



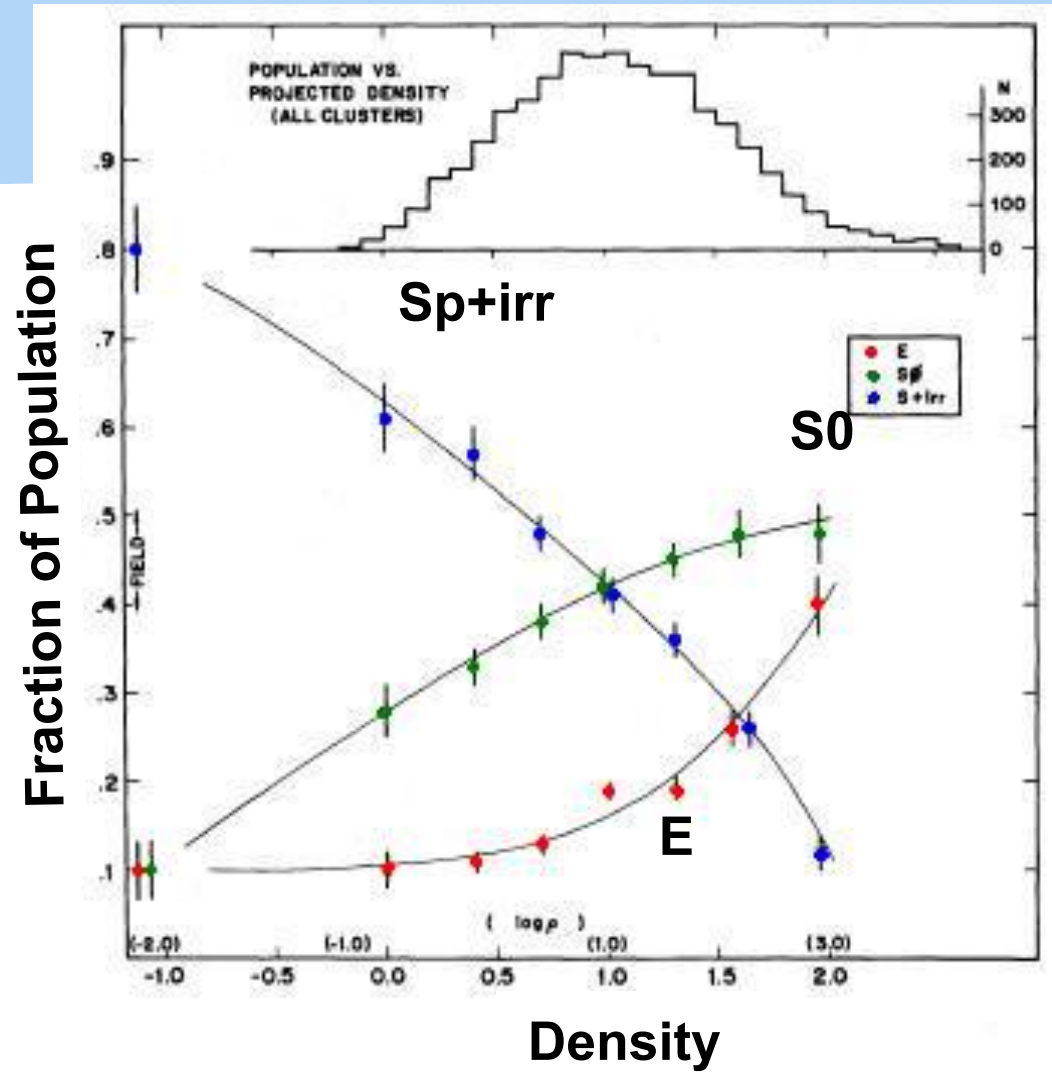
The University of
Nottingham

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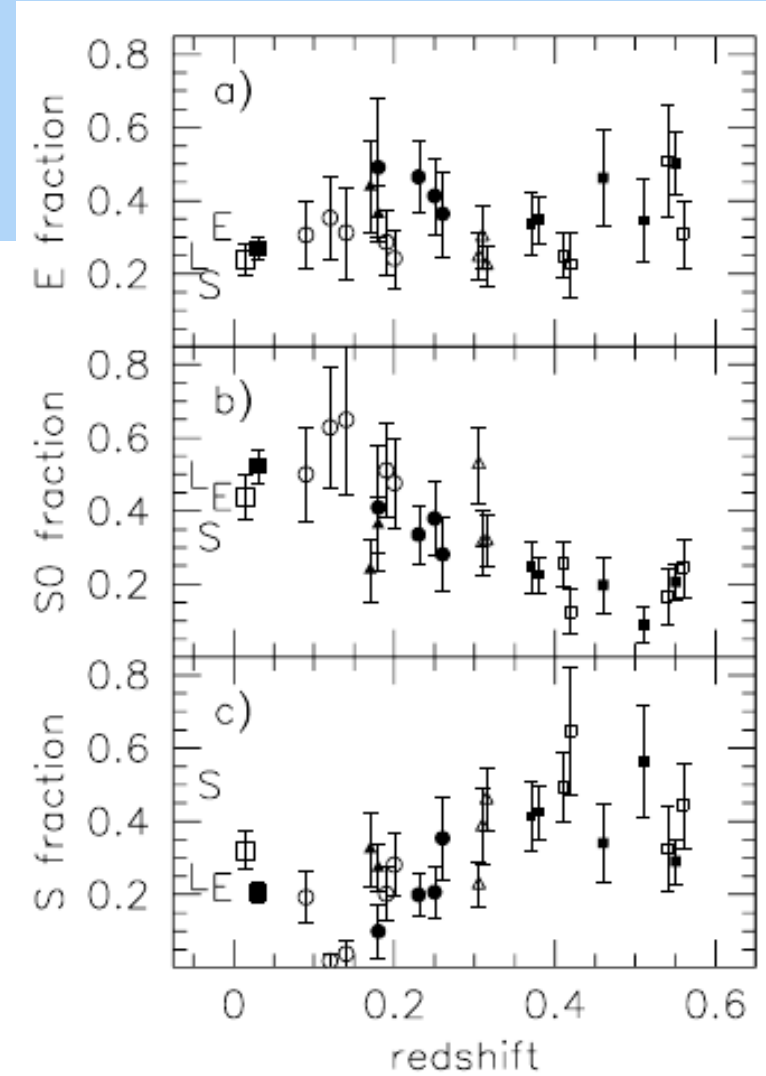
Spectroscopic Bulge-Disc Decomposition of Galaxies

Evelyn Johnston
(ESO, Chile)

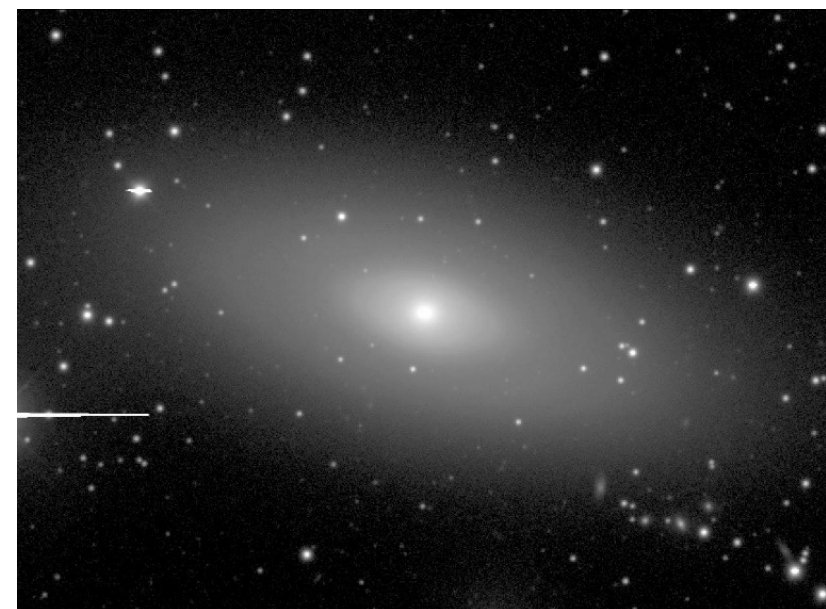
With Martha Tabor, Alfonso Aragón-Salamanca, Michael Merrifield,
Steven Bamford, Boris Häußler and Michele Cappellari



Dressler 1980



Fasano *et al*, 2000

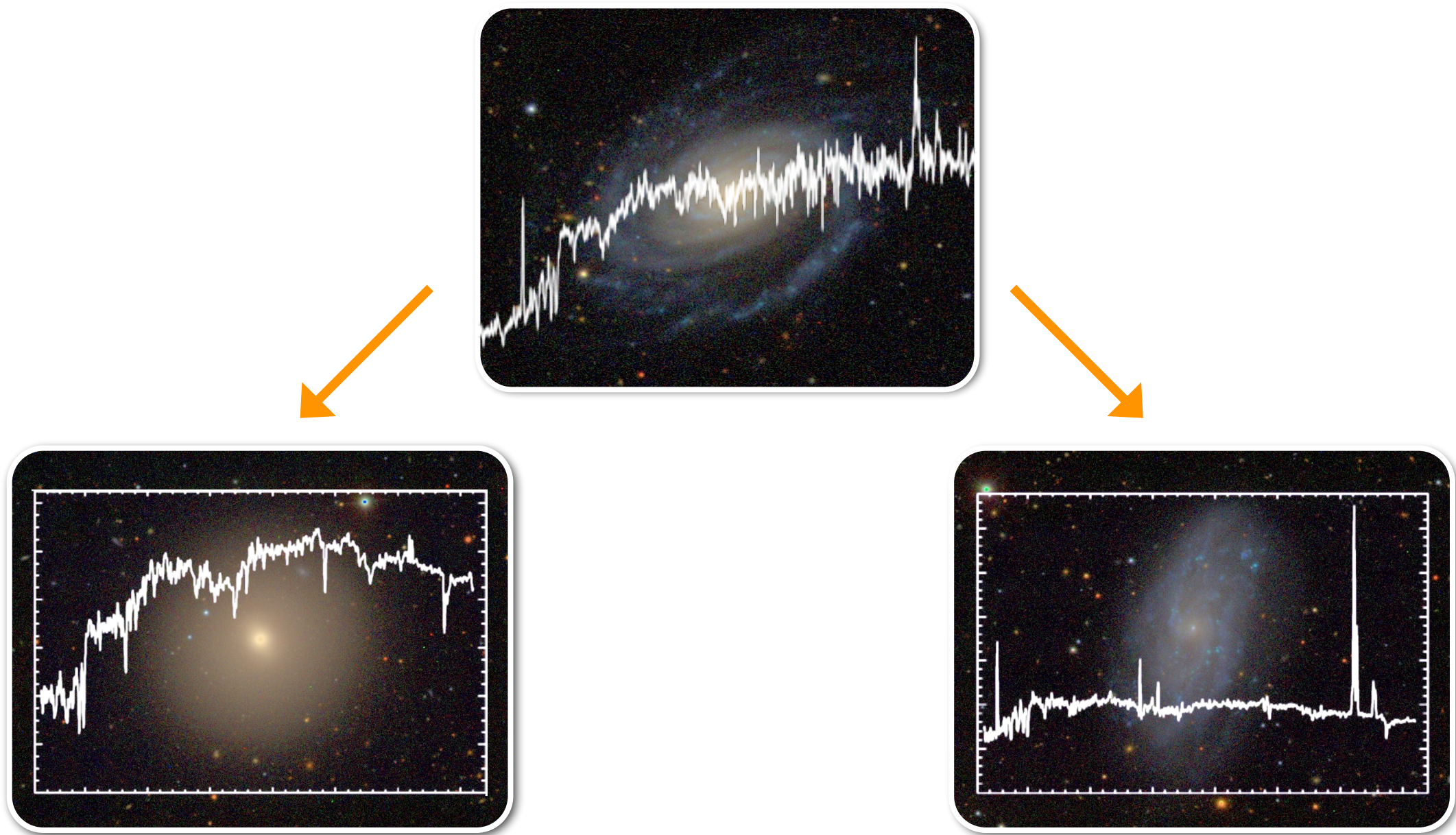


How to transform a Spiral to S0?

- Quench star formation in the disc
- Boost the B/T ratio

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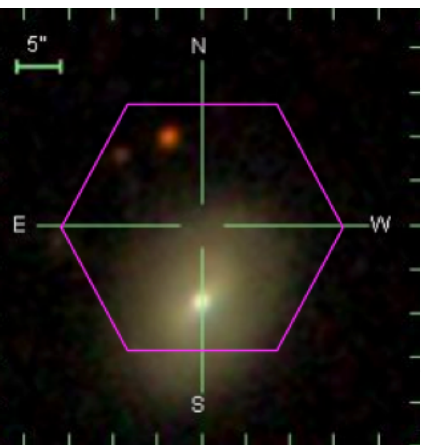
How to decompose a galaxy spectrum

Use the light profile as a function of wavelength

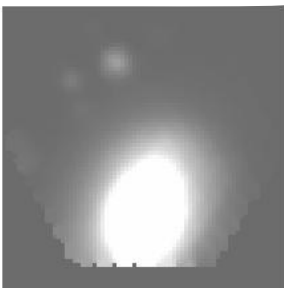
BUDDI

(Bulge Disc Decomposition of IFU data)

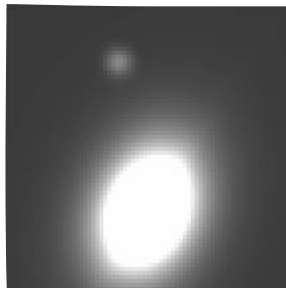
SDSS



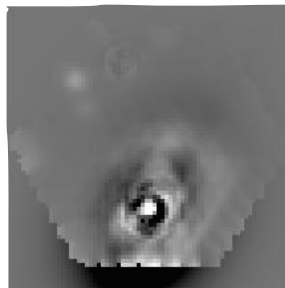
MaNGA



Model



Residual

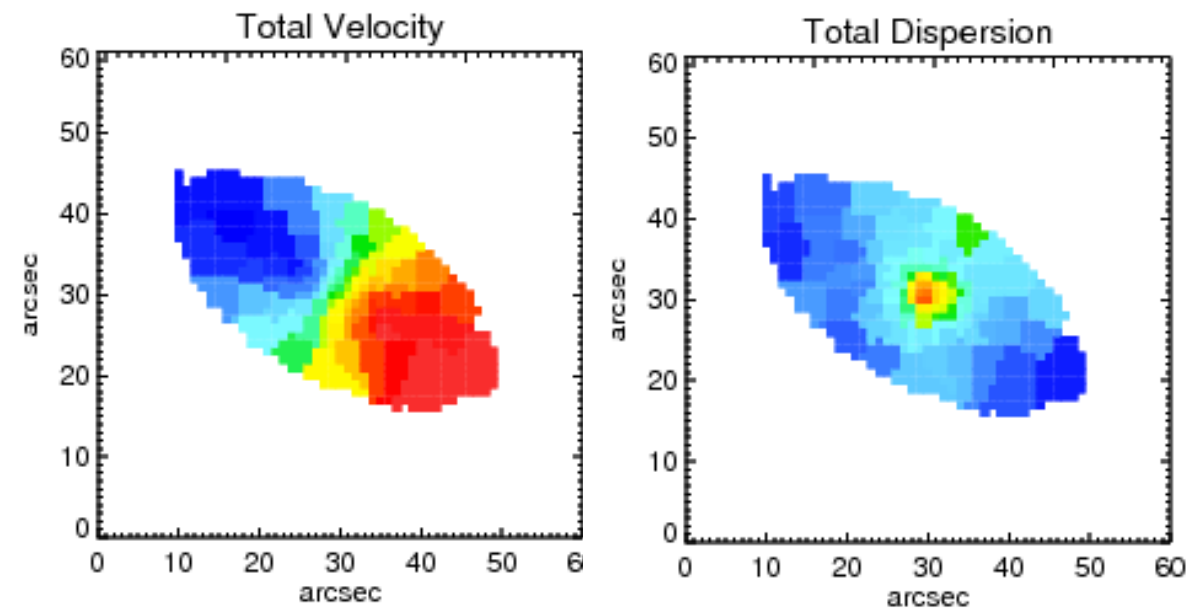


Johnston *et al*, submitted

Use the different kinematics

PPXF

(Cappellari & Emsellem, 2004)

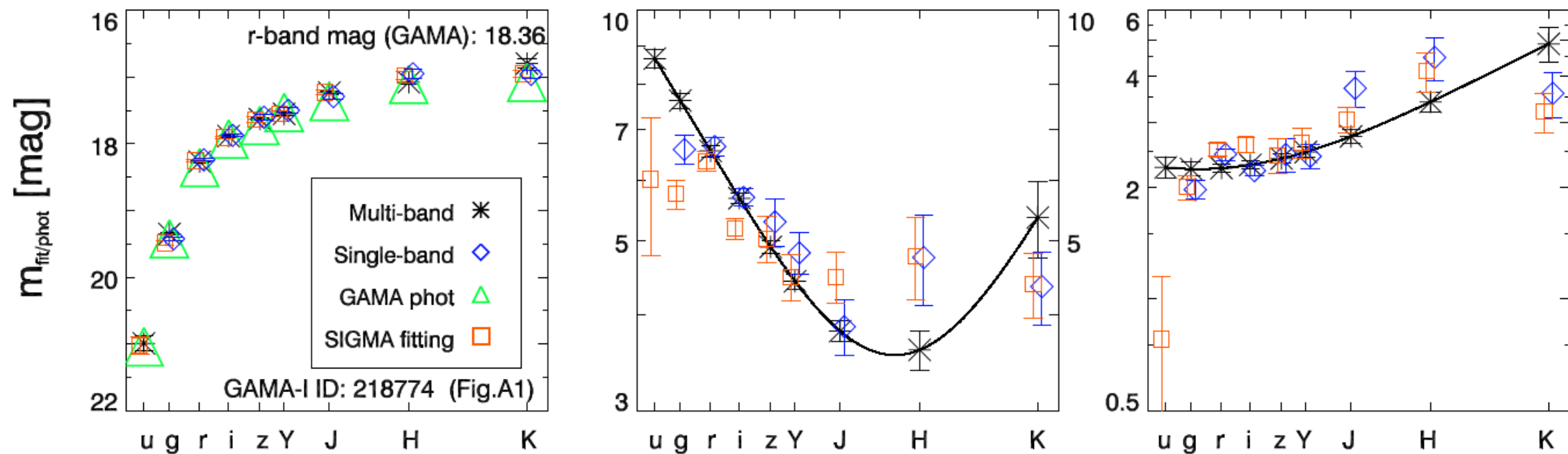


Tabor *et al*, in prep

BUDDI

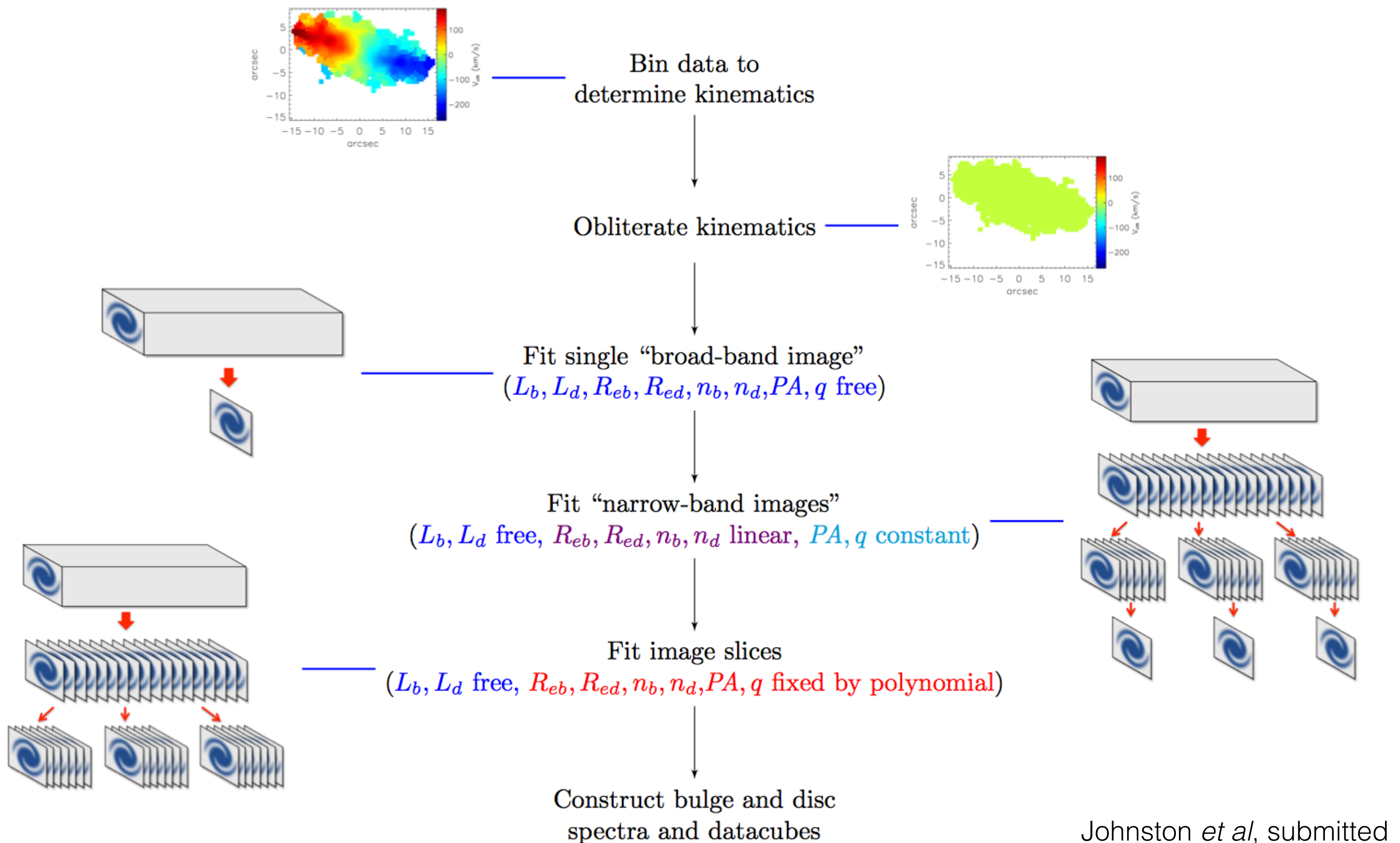
(Bulge Disc Decomposition of IFU data)

- Uses GalfitM (Bamford et al, in prep), a multi-waveband version of Galfit (Peng et al, 2002)



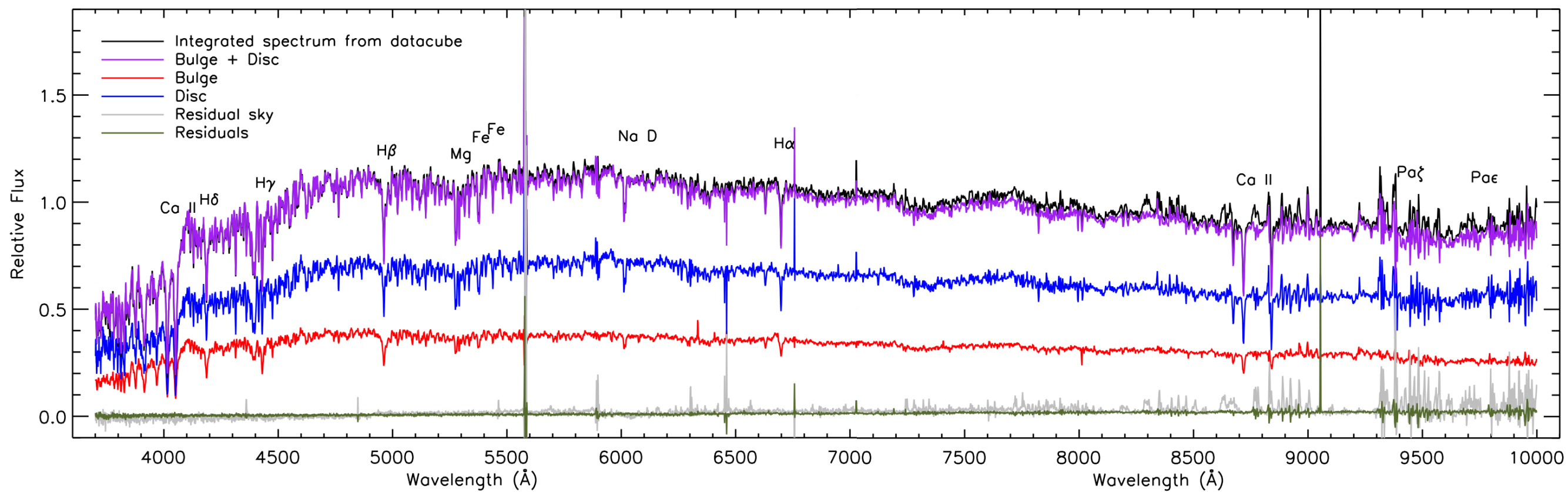
BUDDI

(Bulge Disc Decomposition of IFU data)



BUDDI

(Bulge Disc Decomposition of IFU data)

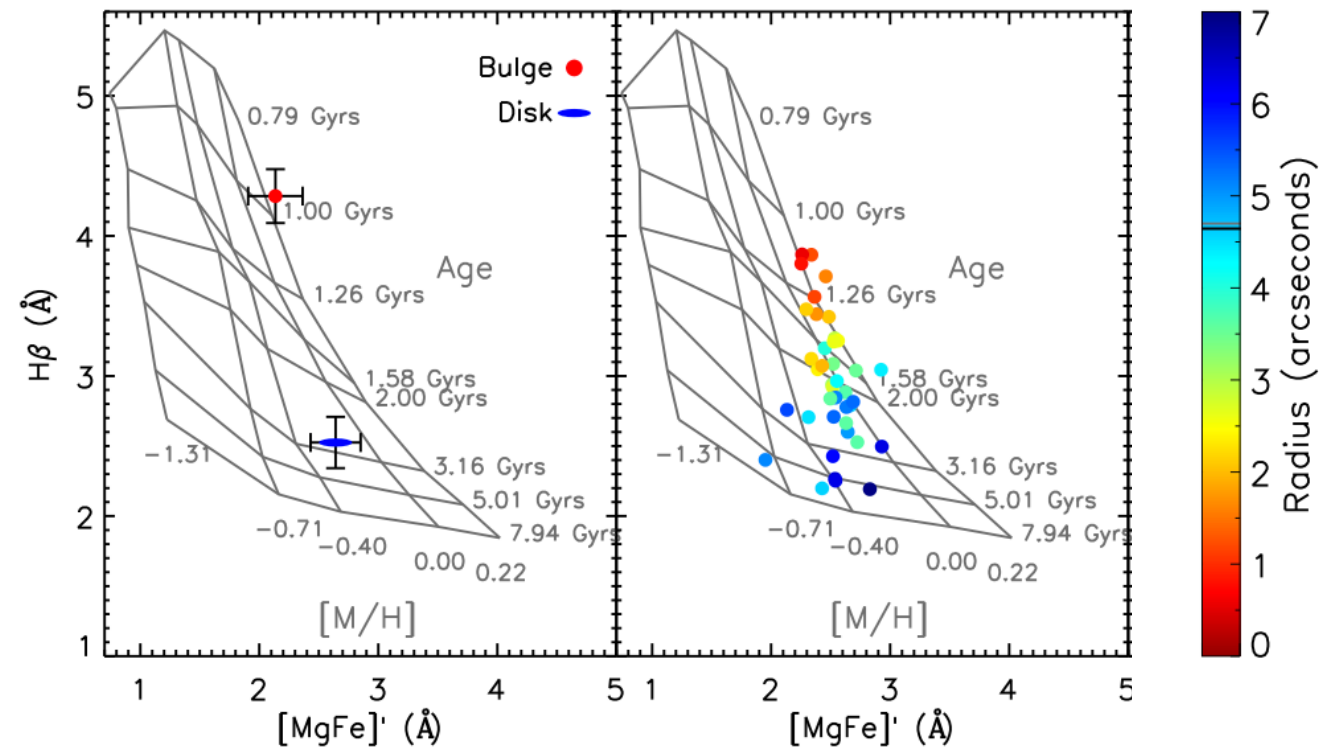


Example analysis with BUDDI

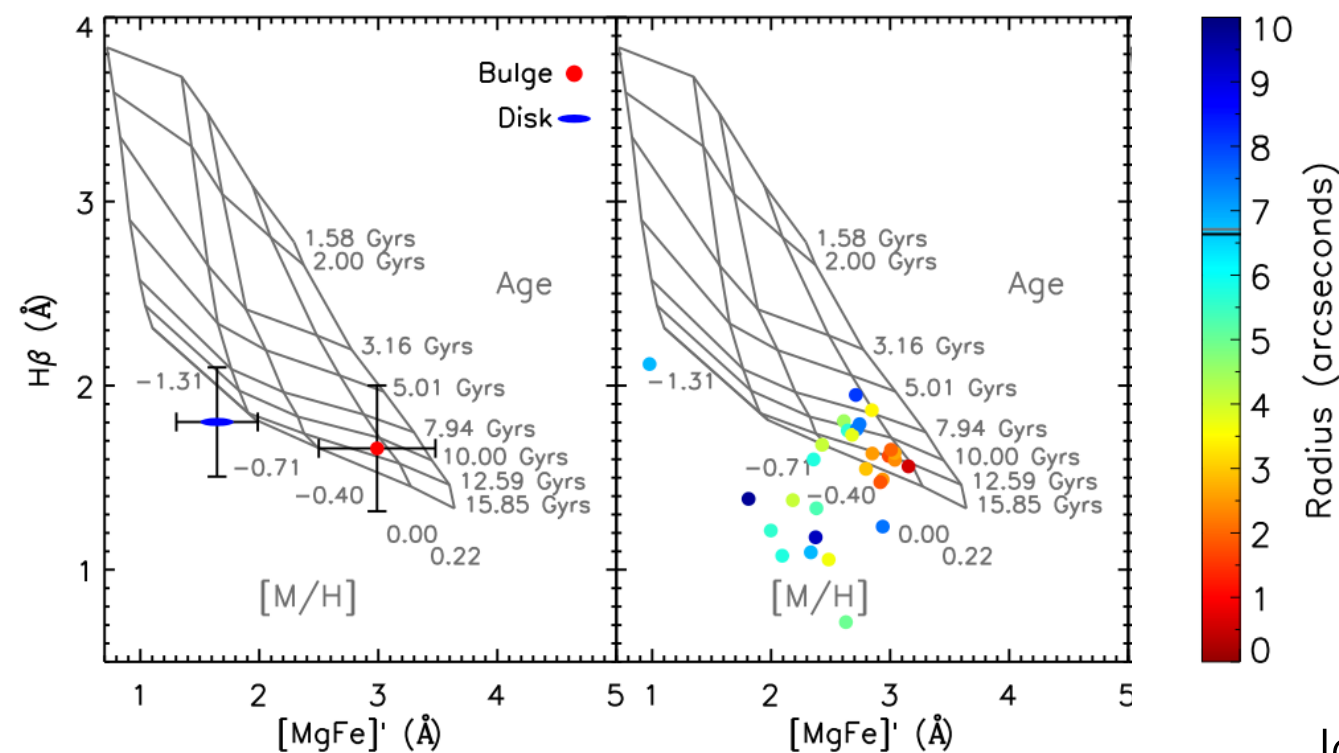
light-weighted stellar populations



Post-starburst
galaxy



S0 galaxy

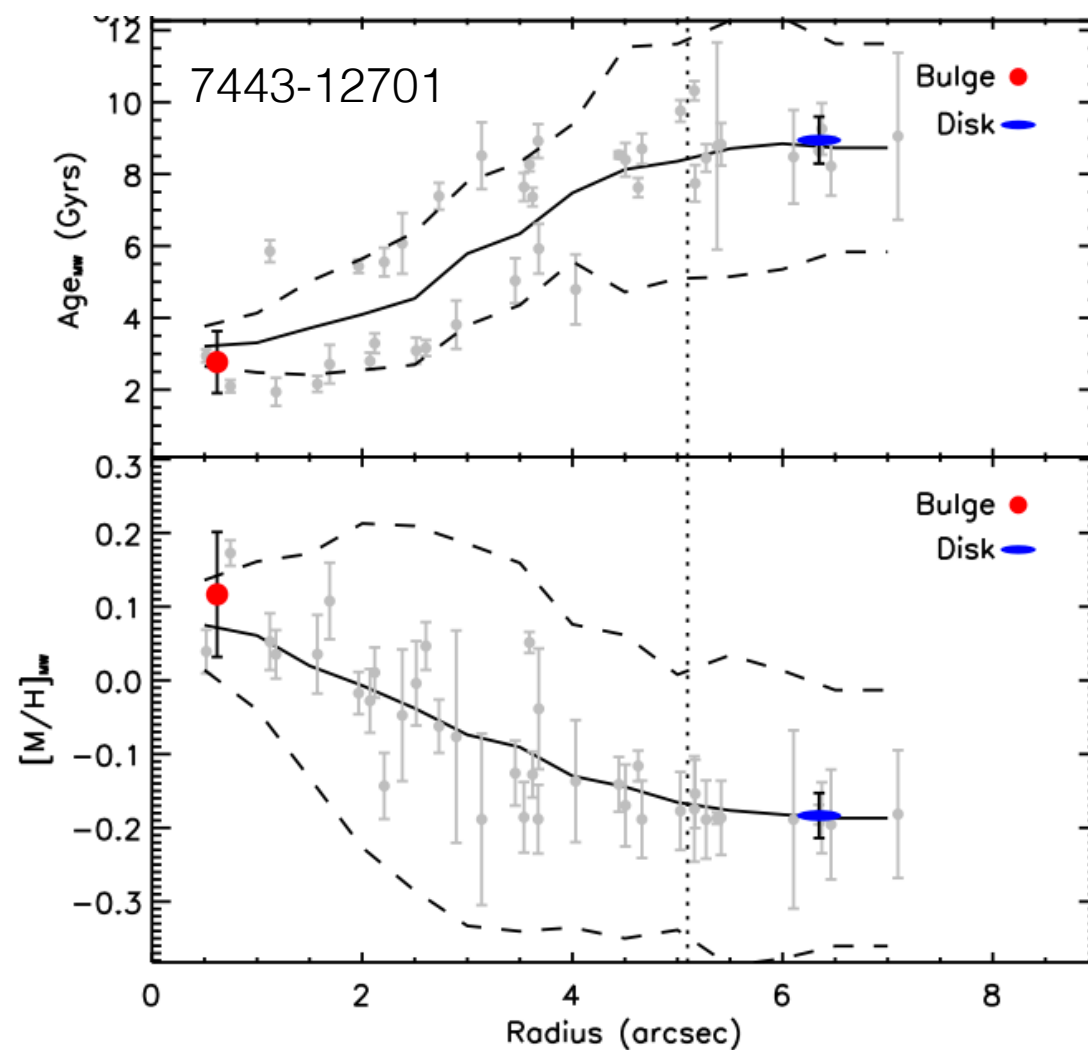


Example analysis with BUDDI

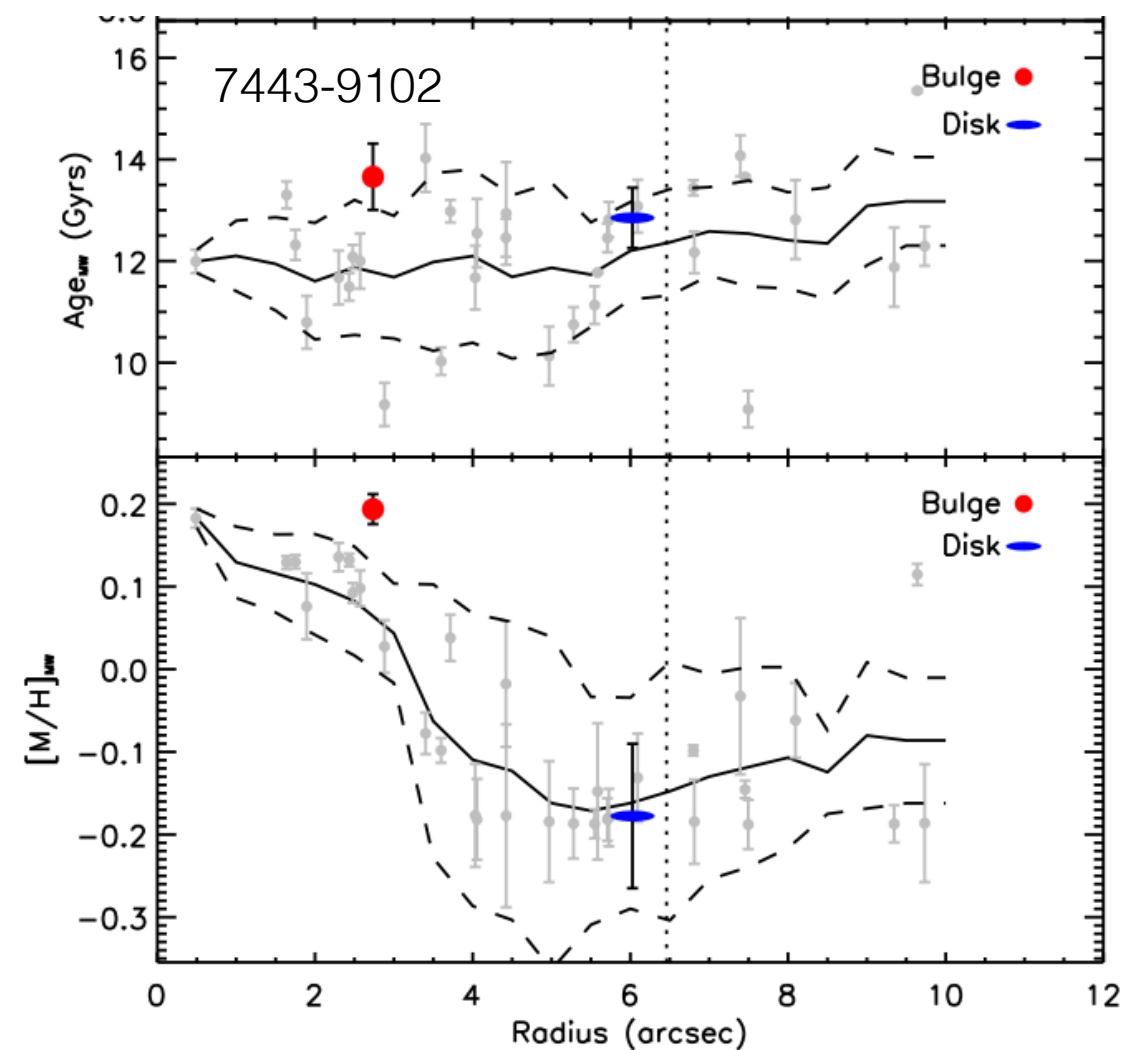
mass-weighted stellar populations



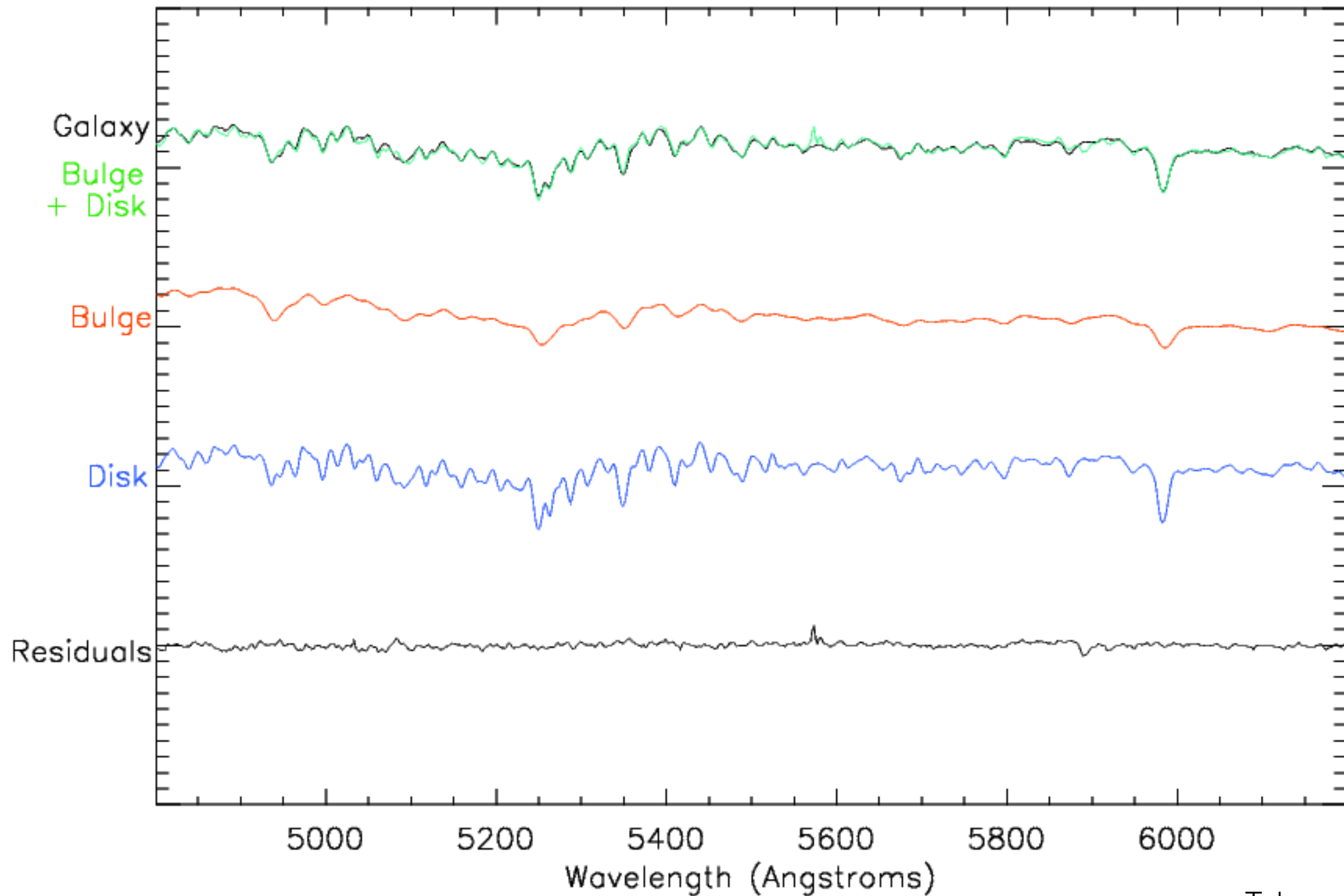
Post-starburst
galaxy



S0 galaxy



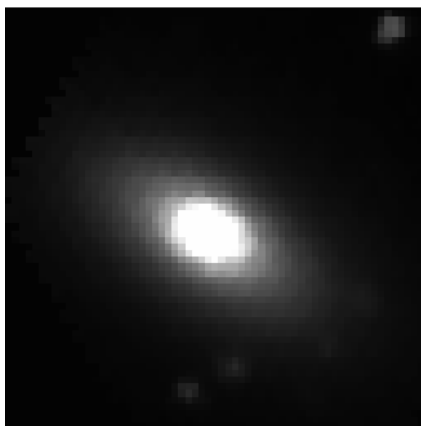
Constrained kinematic decomposition



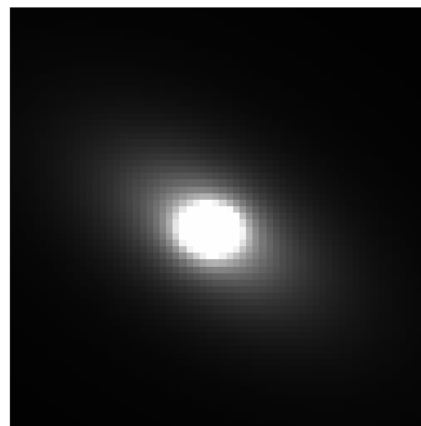
Constrained kinematic decomposition

- **Assumptions:**
 - rotation dominated disc
 - dispersion dominated bulge
- **Constraints:**
 - use photometric decomposition to measure fraction of light of each component in each bin

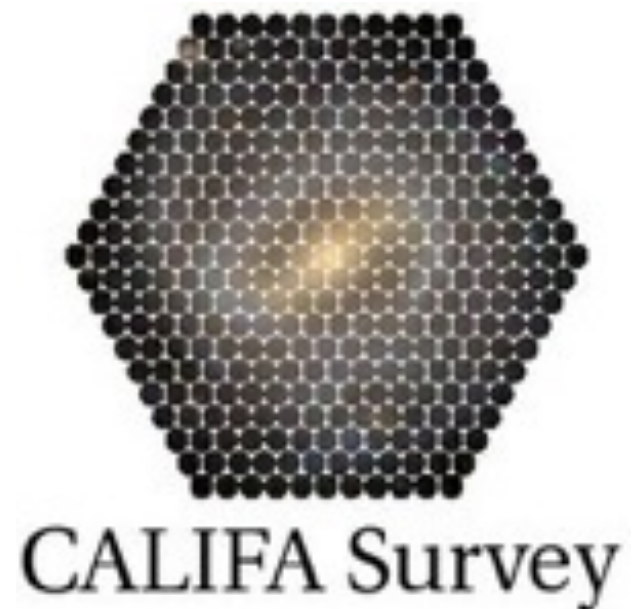
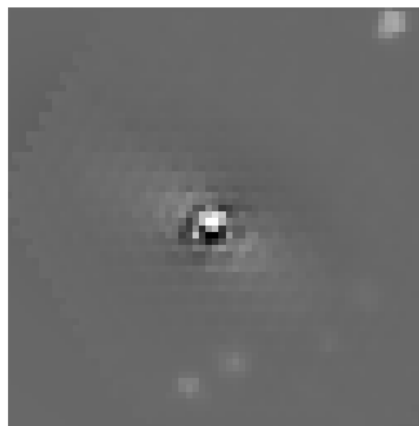
CALIFA



Model

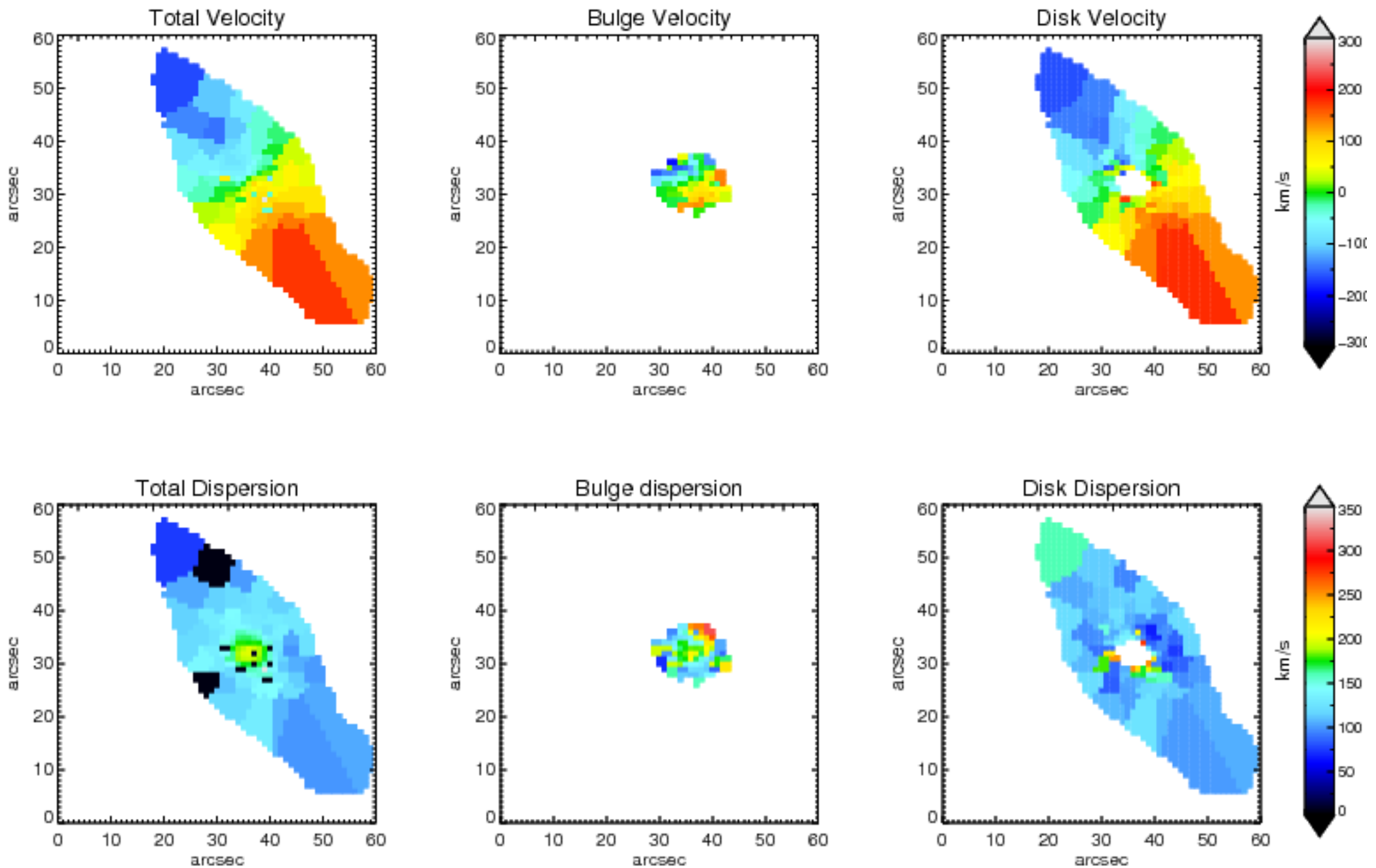


Residual



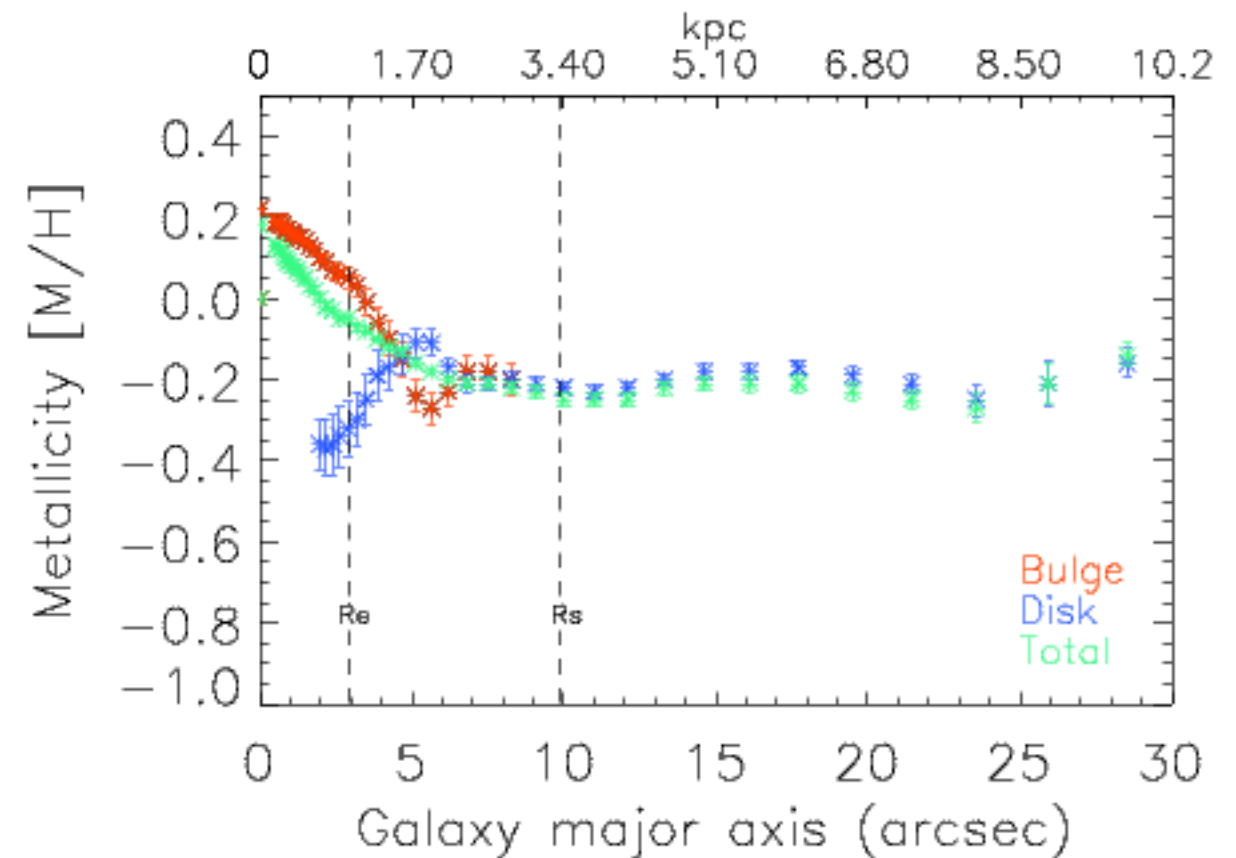
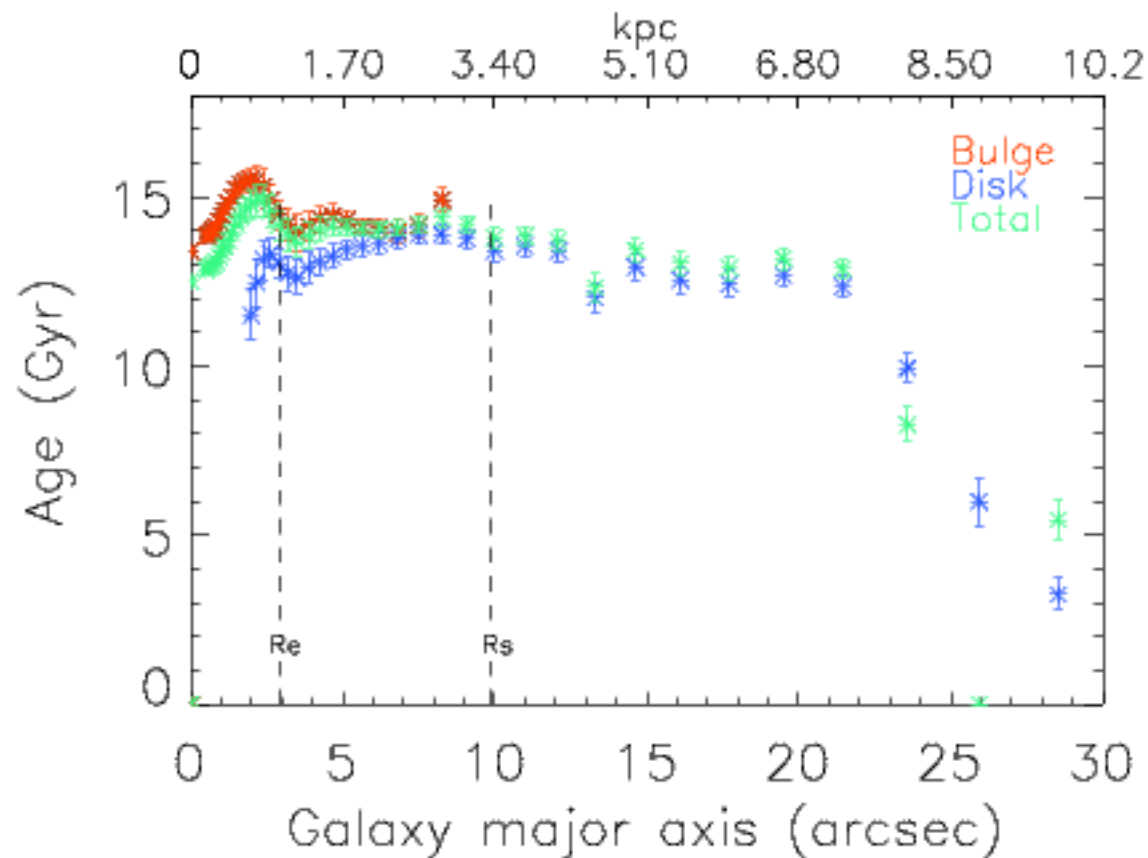
Constrained kinematic decomposition

Decomposing NGC6427



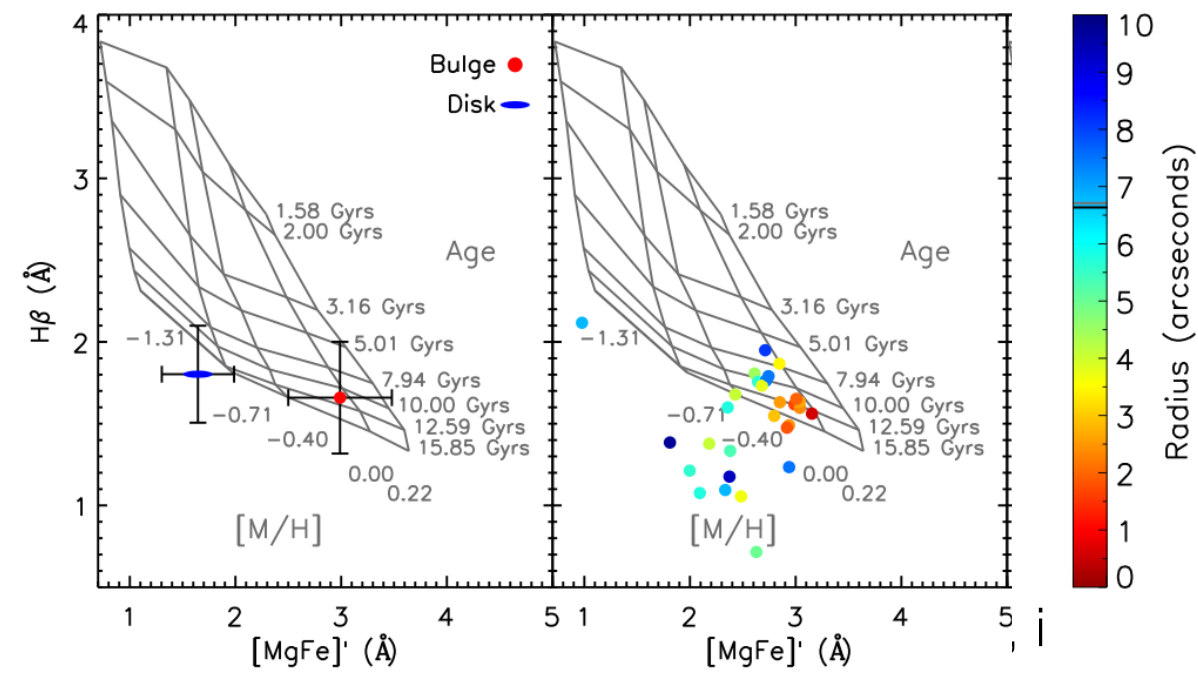
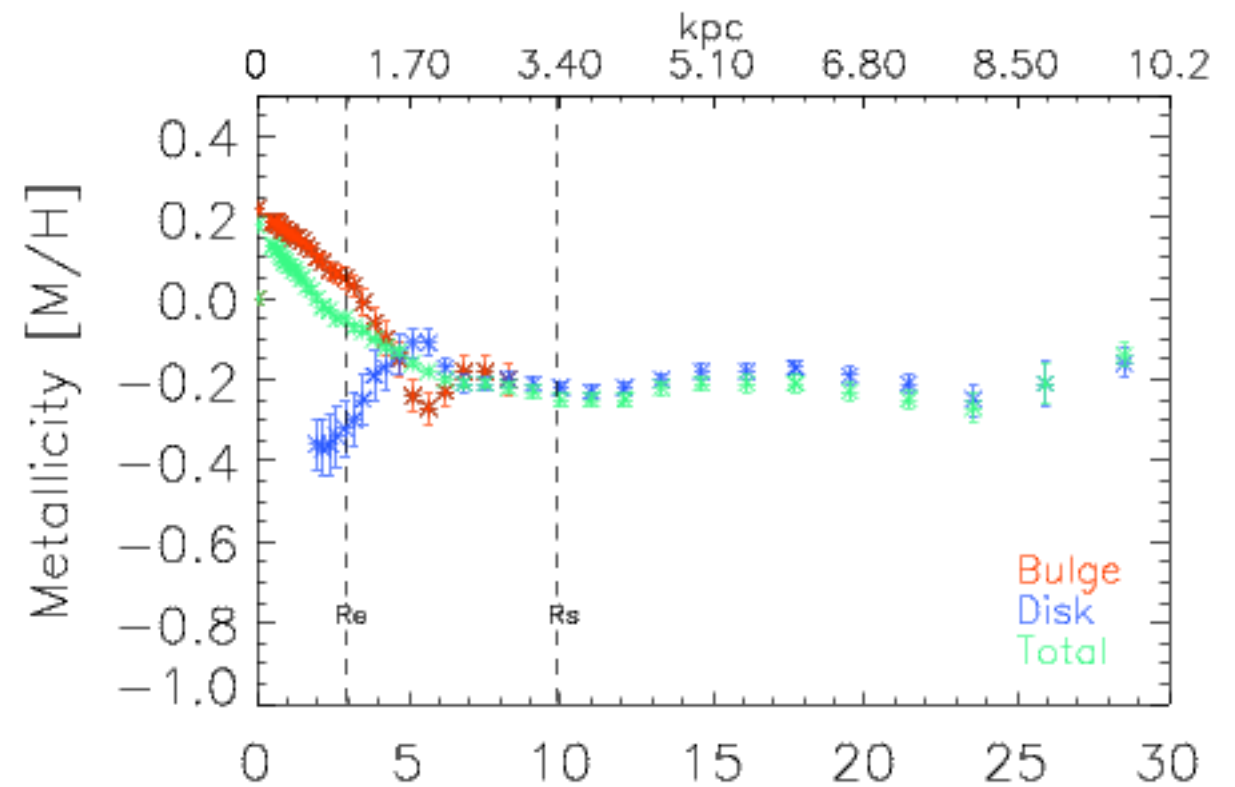
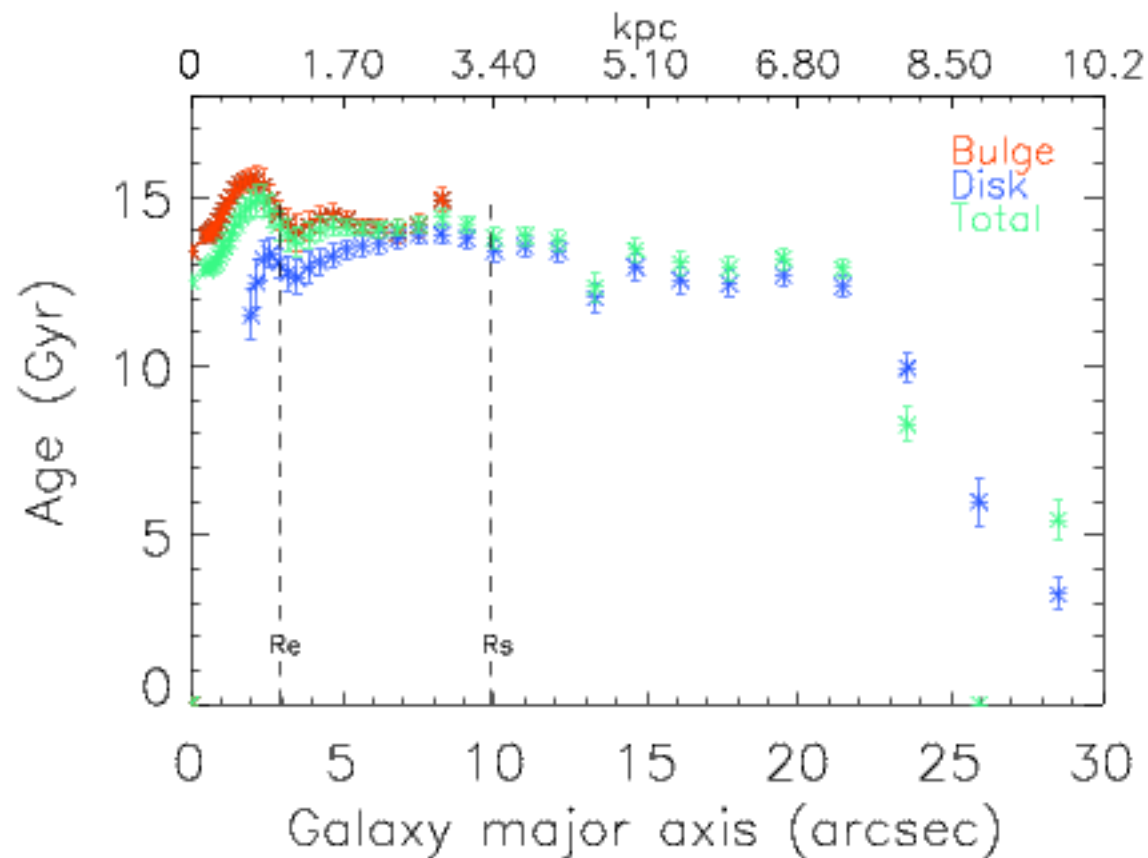
Constrained kinematic decomposition

Decomposing NGC6427



Constrained kinematic decomposition

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Constrained kinematic decomposition

How to achieve a good fit

- Fit can be achieved to both components if:
 - light fraction is constrained by photometric decomposition
 - fraction of light for both components $>30\%$
 - $S/N > 25\%$
 - fits are repeated for a 5×5 grid of initial velocities

Summary

- IFU observations of S0 galaxies are just begging to be decomposed into bulge and disc components, and we are now developing tools to do so
 - BUDDI
 - constrained kinematic decomposition
- We are now in a position to spectroscopically separate the light from bulges and discs
- Our next step is to apply these decompositions to a large sample of S0 galaxies. The information that can be derived through these two techniques can help us understand how these galaxies transformed.