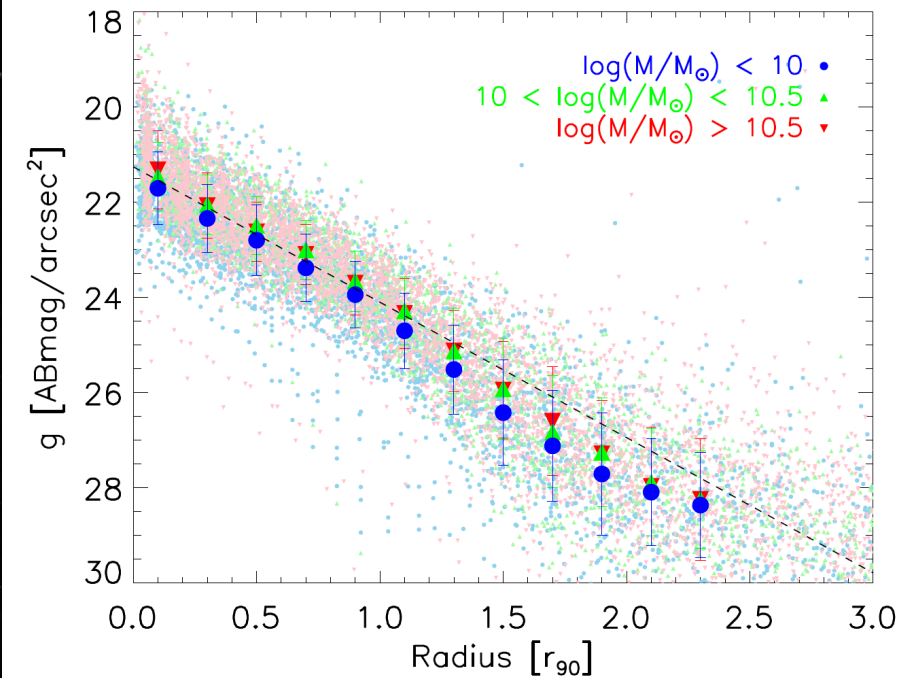


The deepest stellar surface brightness radial profiles



700 disk galaxies from PS1 MDS (10ks/20ks exposures)

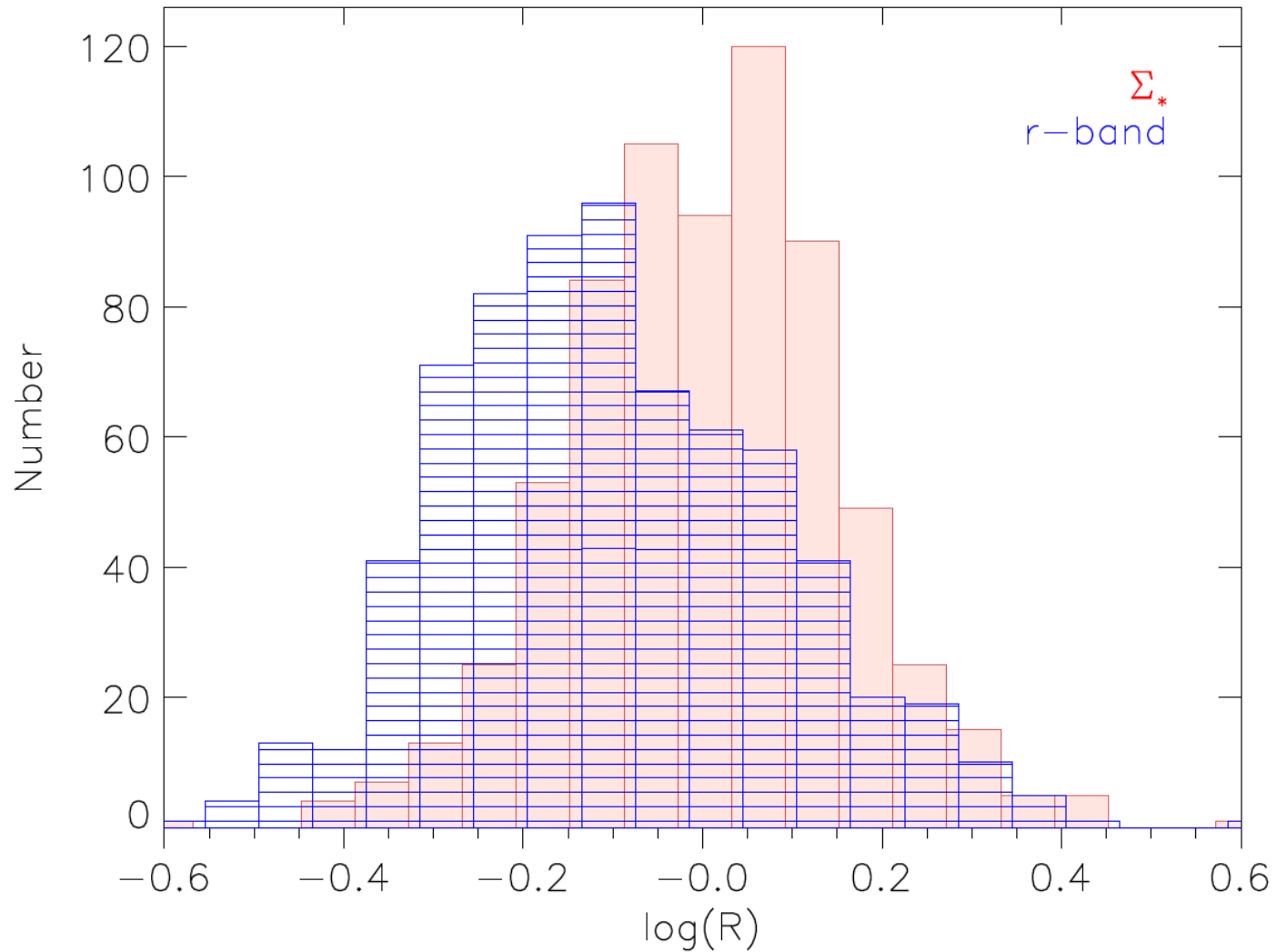




Redder bands
are less bended

Stellar surface
mass density
profiles are
single exp!

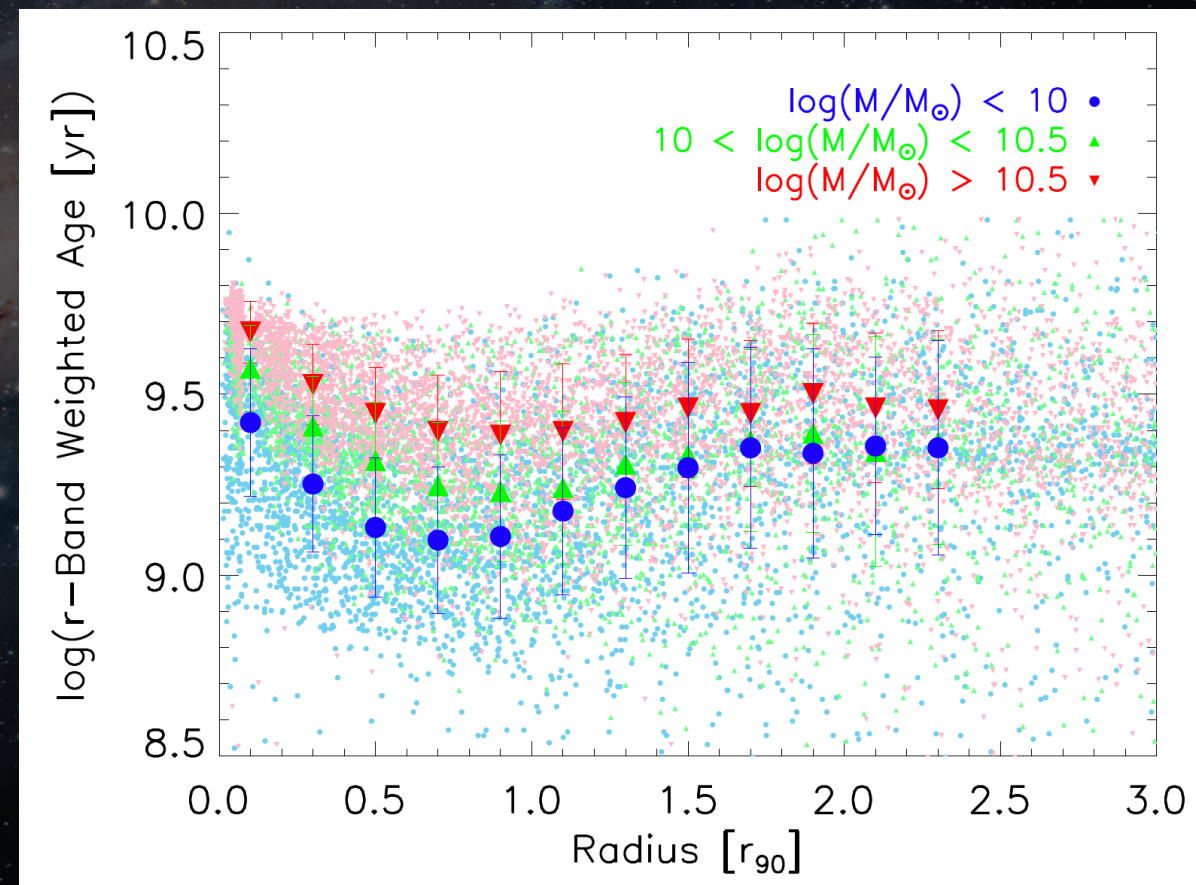
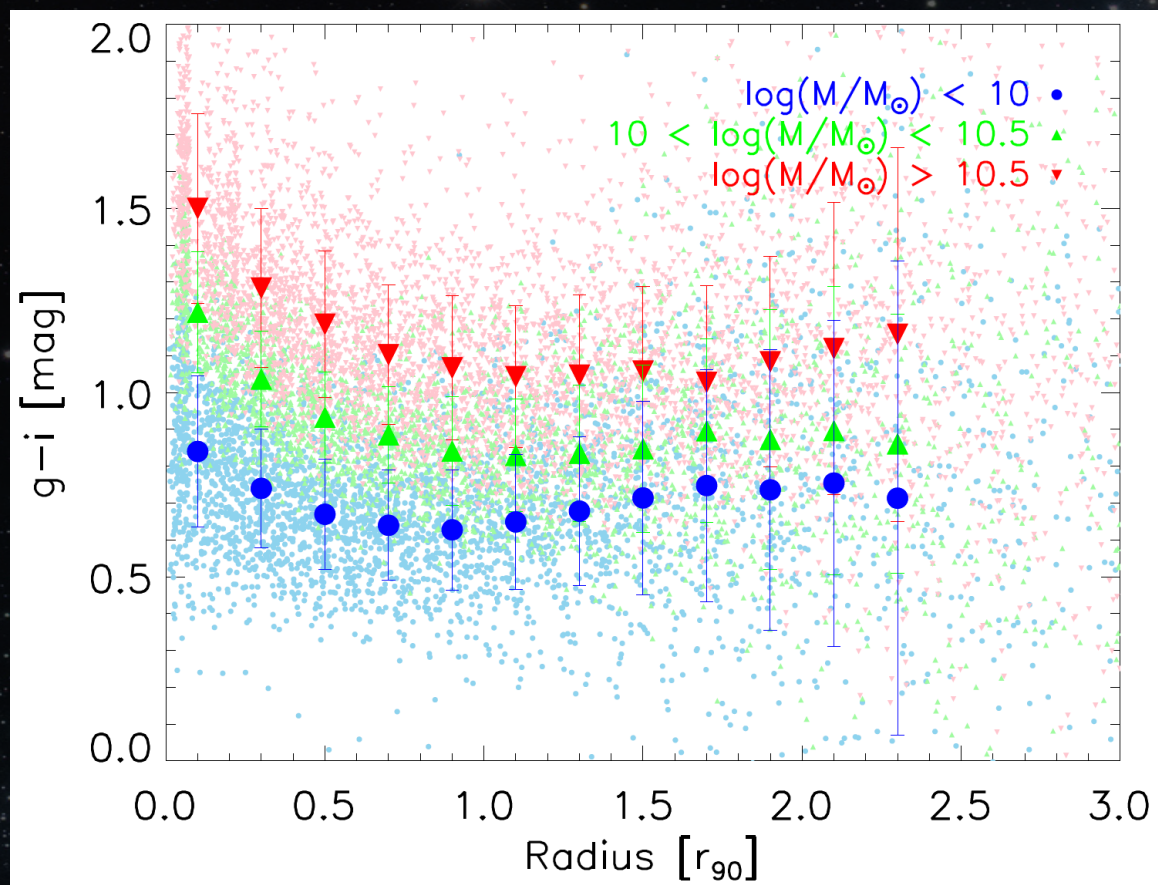
Distribution of inner-outer slope ratio



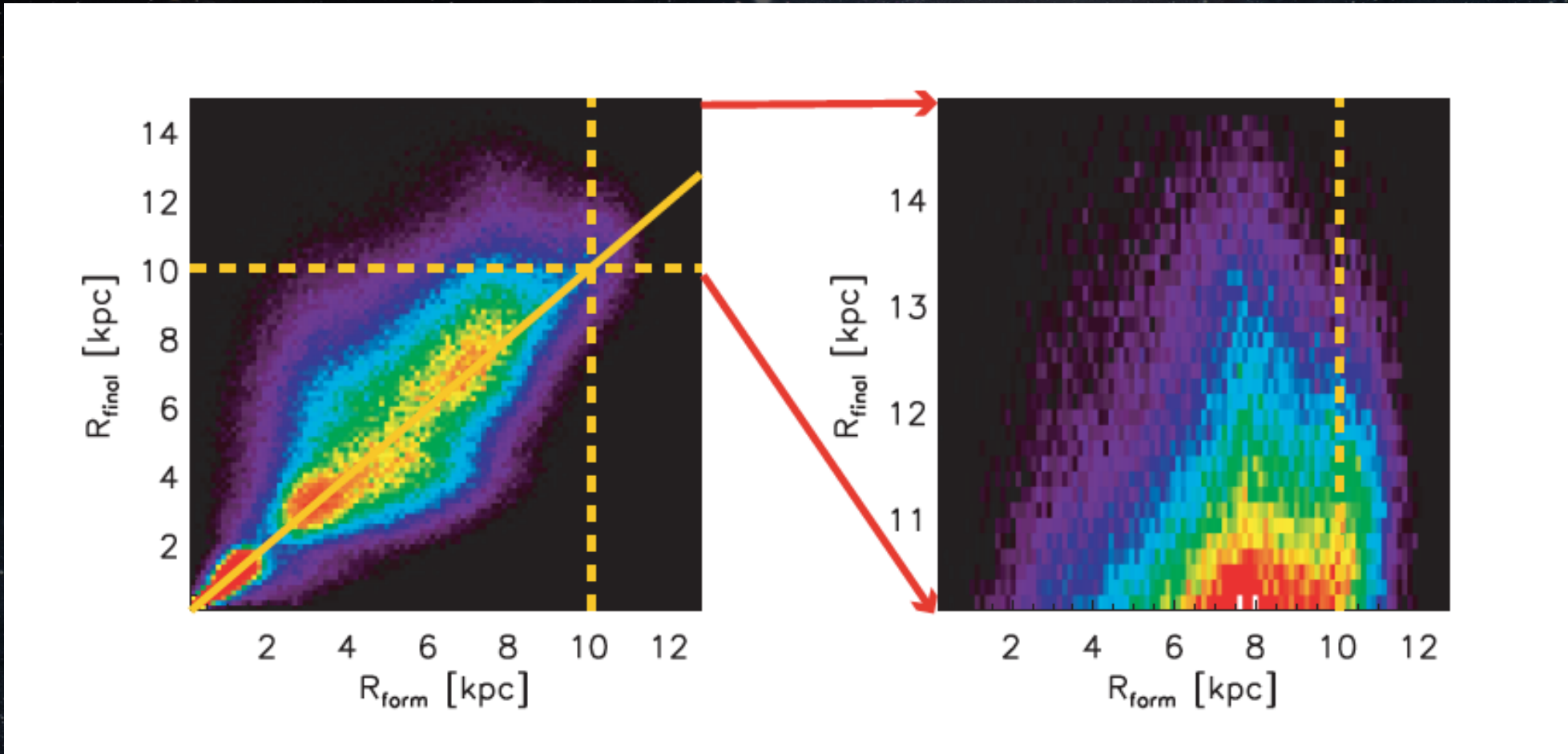
NOT three types!

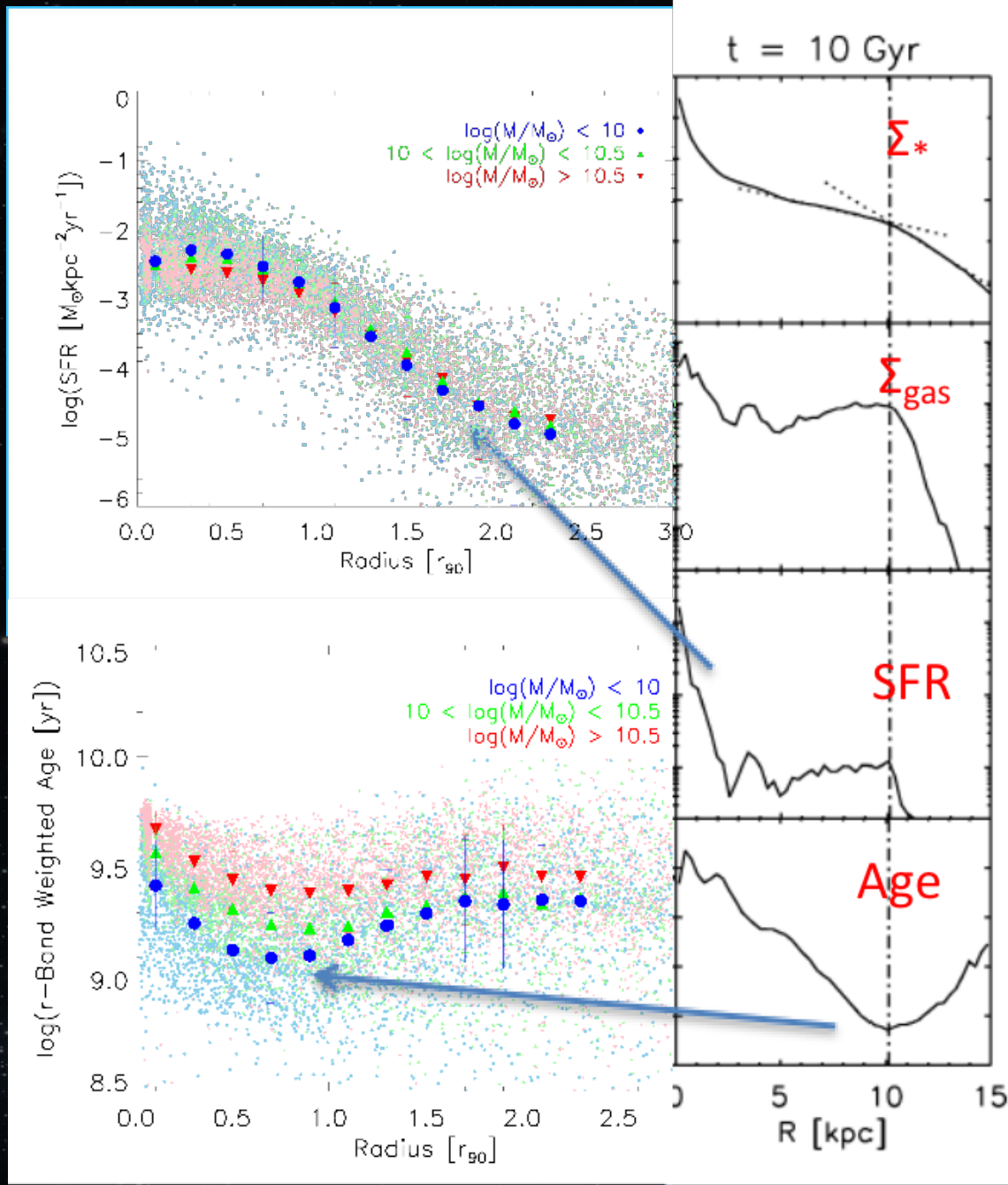
$$R = \frac{\text{Inner slope}}{\text{Outer slope}}$$

'U'-shape color and age profiles

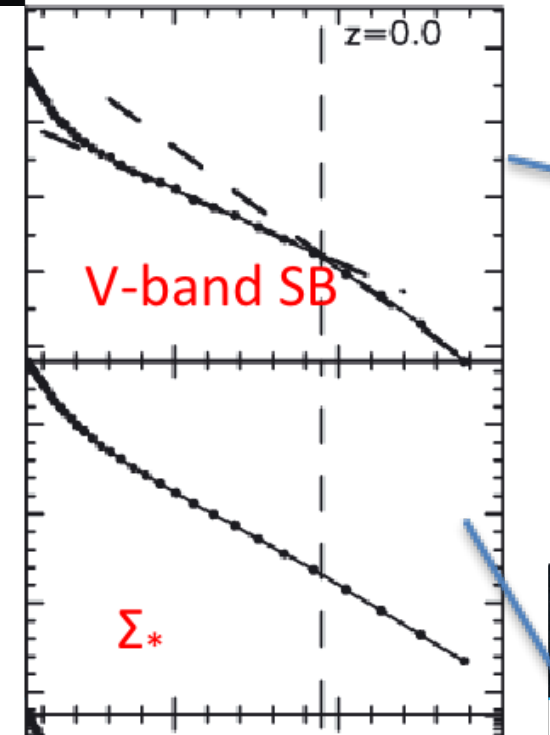


Stellar radial migration

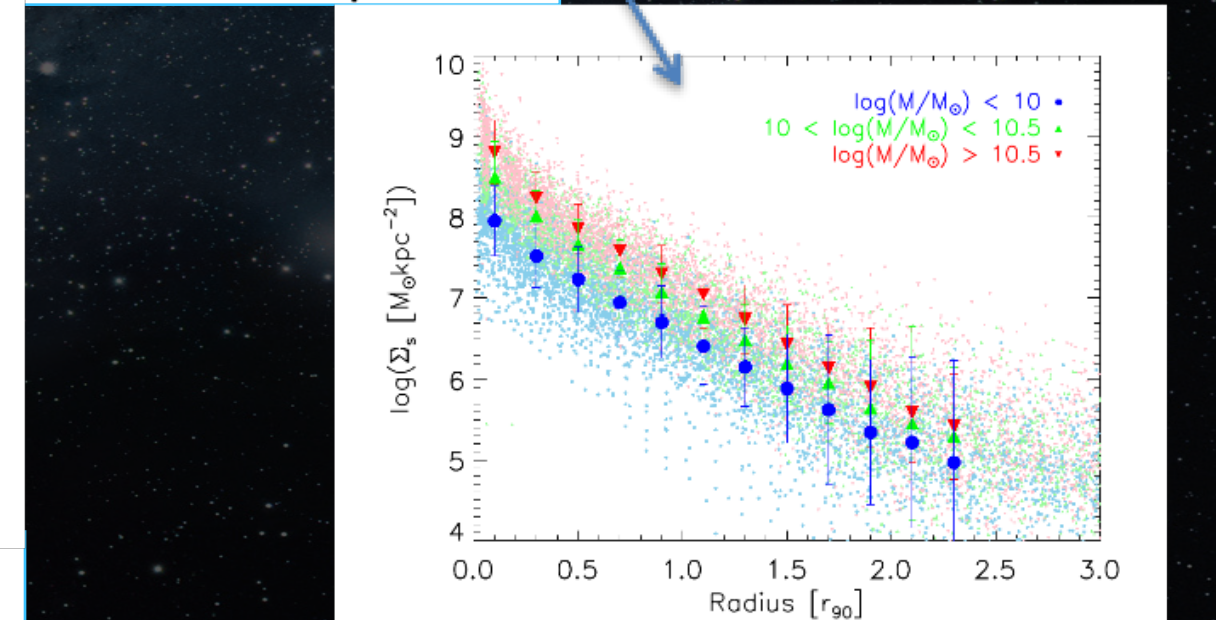
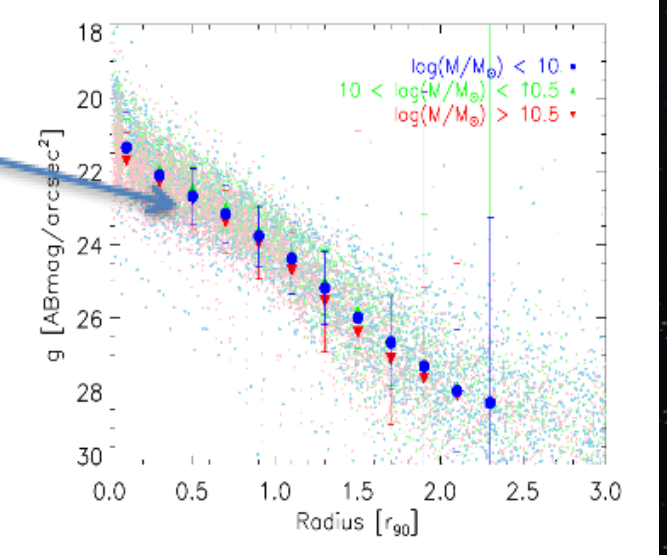




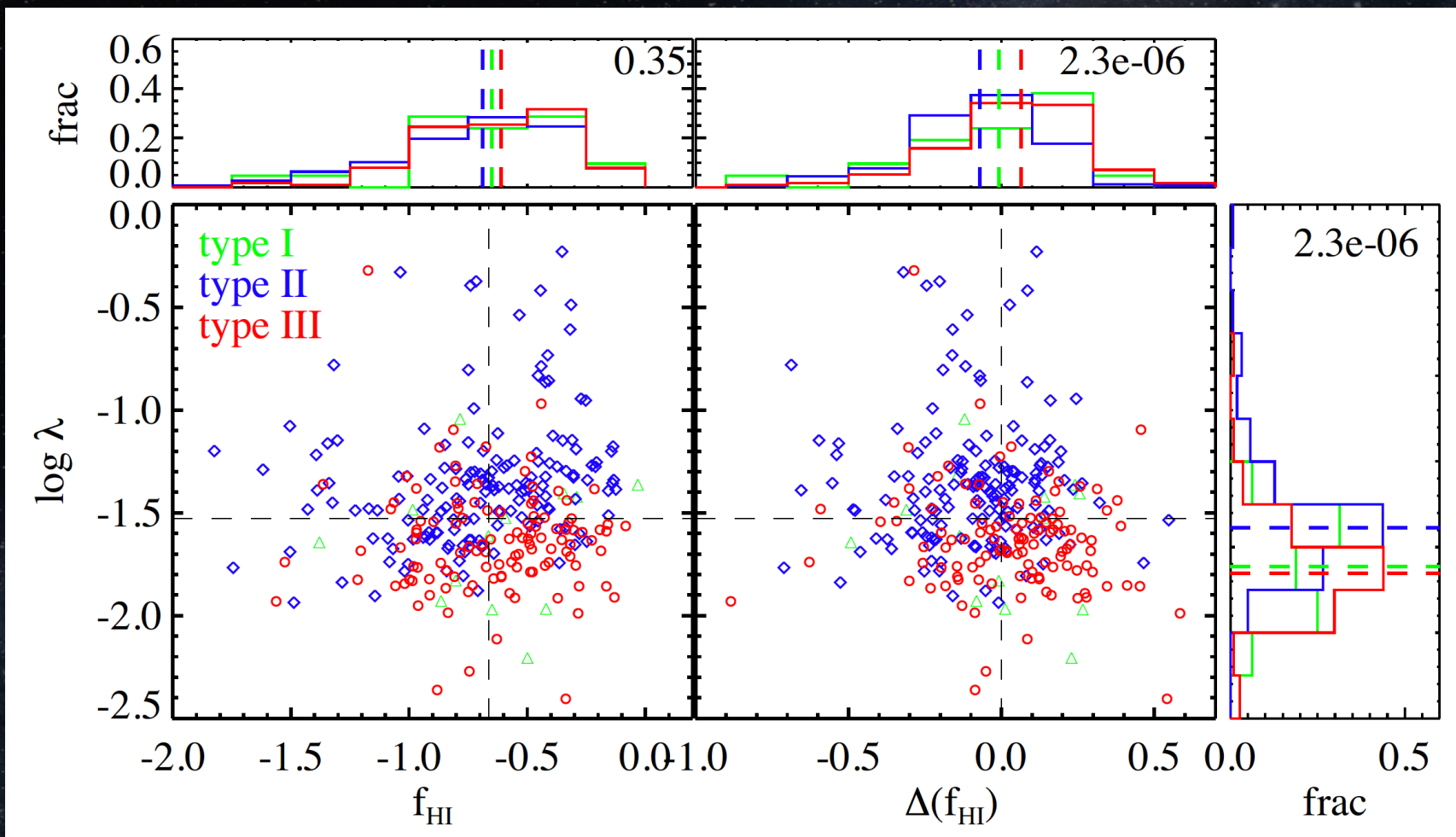
Roskar+08



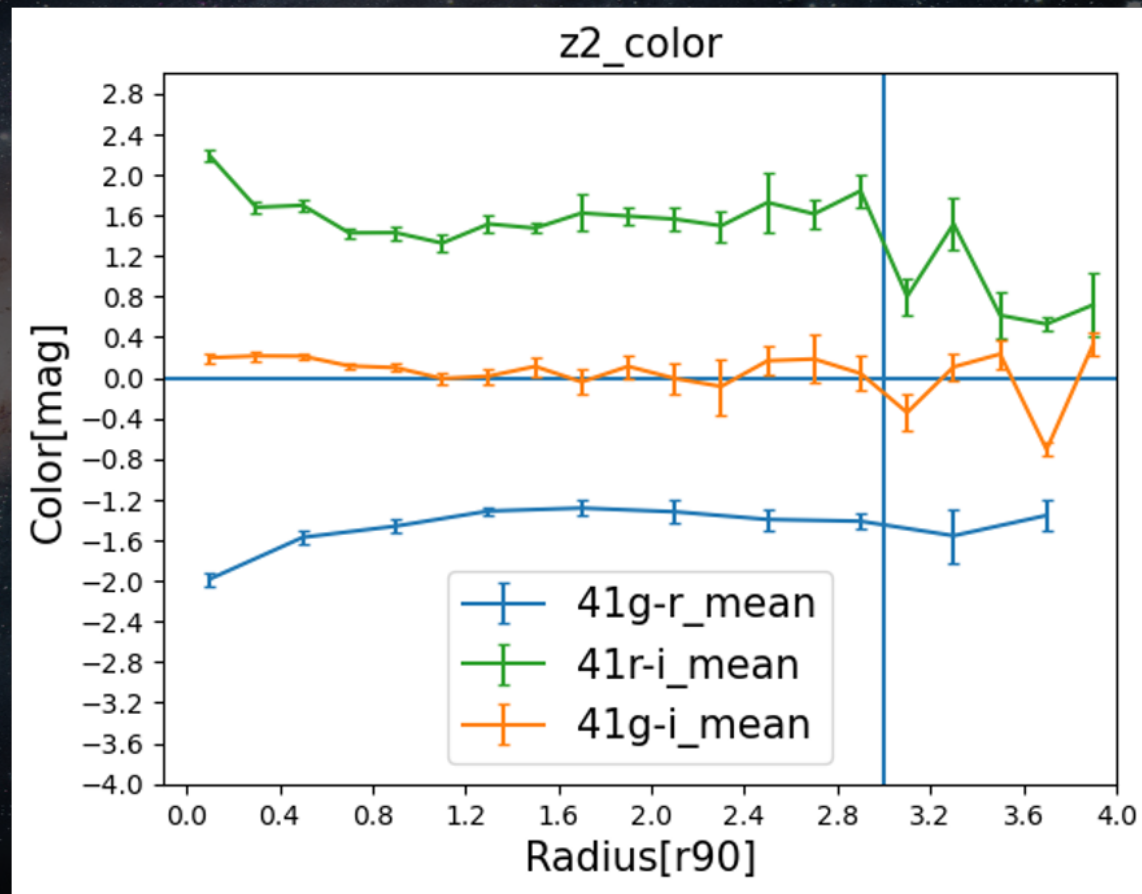
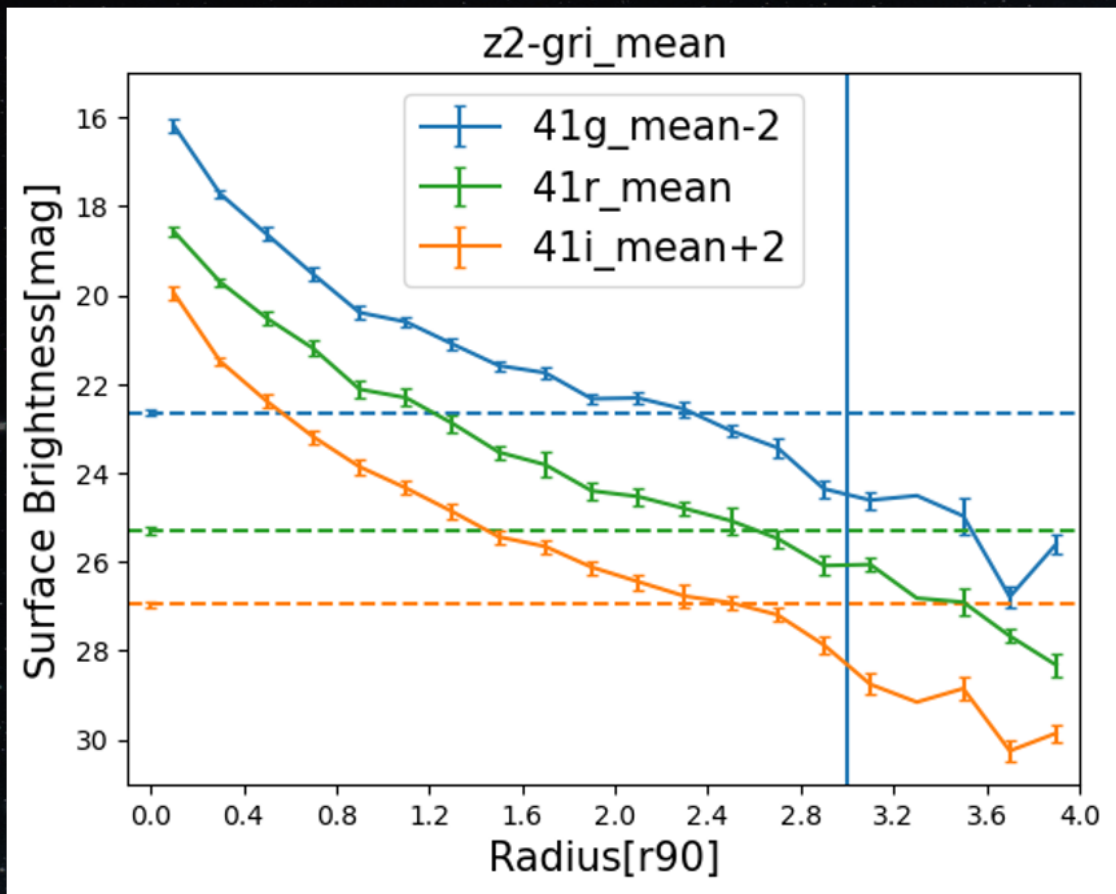
Sanchez-Blazquez+09



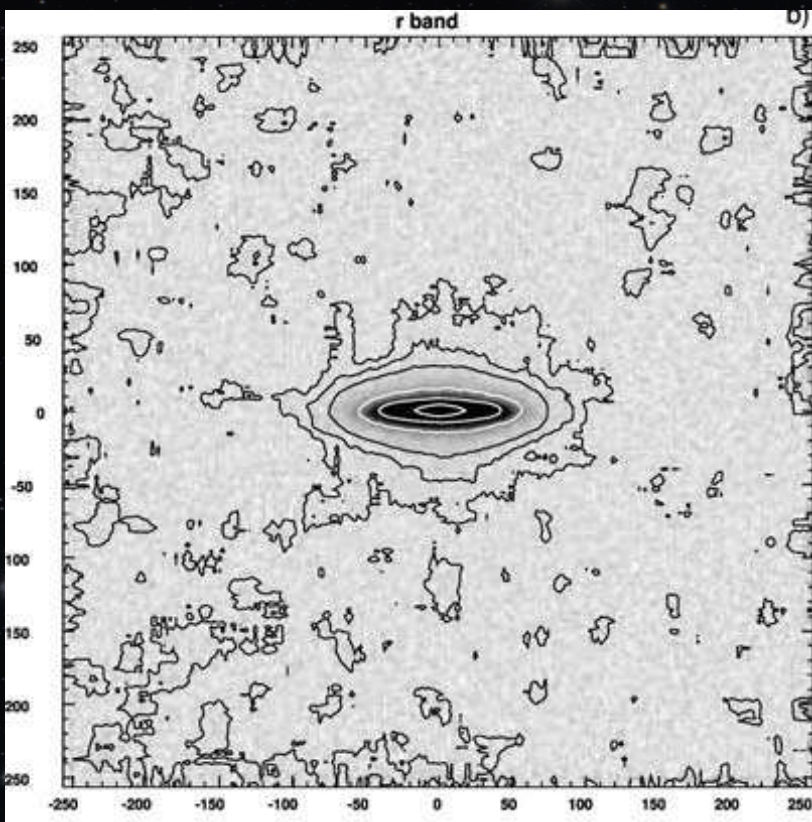
HI fraction



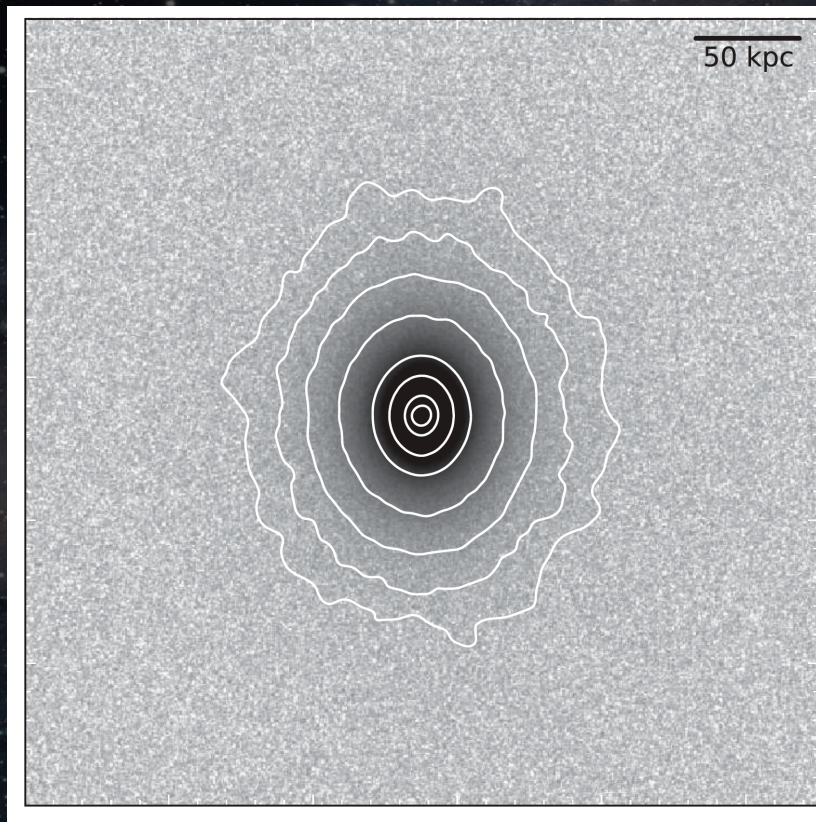
Higher redshift



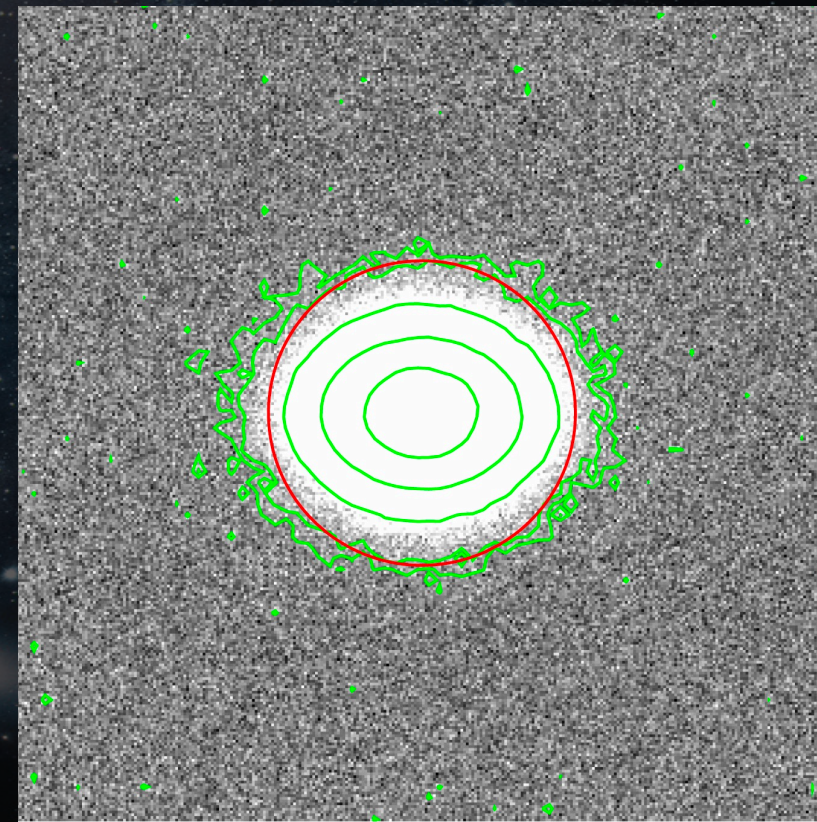
Stellar halo



Zibetti+2004



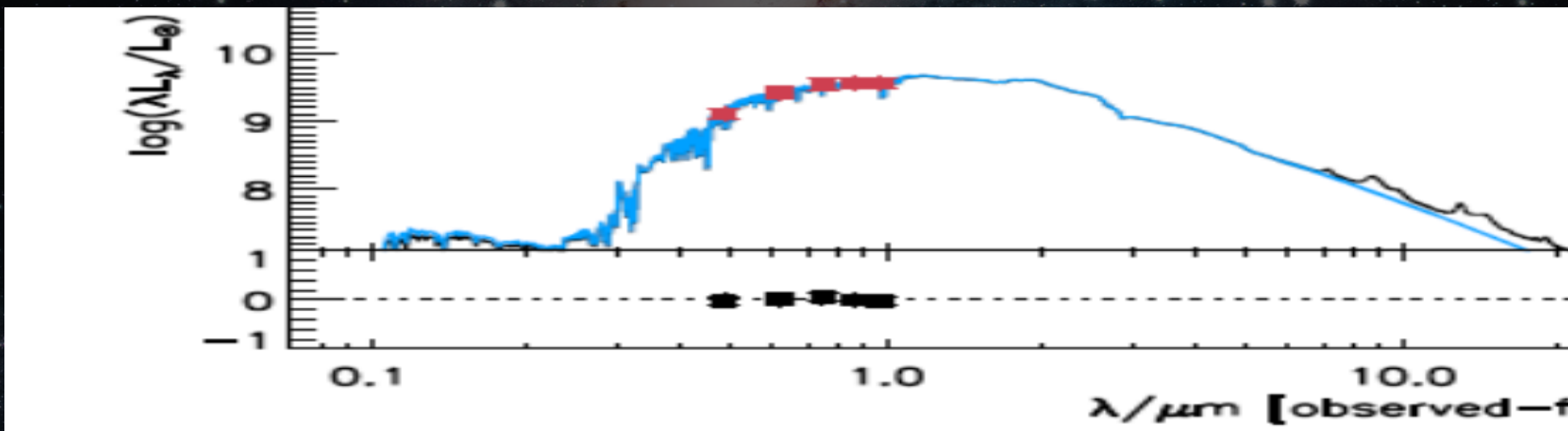
D'Souza+2014



ZZ+2015

Issues

- The largest sample is ~ 1000 galaxies
- Filters not optimized

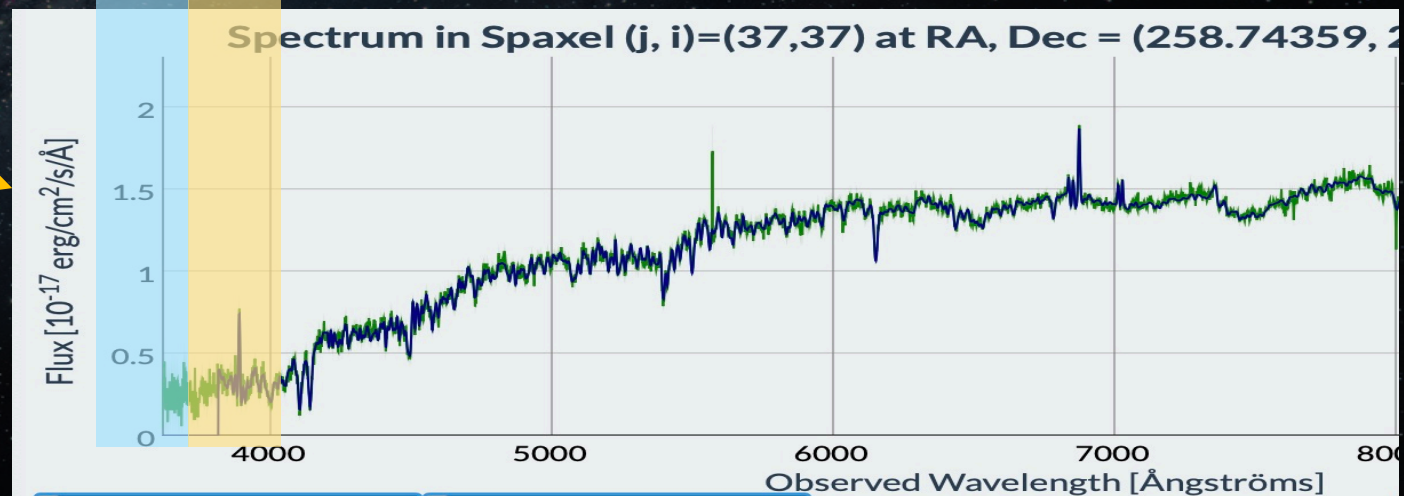
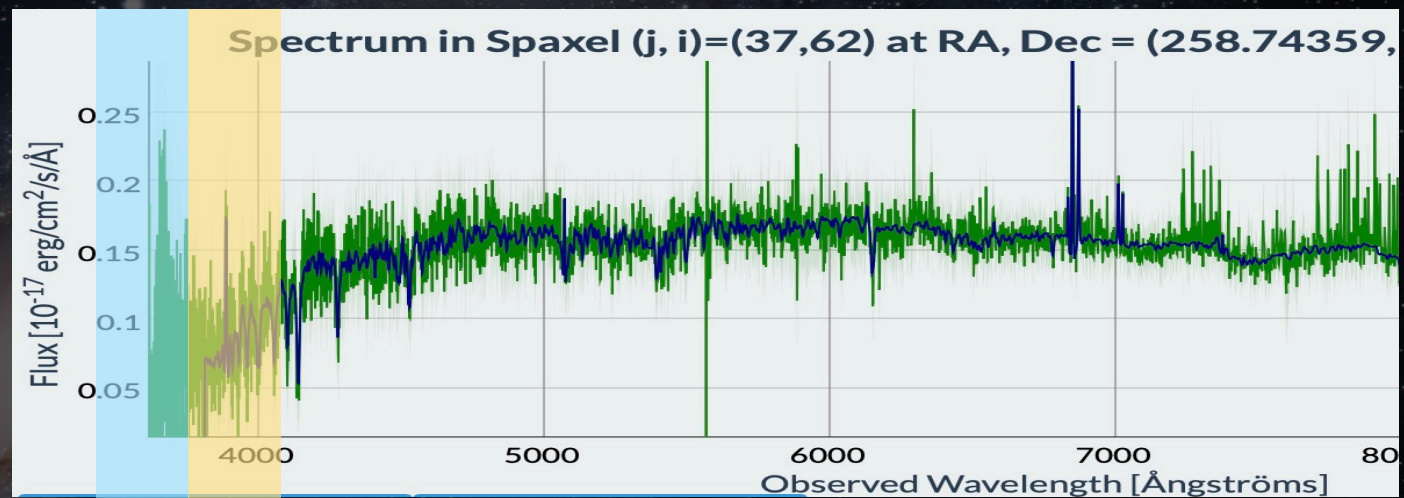
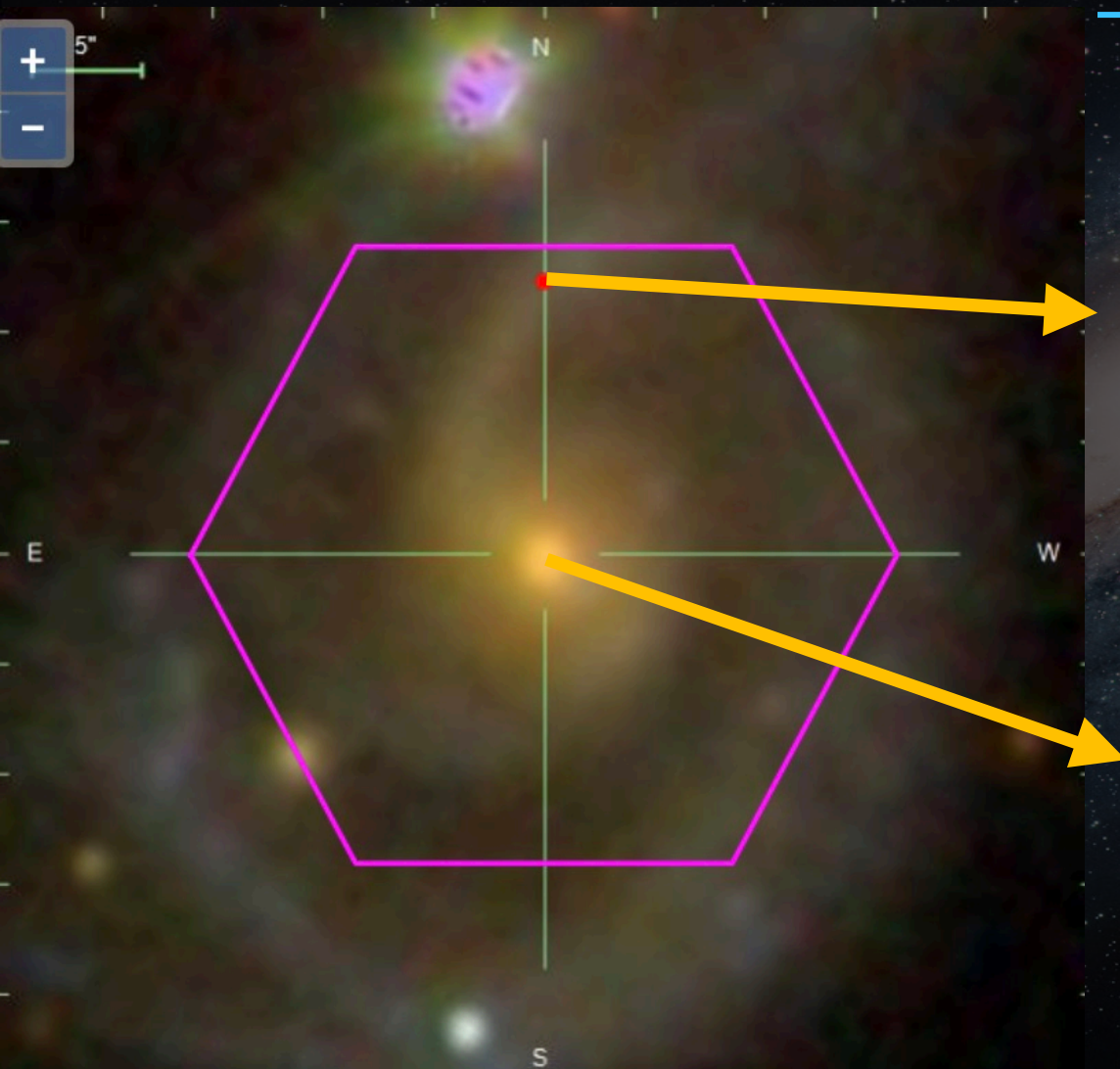


Mephisto

- 6-band (ugvriz): more sensitive to stellar age

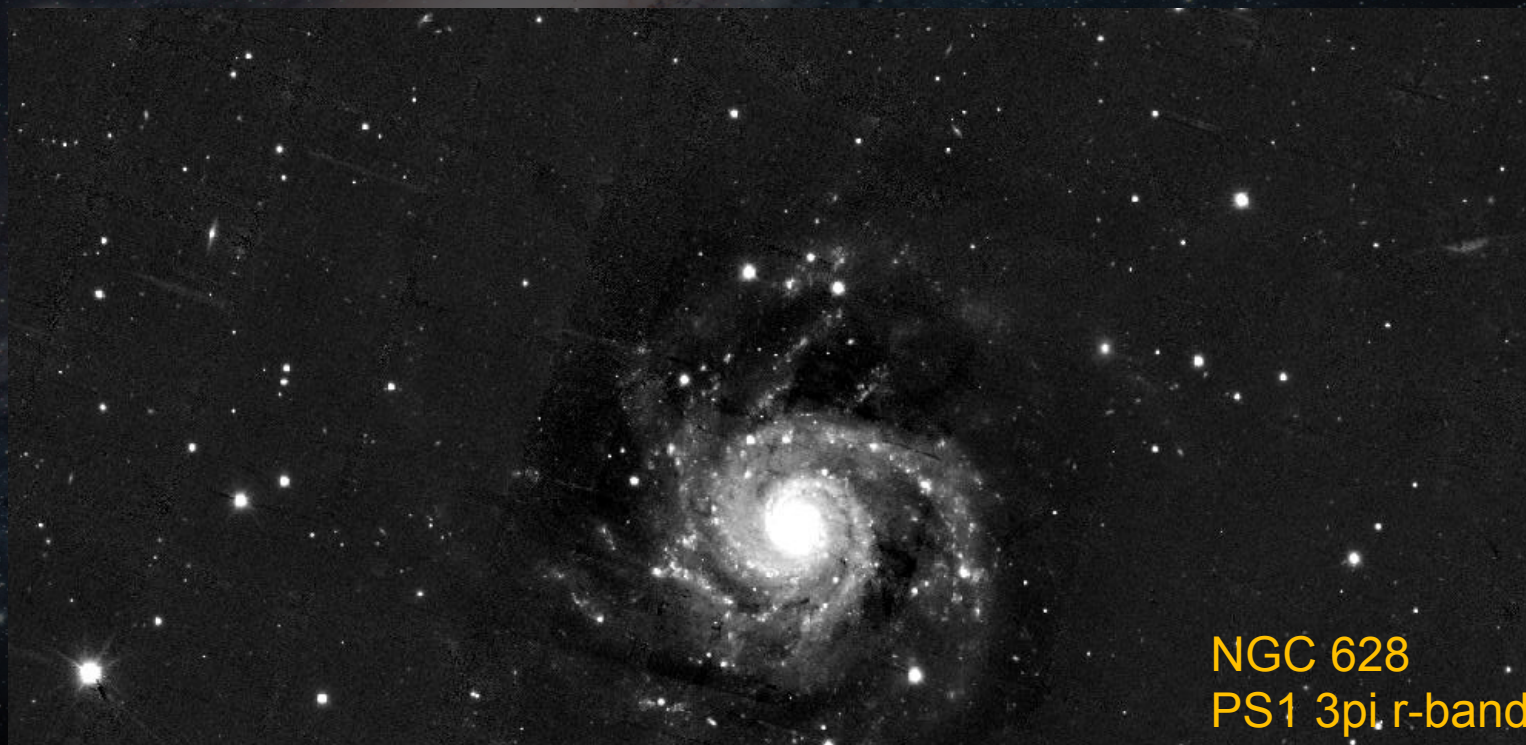


Mephisto



Mephisto

- 6-band (ugvriz): more sensitive to stellar age
- Large FoV (and better sky background subtraction): critical for nearby large galaxies
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- Large survey area, ancillary HI data available (CRAFTS & ALFALFA)

Mephisto

- 6-band (ugvriz): more sensitive to stellar age
- Large FoV (and better sky background subtraction): critical for nearby large galaxies
- Large survey area, ancillary environment & HI data available (e.g. CRAFTS)
- Deep stacking
 - 5-year stacking image down to $\sim 27\text{-}28$ mag/arcsec² for individual galaxies, enough to explore outer disk
 - down to $\sim >30$ mag/arcsec² for multi-galaxy stacking, enough to explore stellar halos around different types of galaxies