Studying extra-planar gas in the halos of MaNGA galaxies

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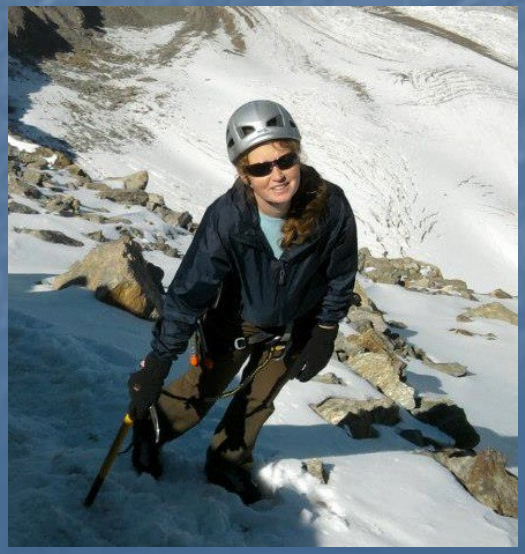
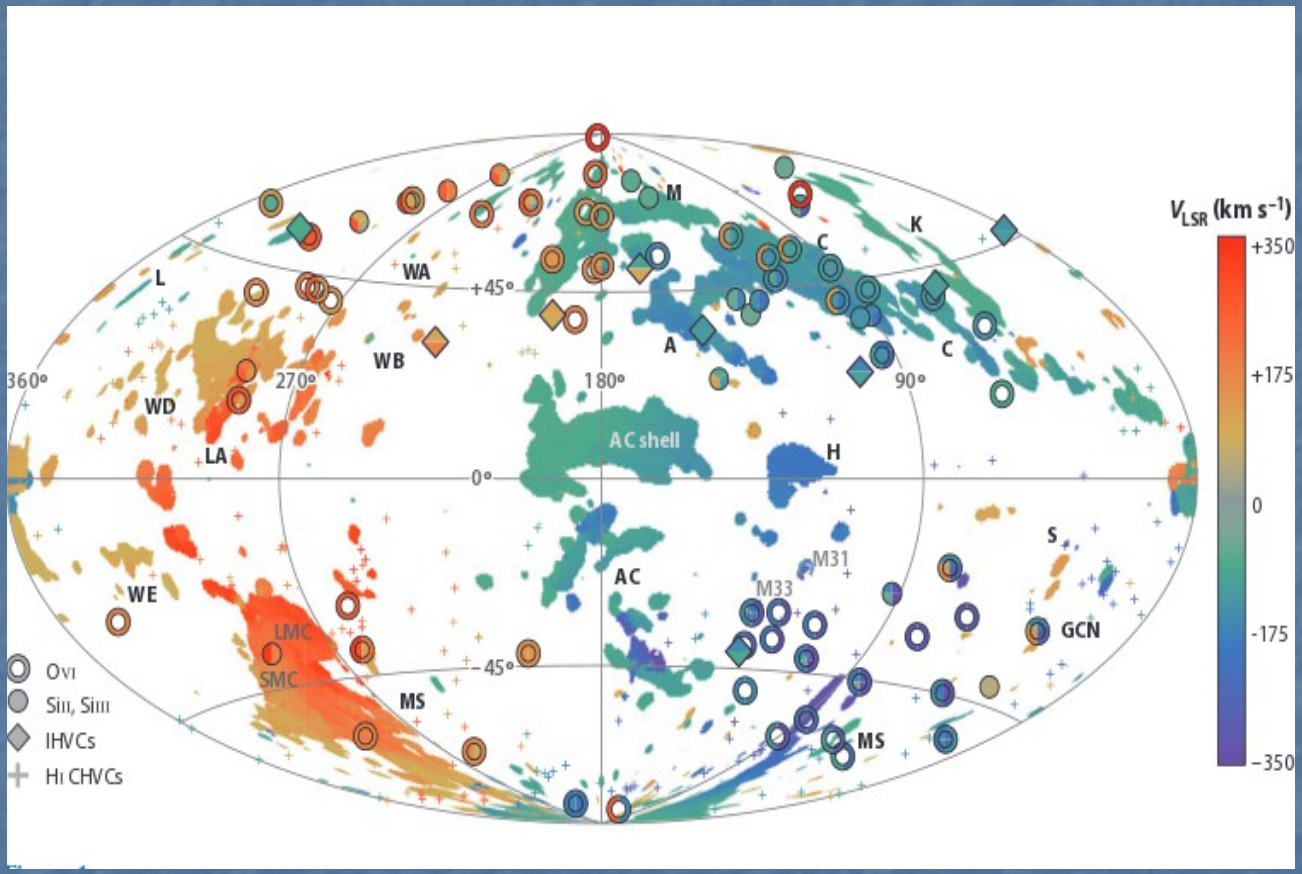
12 April 2016



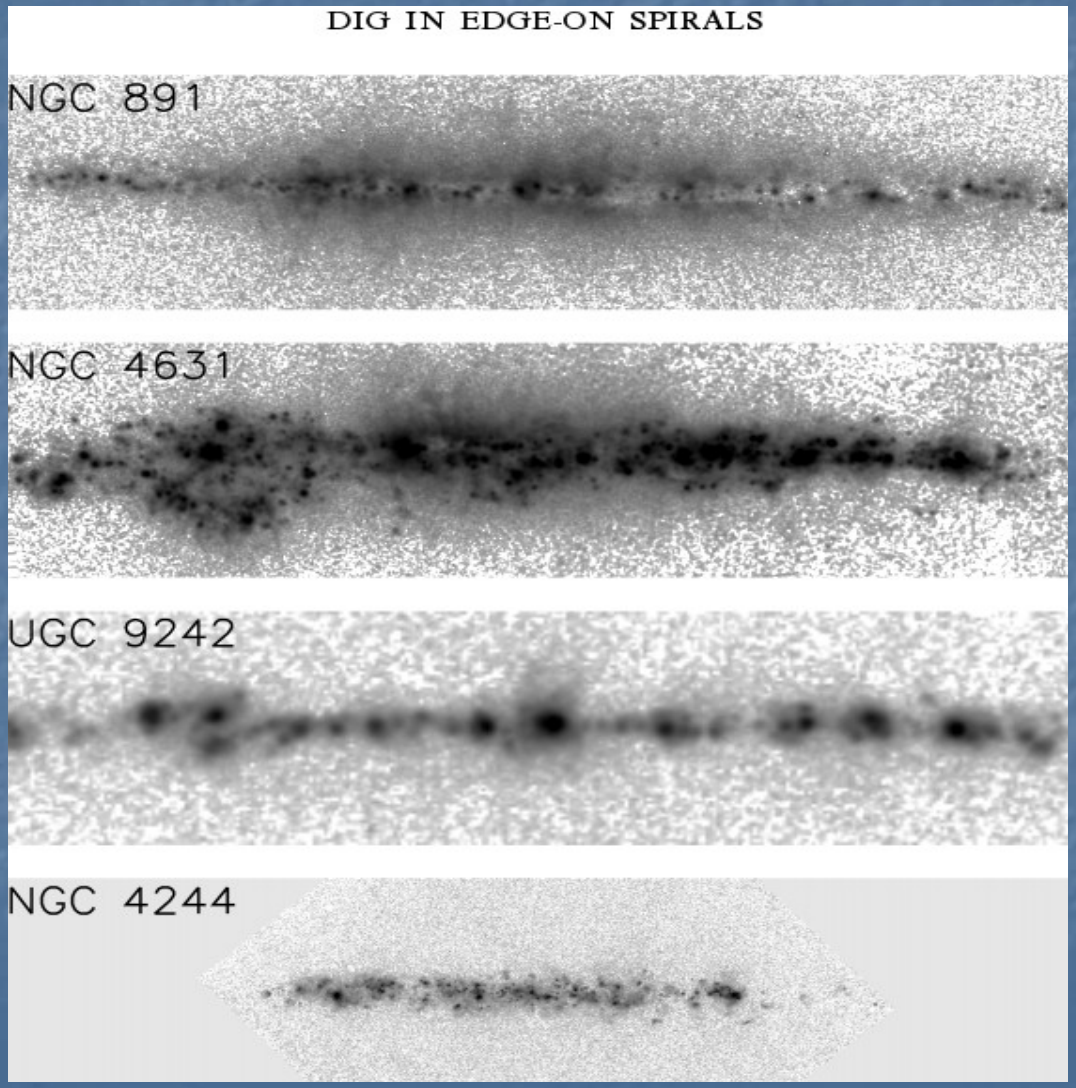
Max Planck Institute for Astrophysics

MW Gaseous Halo



M.E. Putman, J.E.G. Peek, & M.R. Joung, 2012

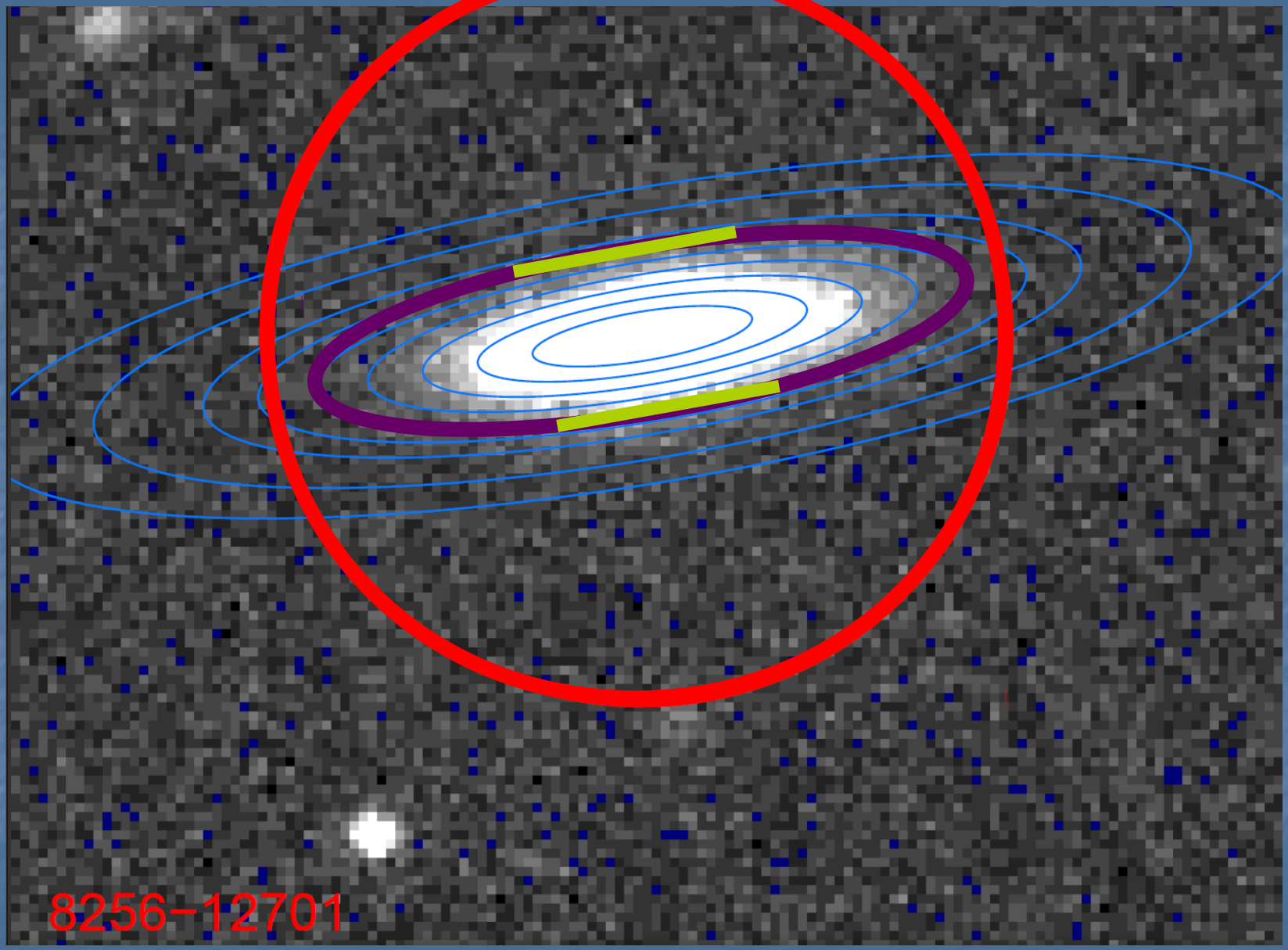
Gaseous Halos



C. Hoopes & R. Walterbos, 1999

MaNGA-SDSS IV

- Mapping Nearby Galaxies at APO
- 6 year survey part of SDSS IV
- Observing ~10 000 galaxies at z~0.03
- IFU with varying bundle sizes
- 360-1000 nm with R=2000
- Bundy, et al 2014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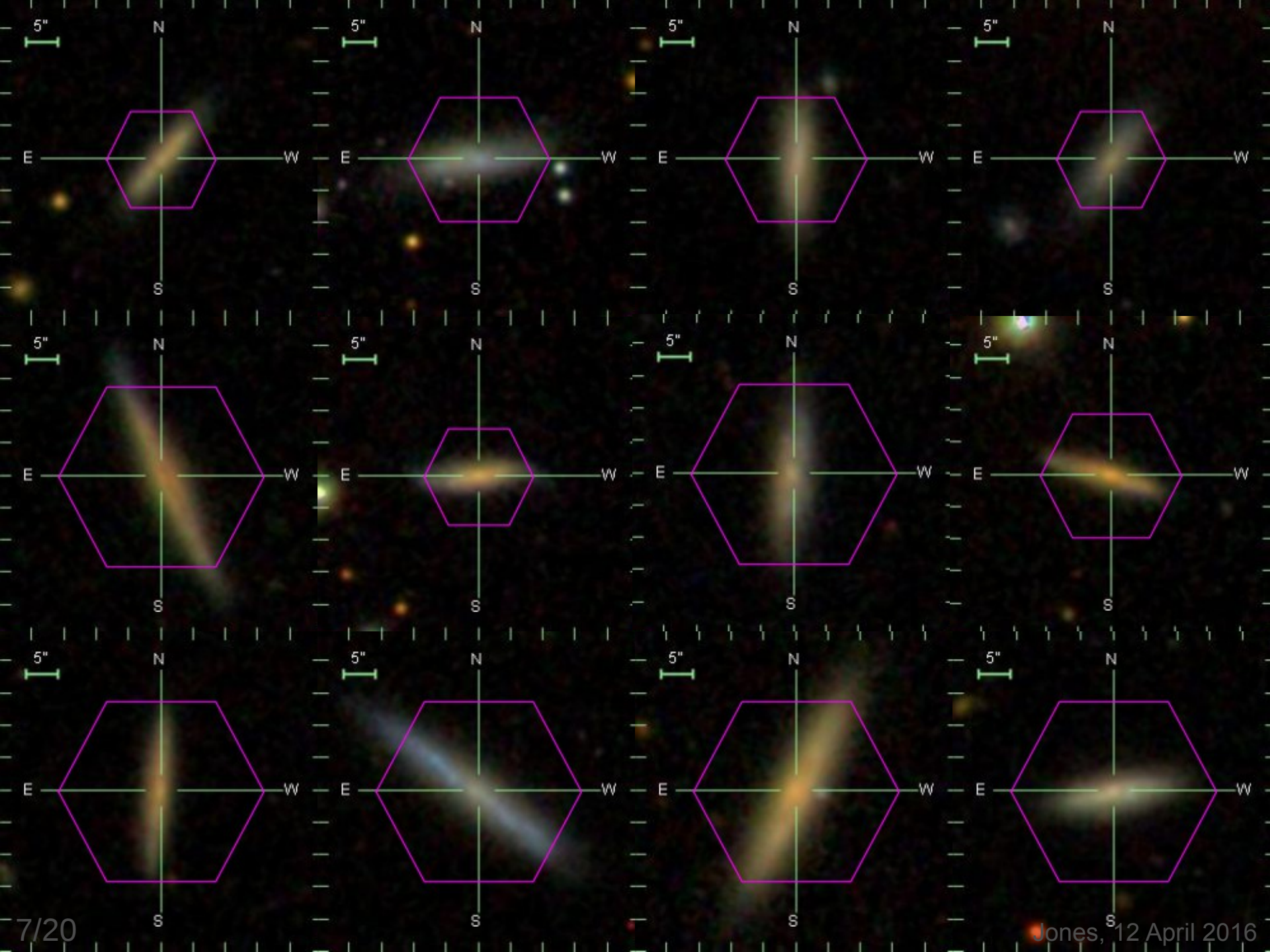
5"
N
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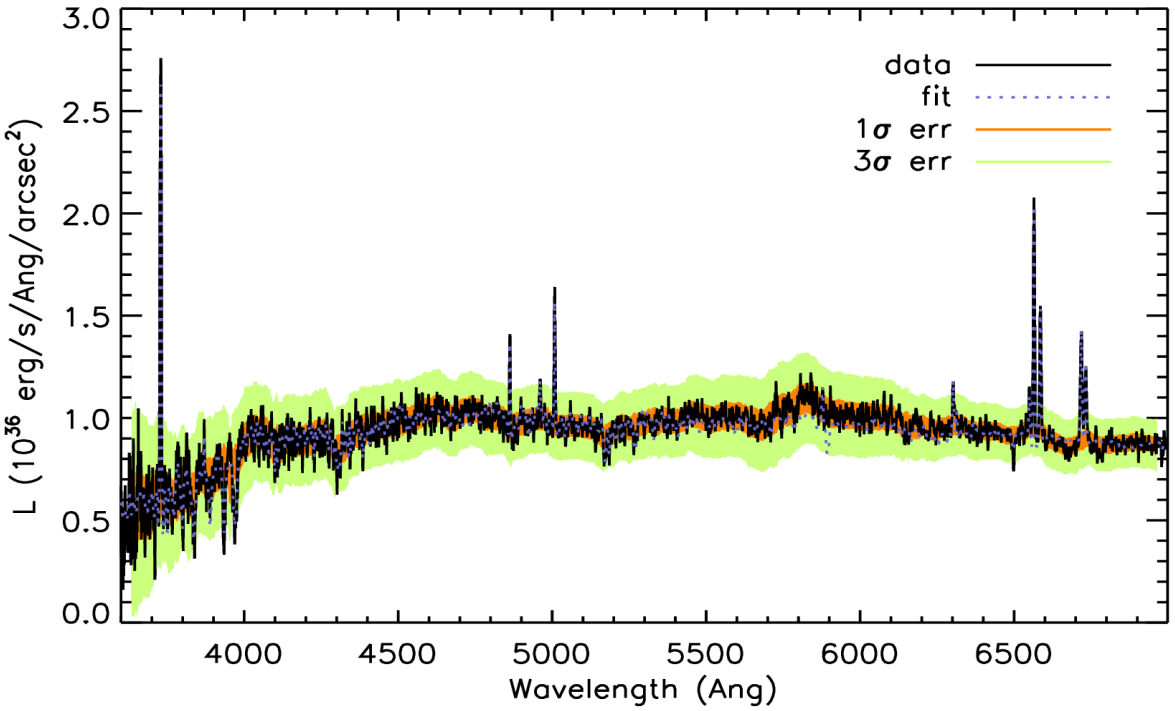
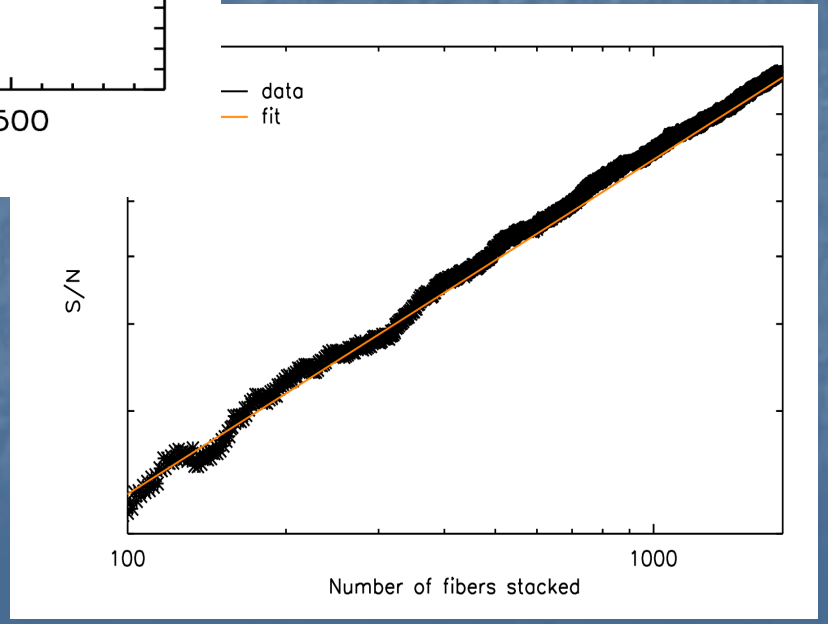
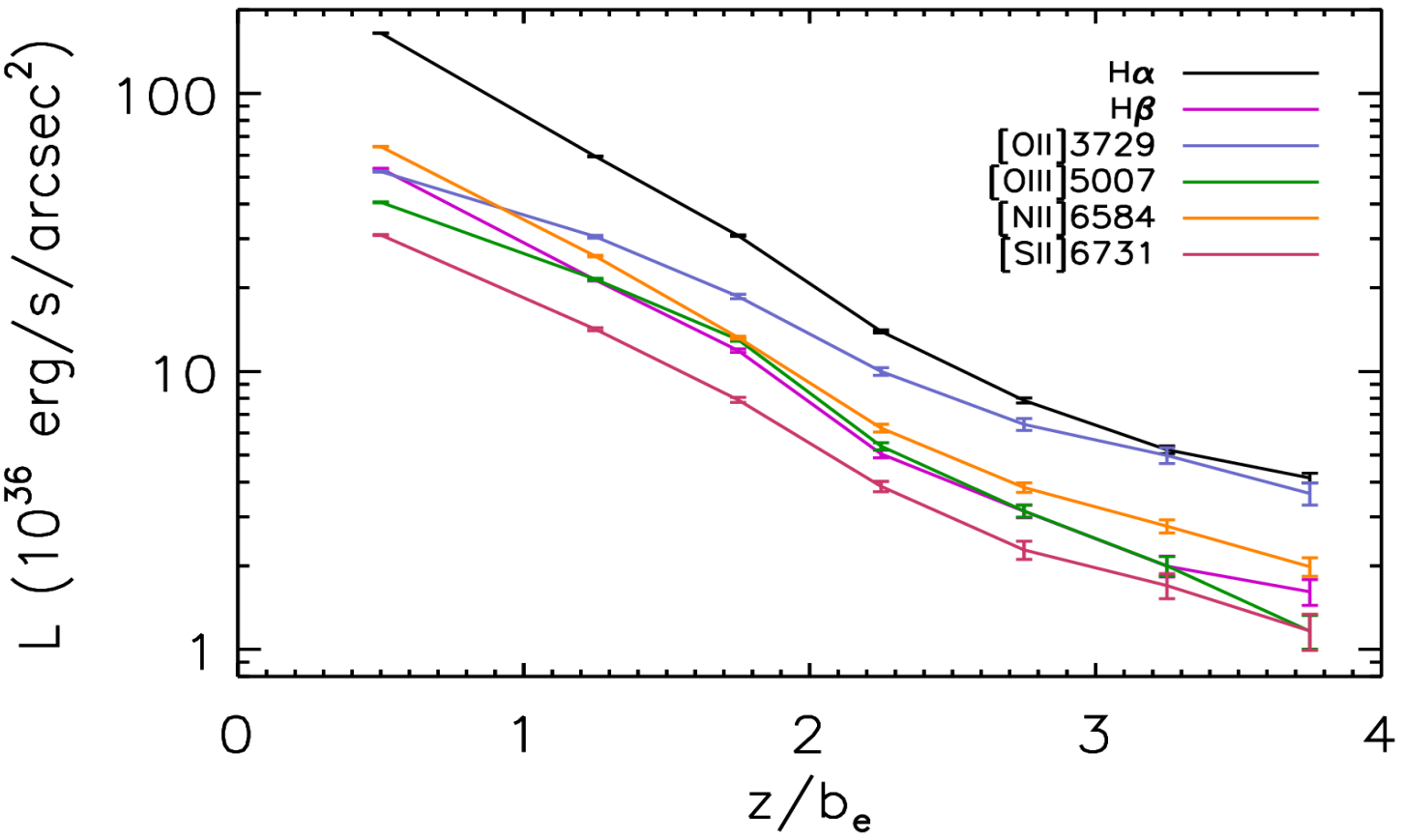
Stacked spectra

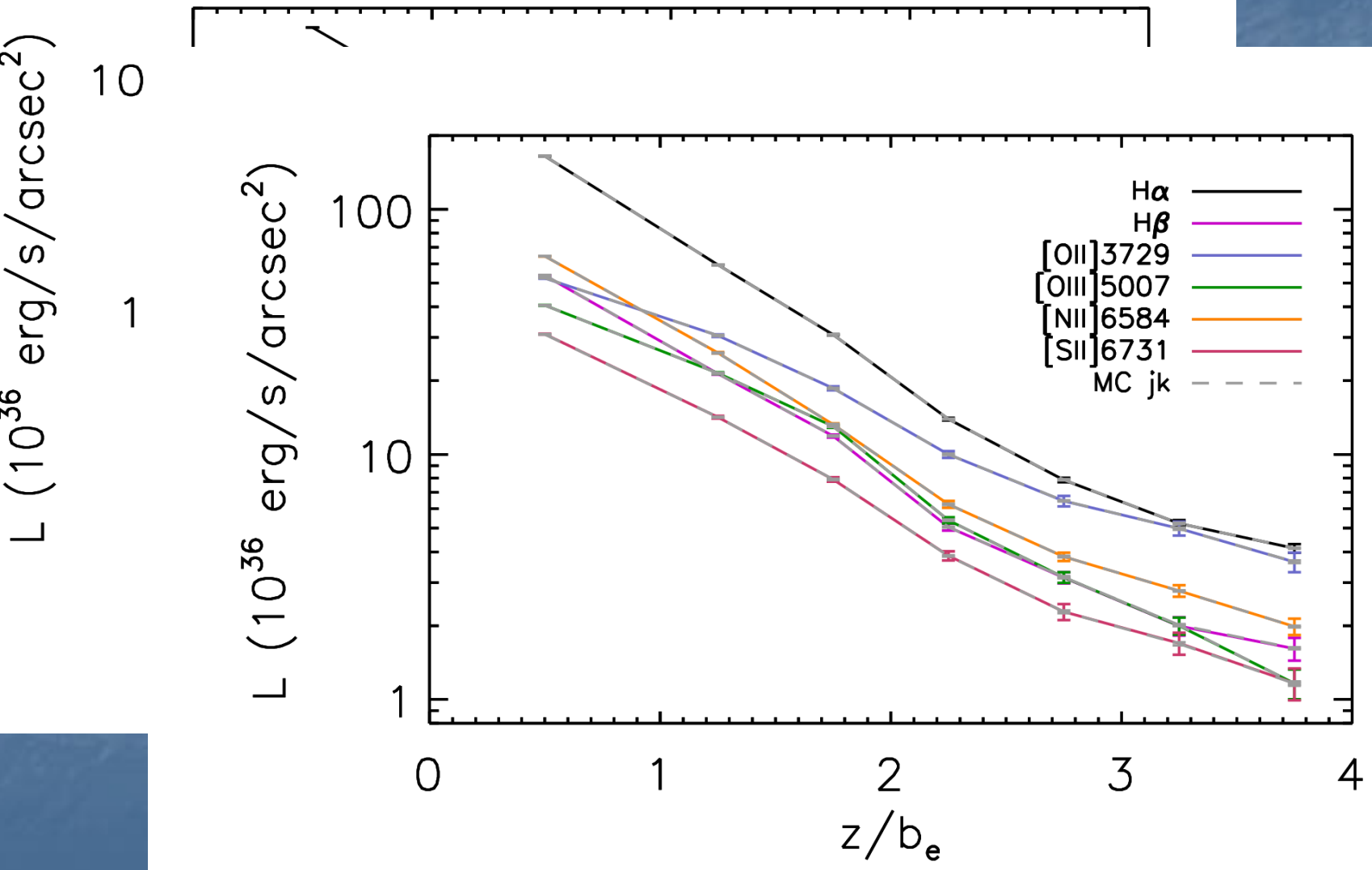




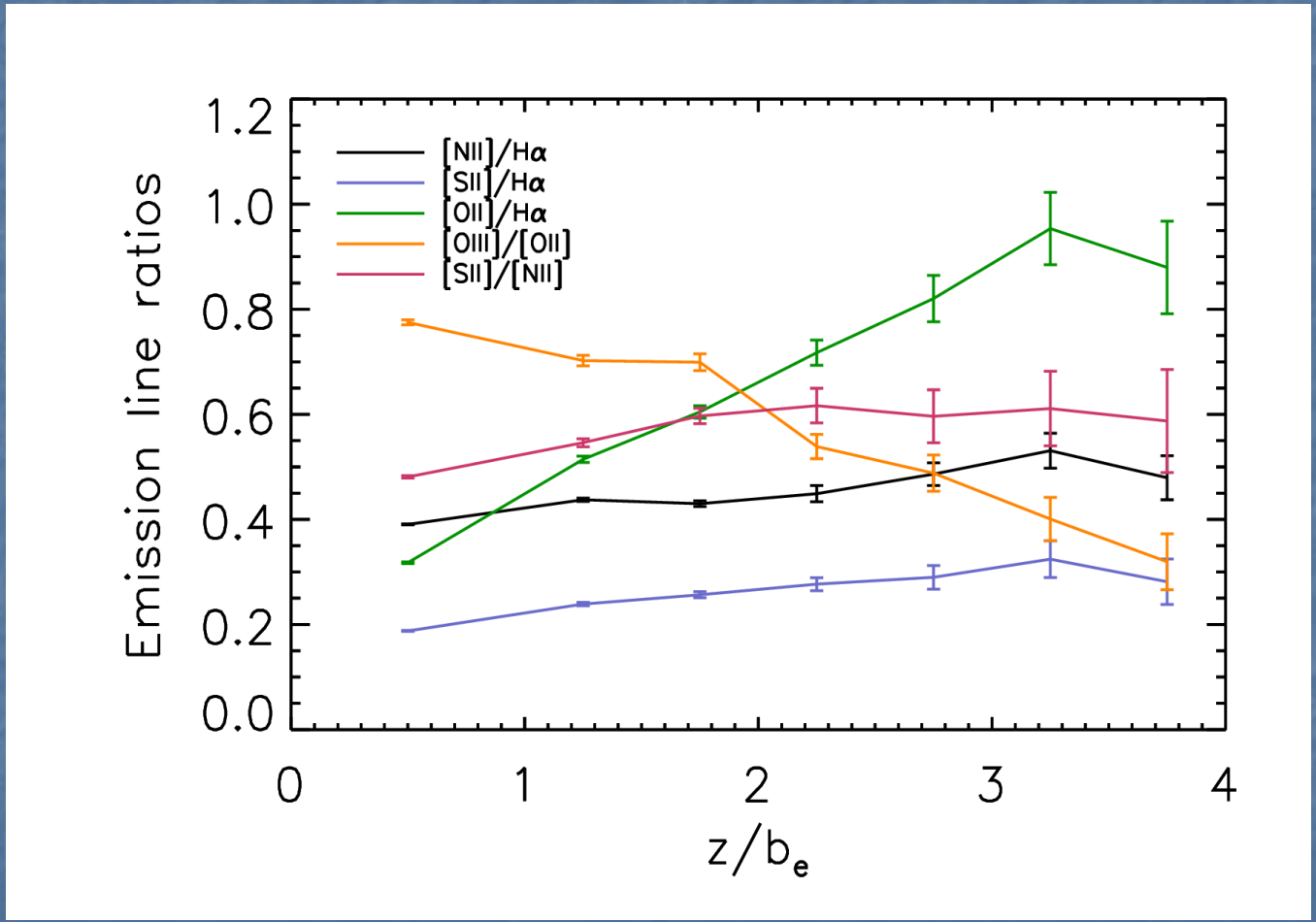
Emission Line Profiles



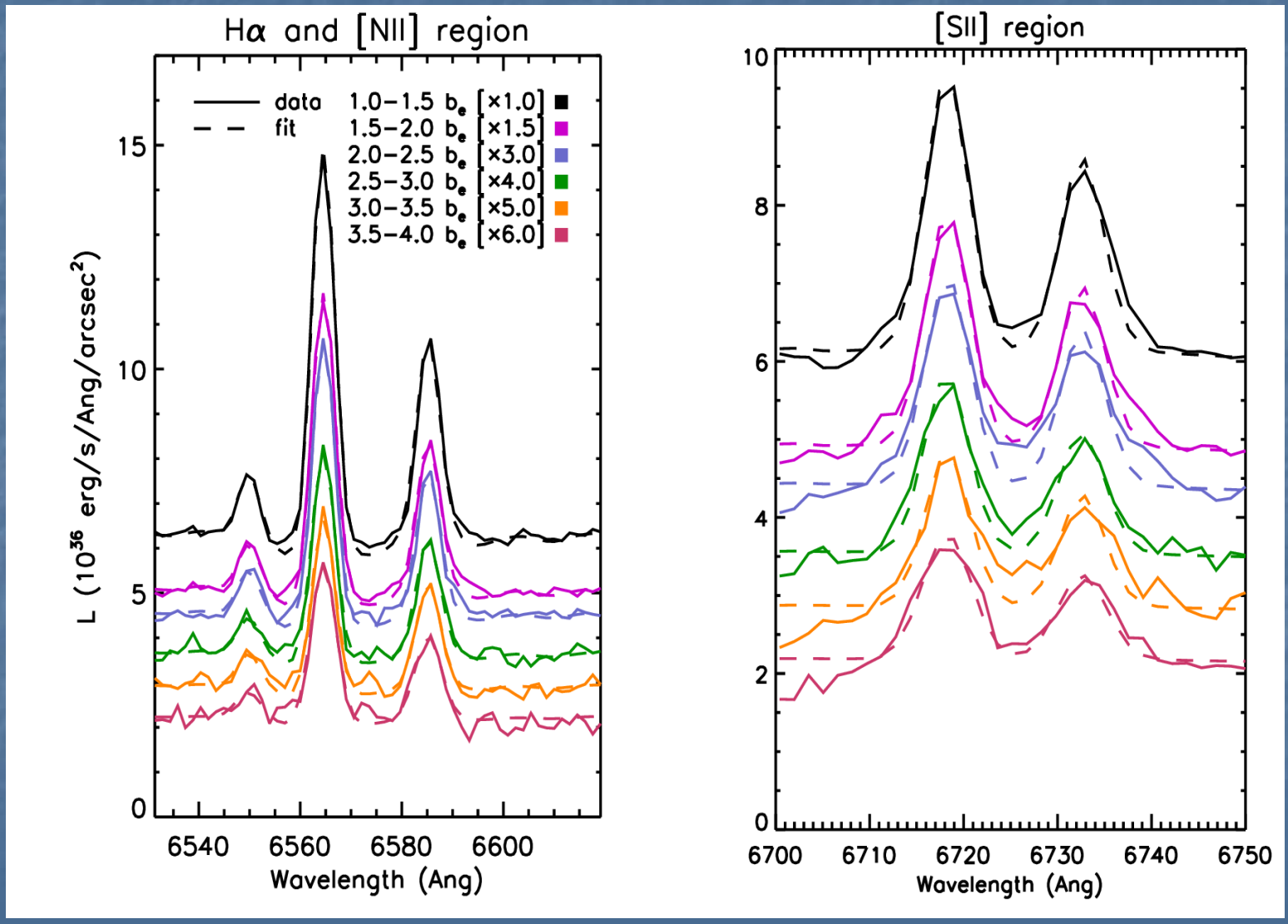
Emission Line Profiles



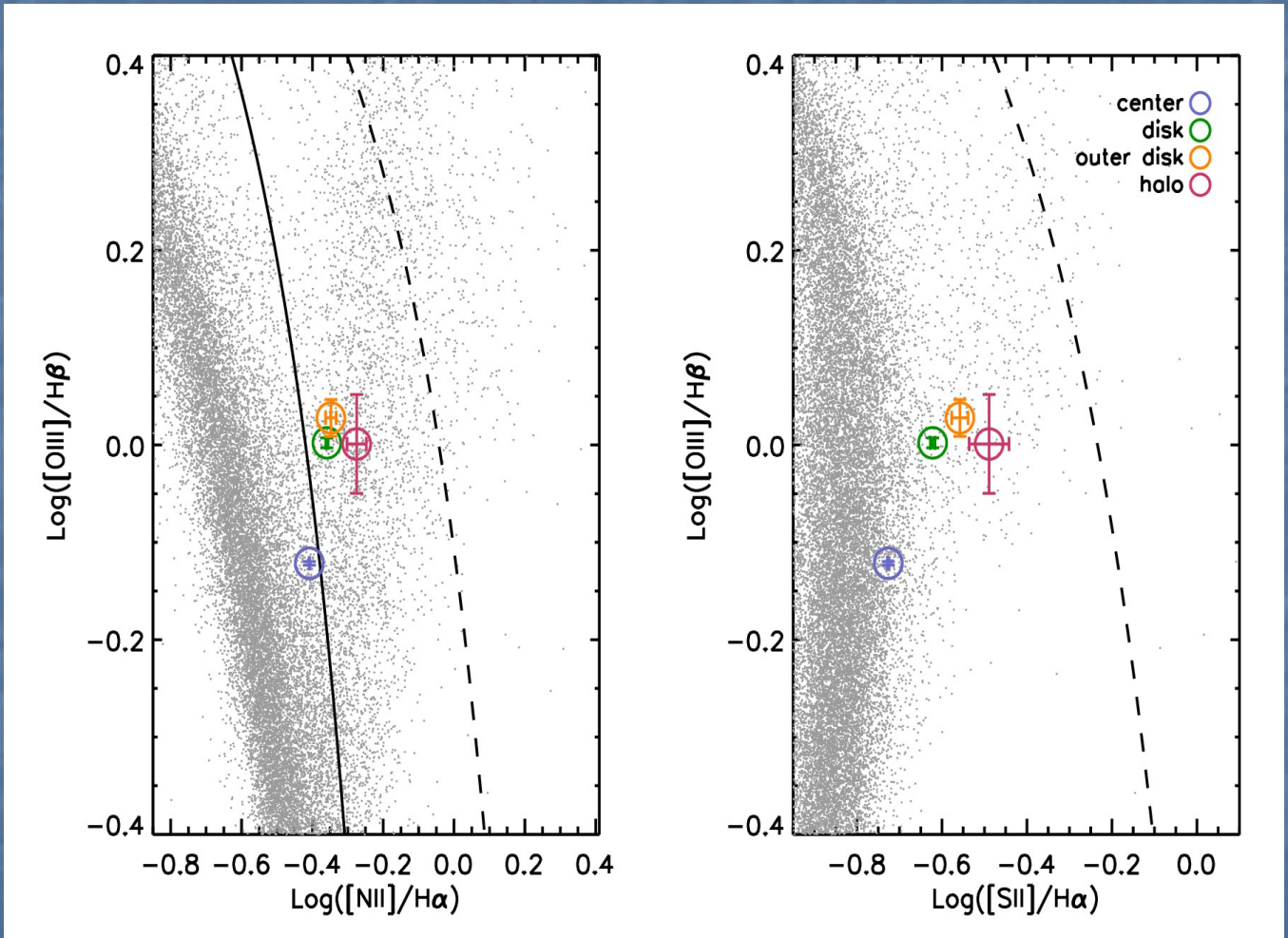
Emission Line Ratios



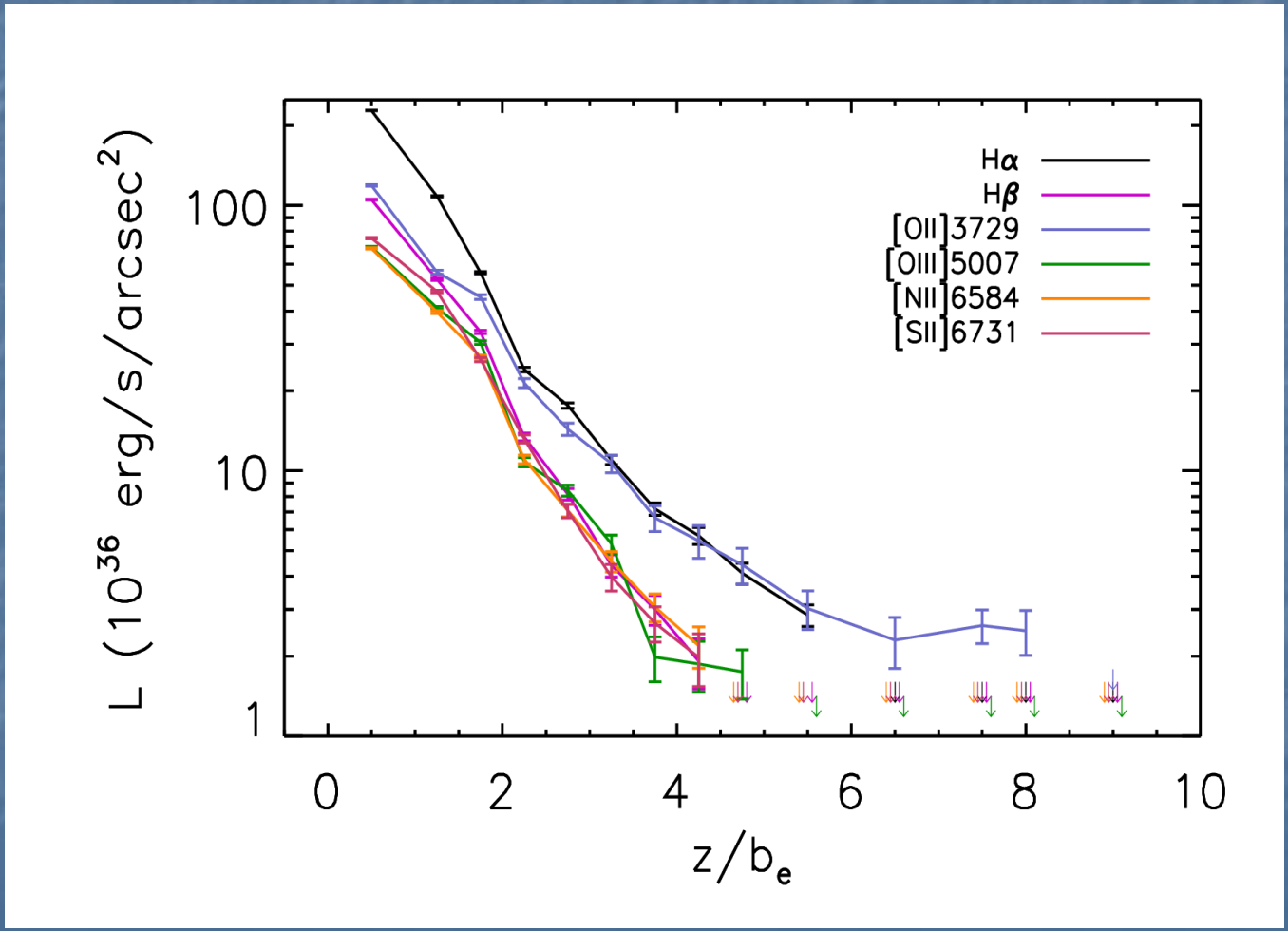
Zoom in on Emission Lines



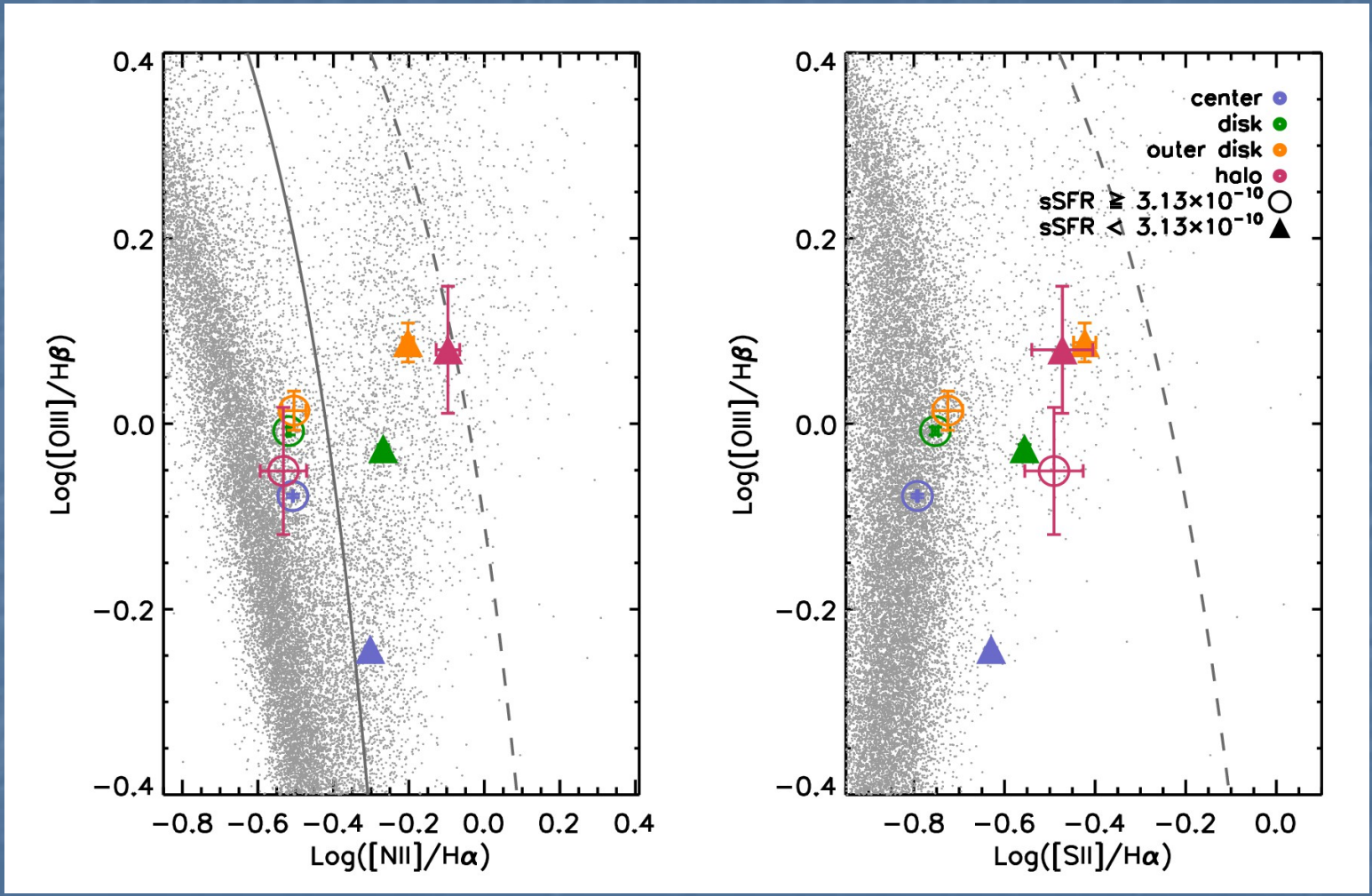
BPT Diagram


0.4
0.2
0.0
−0.2
−0.4
−0.8 −0.6 −0.4 −0.2 0.0 0.2 0.4
Log([OIII]/Hβ)
Log([NII]/Hα)
center
disk
outer disk
halo
−0.8 −0.6 −0.4 −0.2 0.0
Log([SII]/Hα)

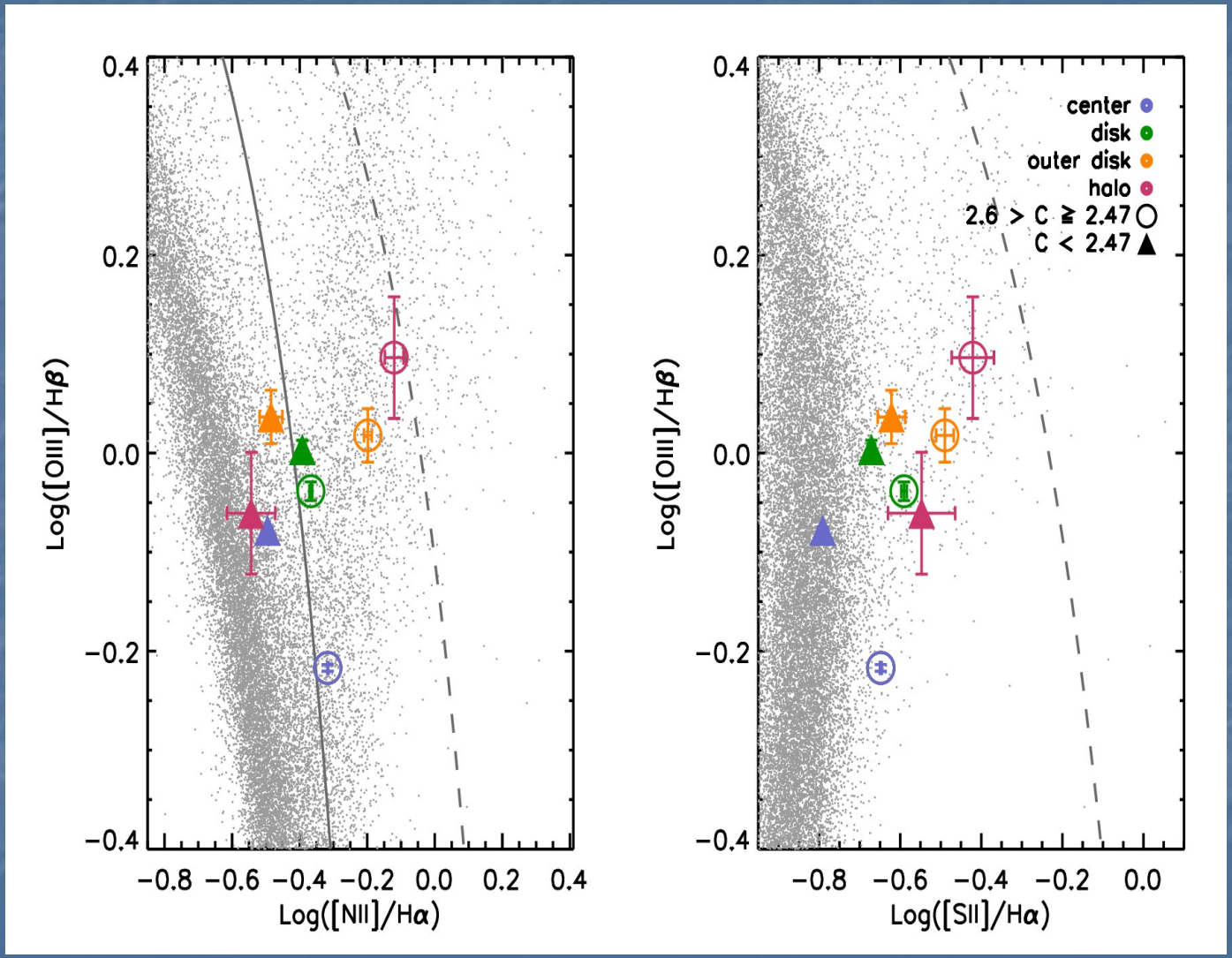
Emission Line Profiles out to Large Re!



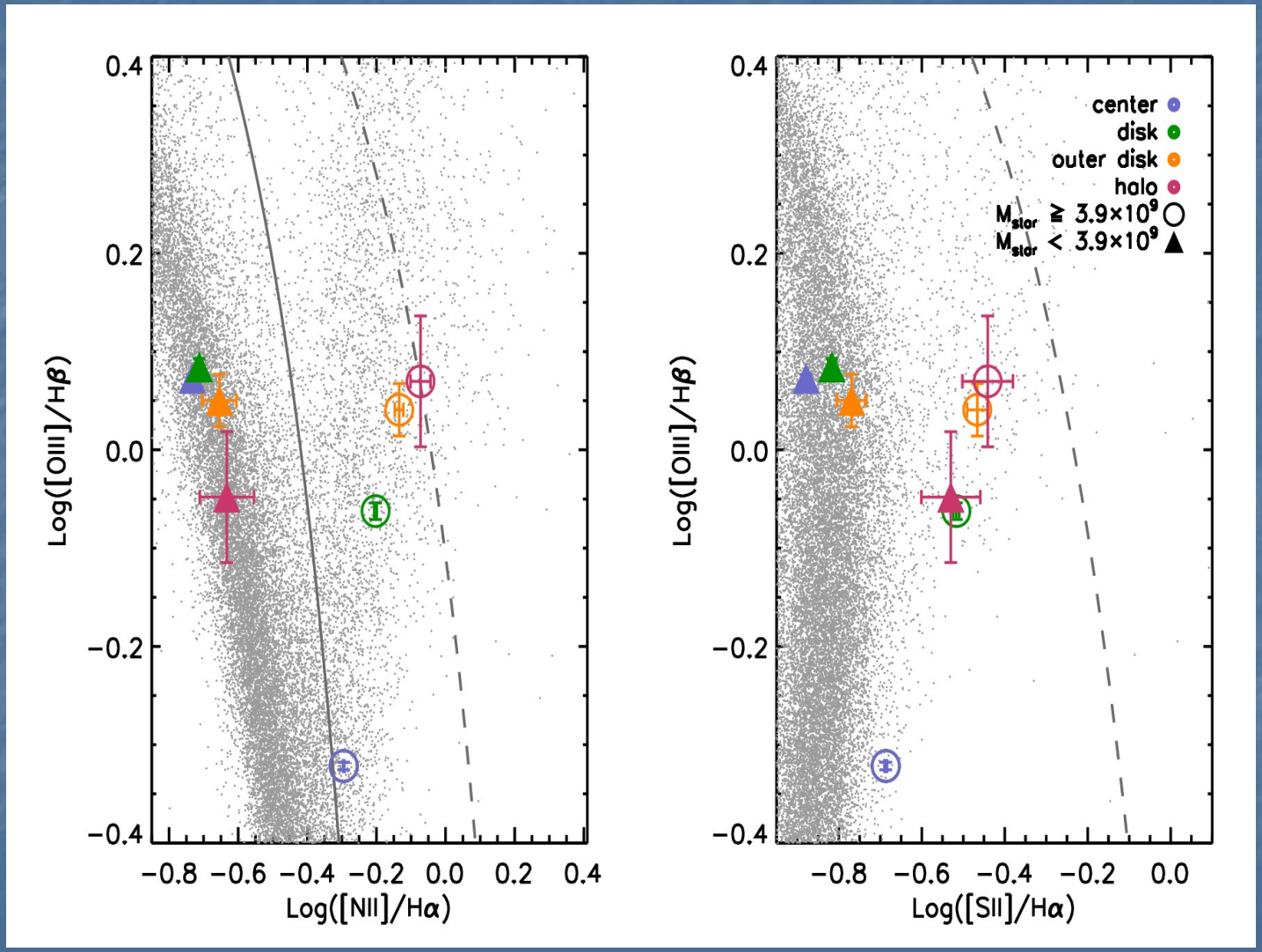
Split by sSFR



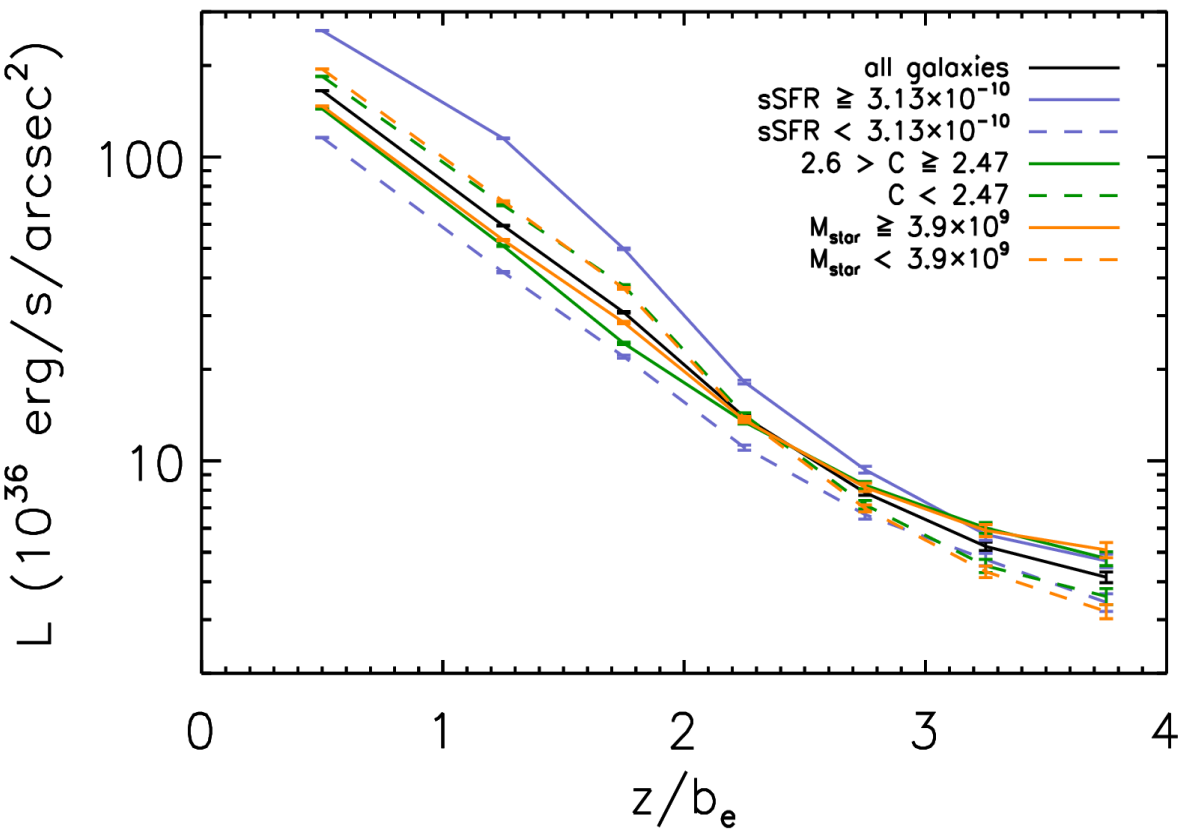
Split by Concentration Index



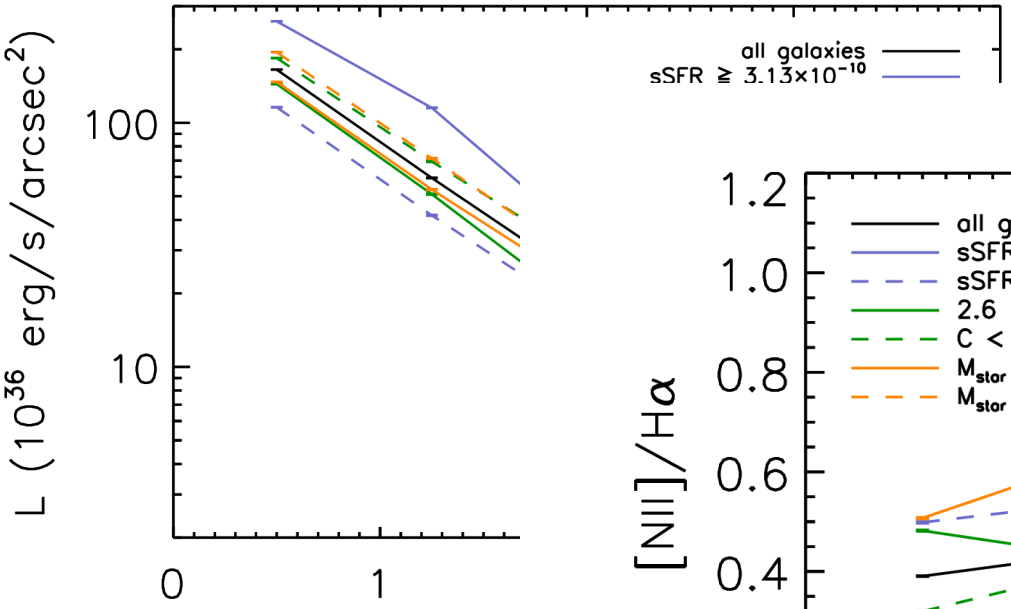
Split by Stellar Mass

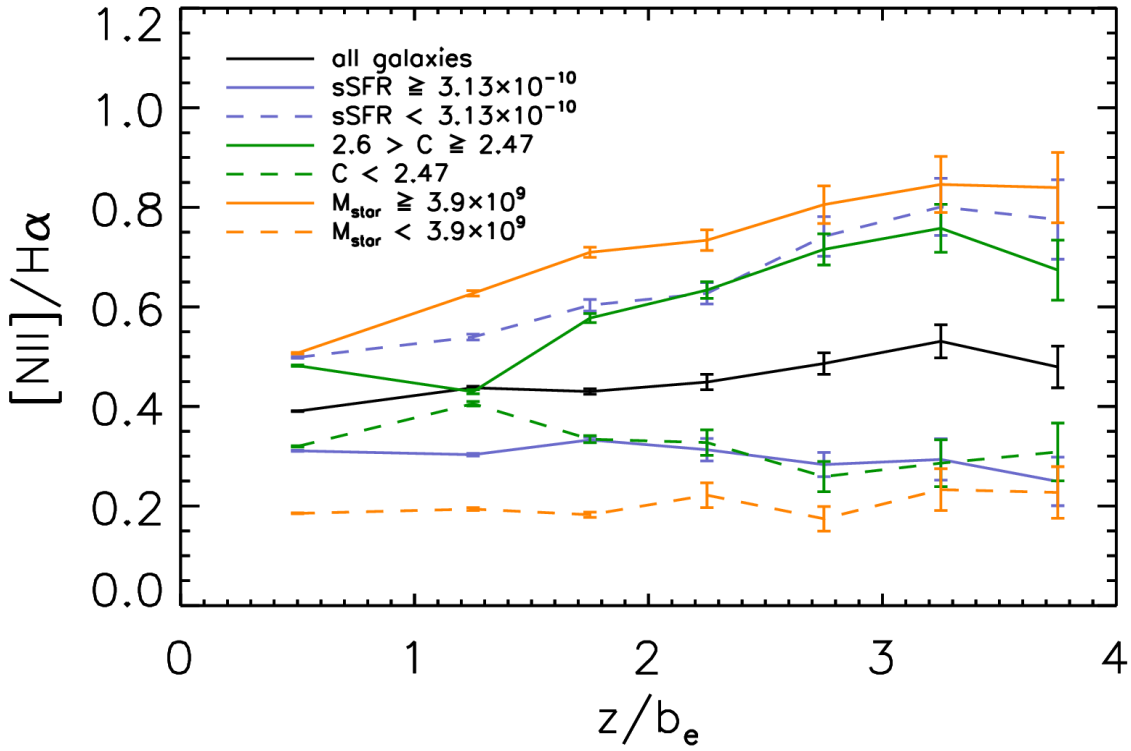


Subsamples: Emission Line Comparisons



Subsamples: Emission Line Comparisons

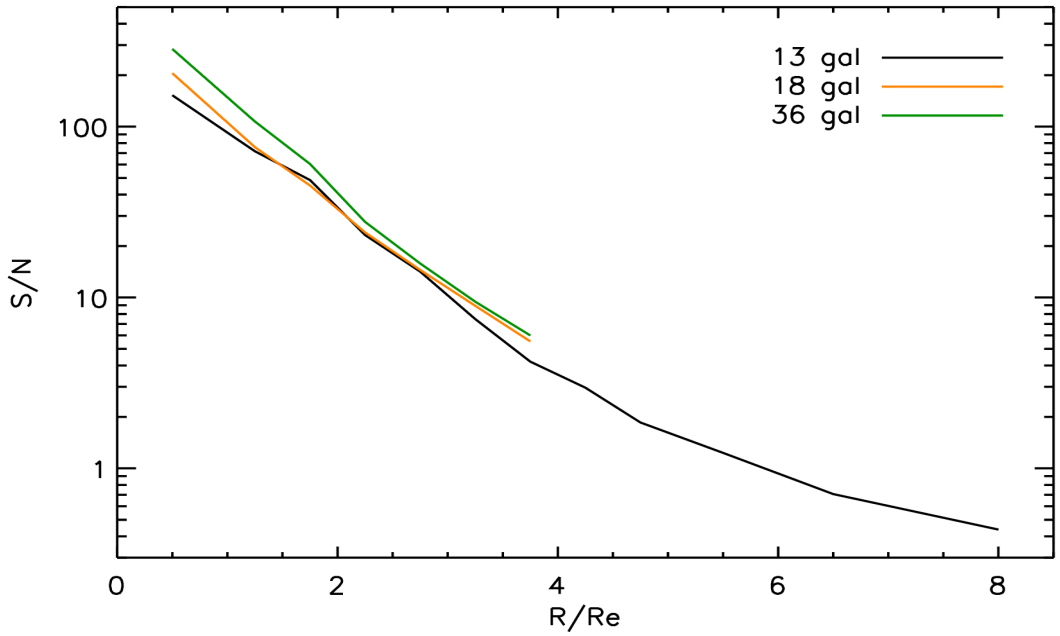


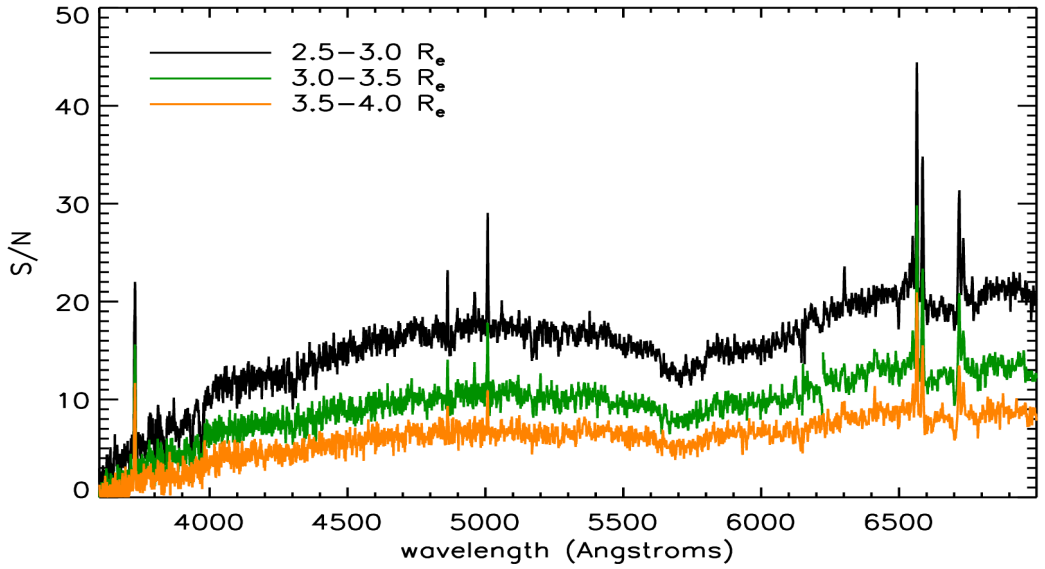


Summary

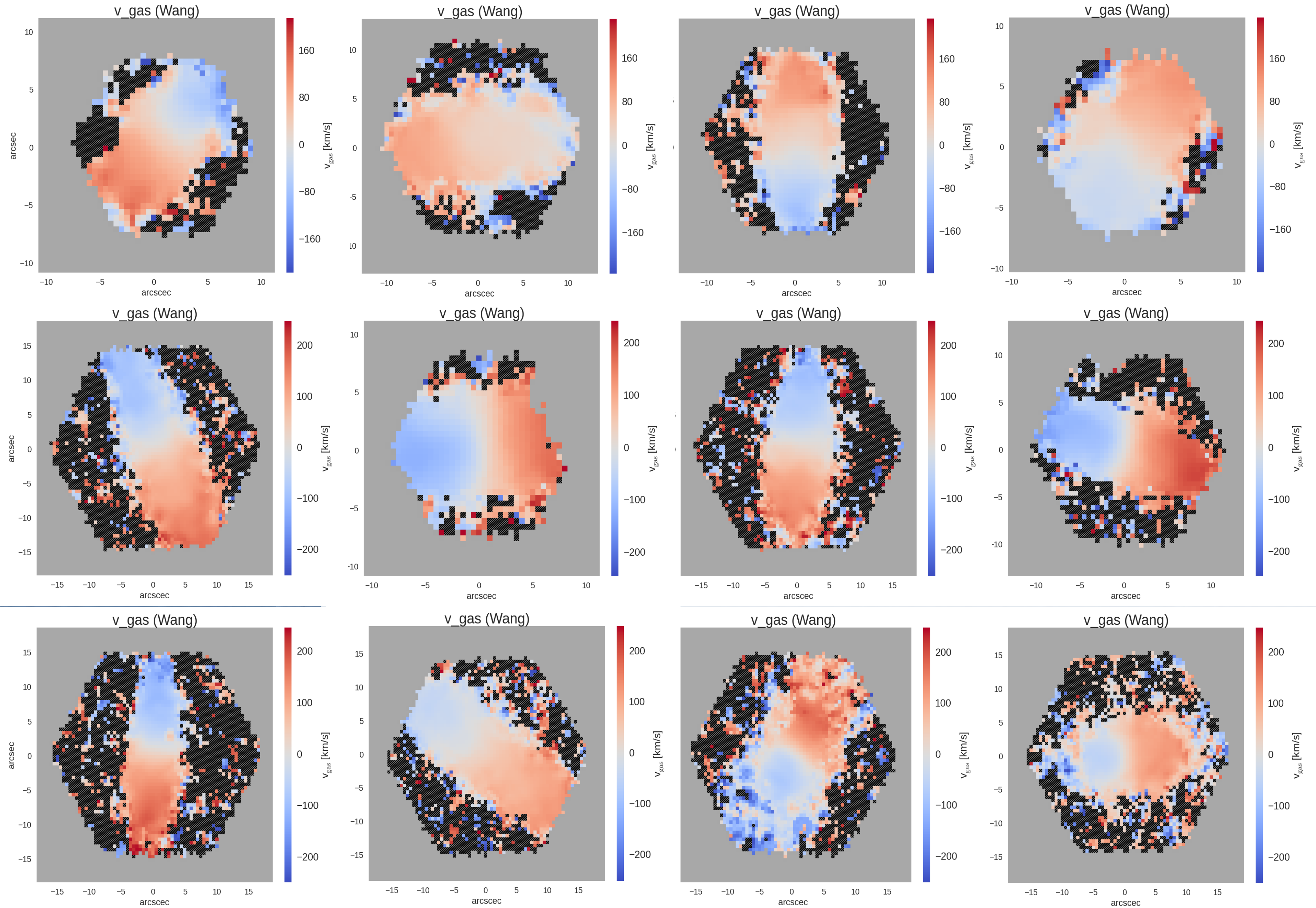
- MaNGA galaxies can be used to study the average properties of the halo out to several Re
- Split the current sample in half to unveil trends about diffuse ionized gas
- By stacking MaNGA galaxies and comparing subsamples, we can help solve the mysteries of the origin of eDIG

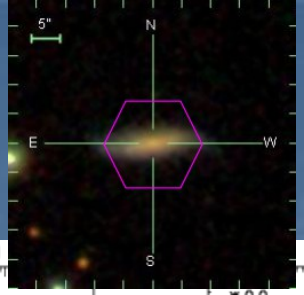
Quality of Stacks

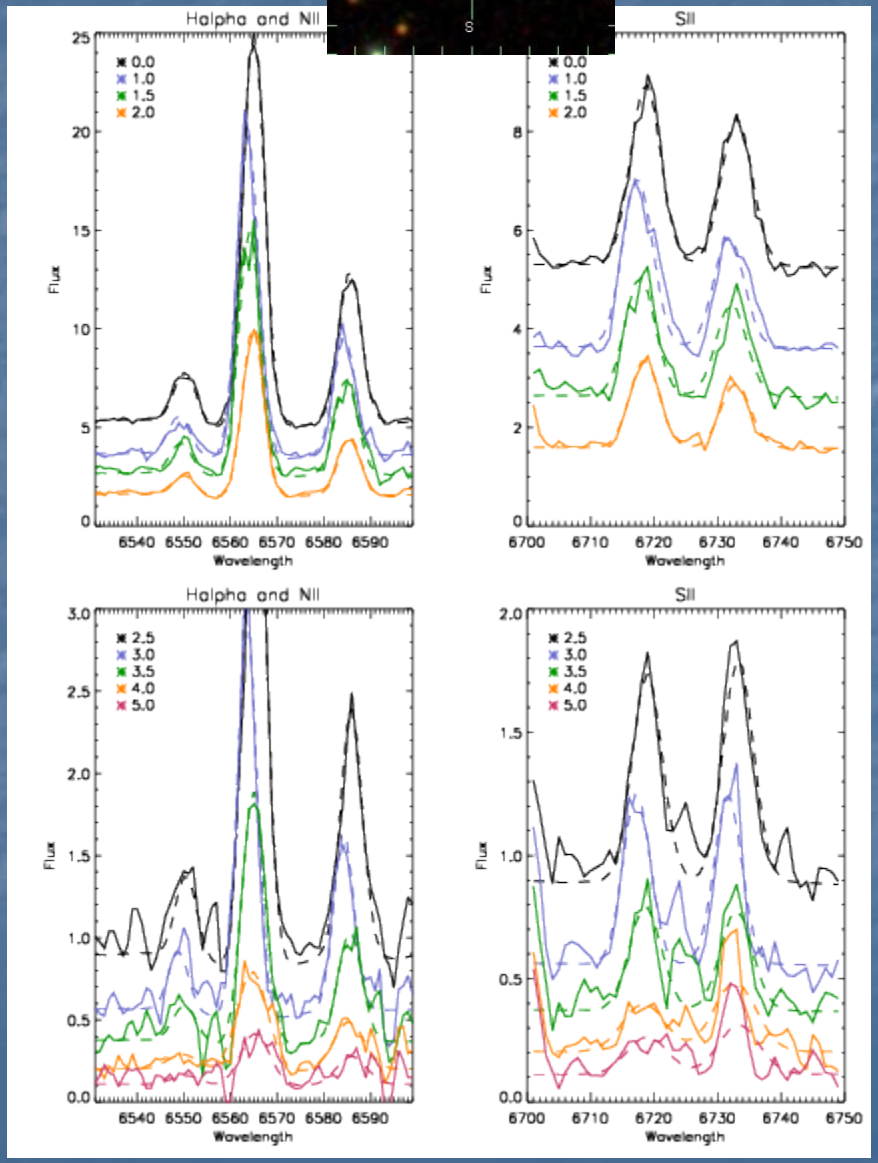


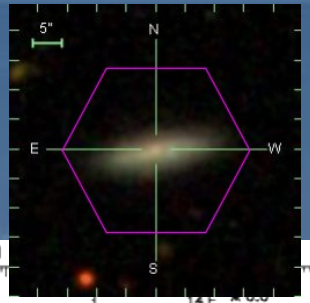


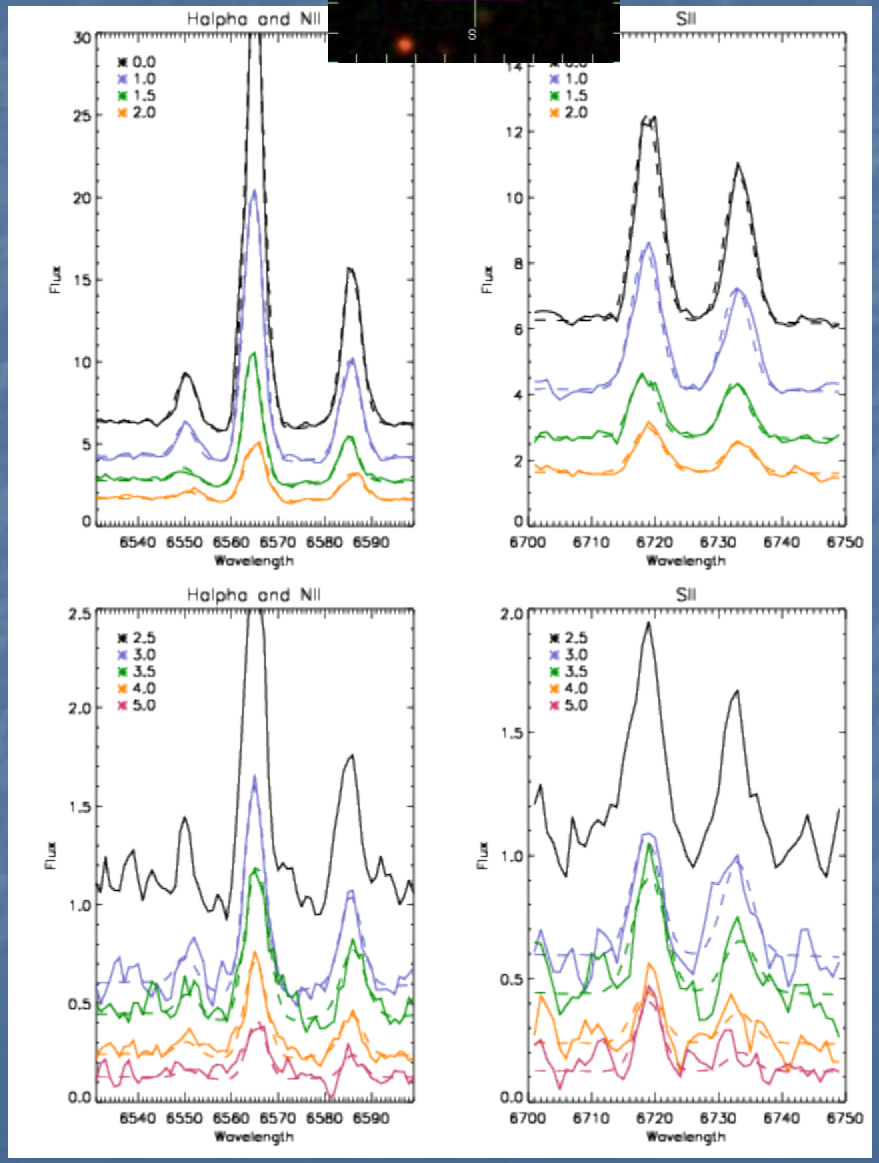
Gas Velocities (DAP)



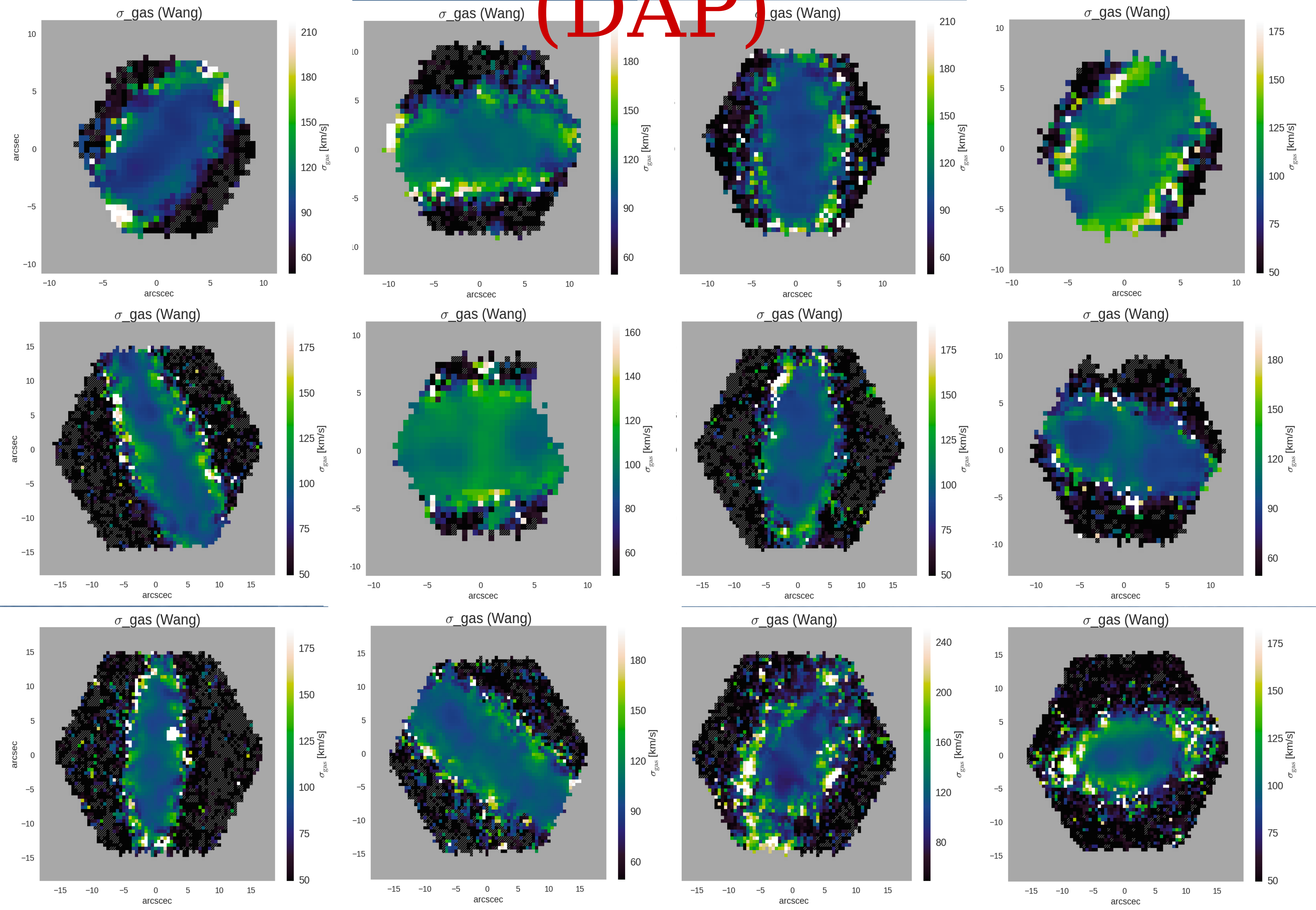

5"
N
E
W
S


Halpha and NII
SII
0.0
1.0
1.5
2.0
2.5
3.0
3.5
4.0
5.0
Flux
Wavelength

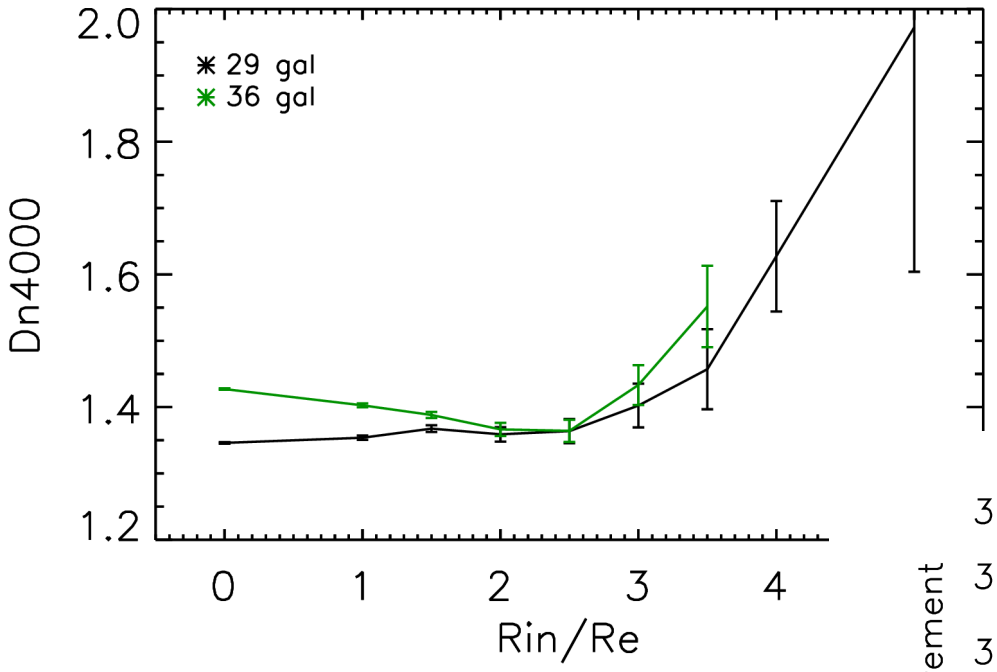

5"
N
E
W
S

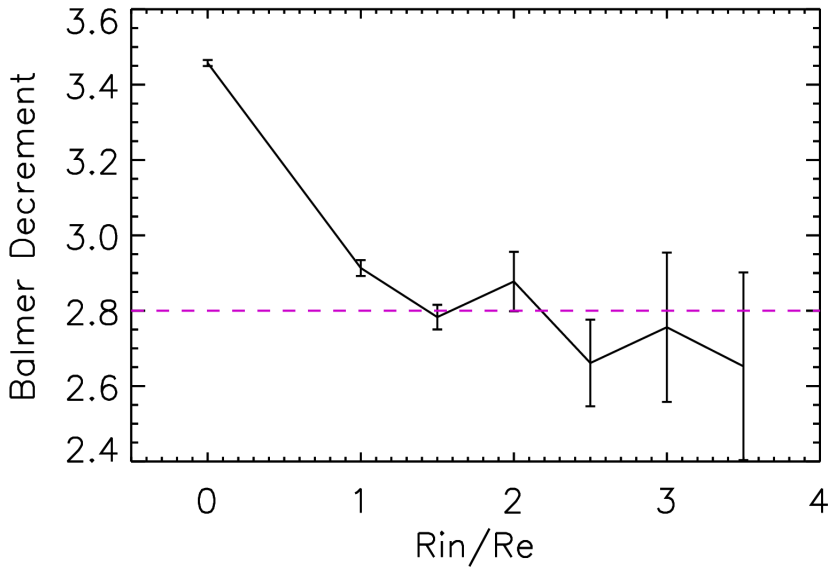

Halpha and NII
SII
0.0
1.0
1.5
2.0
2.5
3.0
3.5
4.0
5.0
Flux
Wavelength

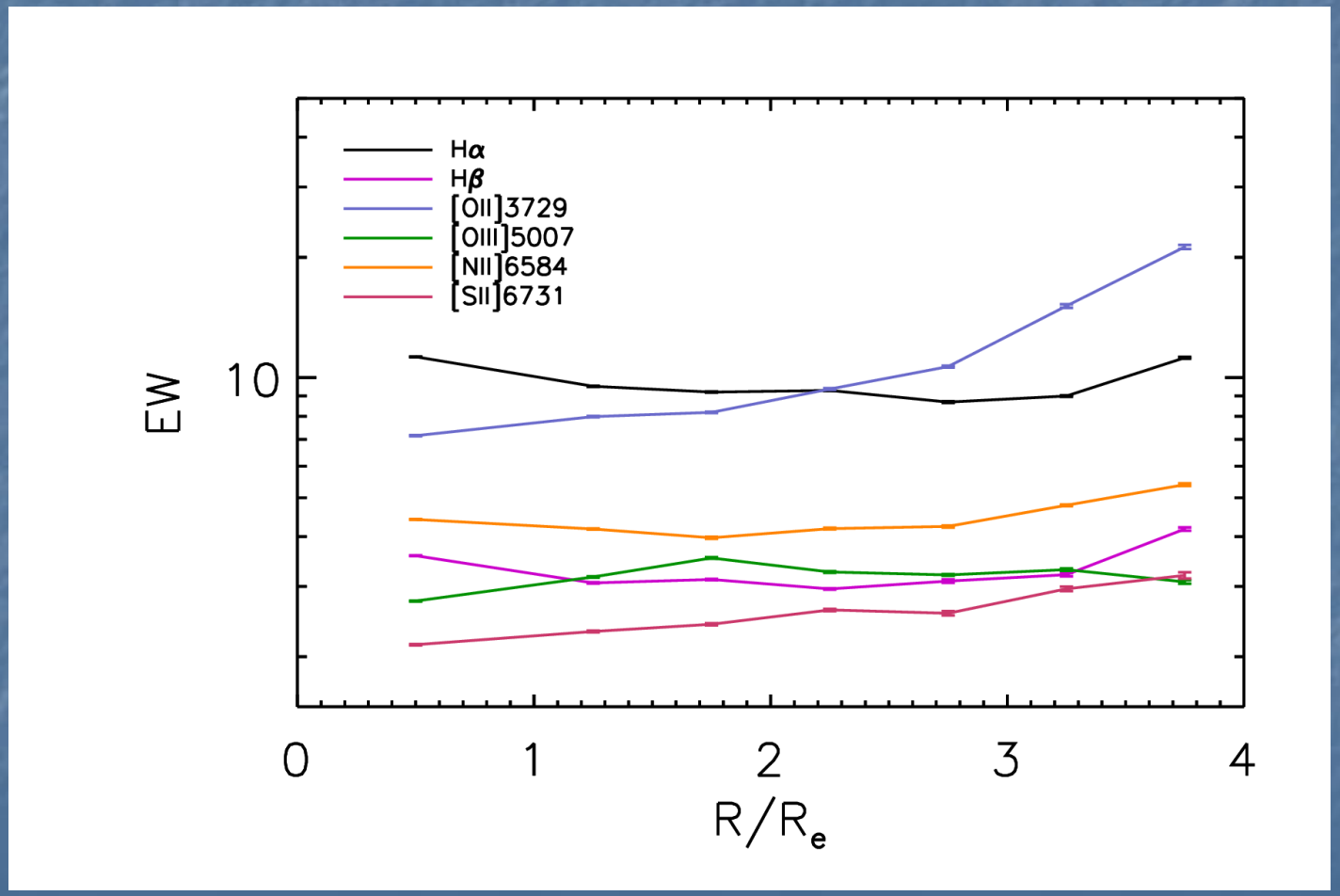
Gas Velocity Dispersions (DAP)



Other Halo Properties






Hα
Hβ
[OII]3729
[OIII]5007
[NII]6584
[SII]6731
EW
10
0
1
2
3
4
R/R_e