



*Studying the interplay between gas
and stars in starburst galaxies: the
case for NGC5253*

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Starburst galaxies

- Starburst: \sim hundreds $M_{\odot} \text{ yr}^{-1}$ of gas are transformed into stars in an small region in the nuclei of galaxies
- Important impact on the host galaxy. Main contributors to the enrichment of the ISM.
- Some of them expell material into the IGM: the SGW

Active Galaxy M82



Hubble
Heritage

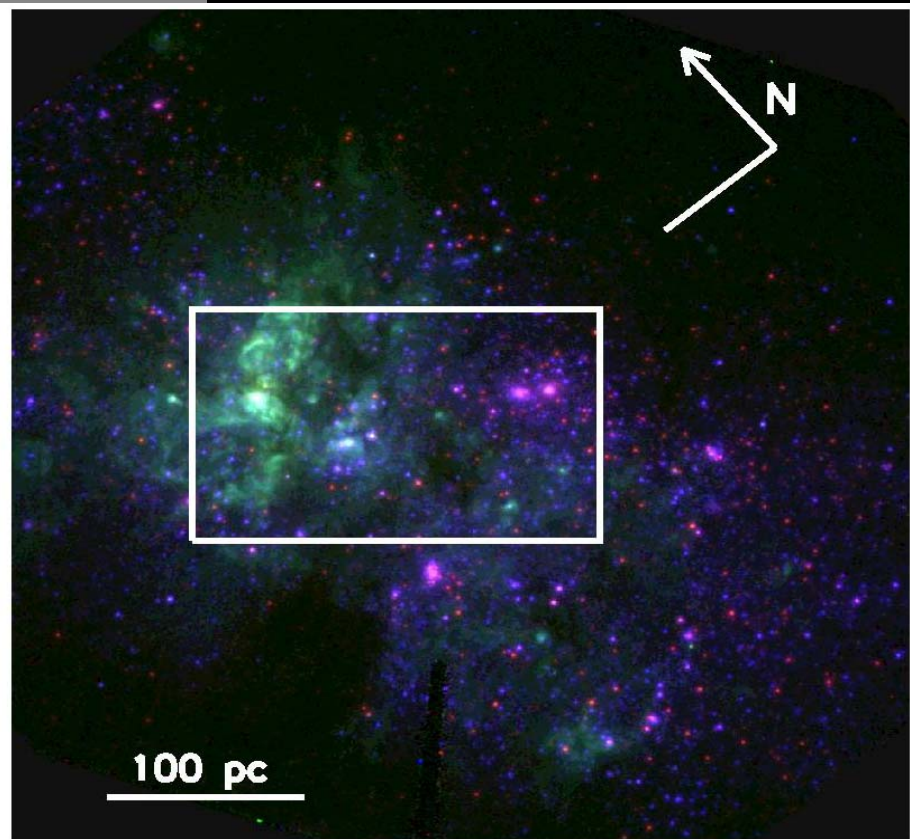
- Nuclear starburst
- Blue Compact Dwarfs
- (U)LIRGs

HII galaxies

- Gas rich
- Metal poor
- "simple"

Ex: NGC5253

NGC5253



(HST-ACS, I+H α +B,
program 10609, P.I.: Vacca)

- Very near; $z=0.001358$, $D=3.8$ Mpc
- Scale=18.4 pc/''
- $Z \sim 0.30 Z_{\odot}$
- $M_B = -17.13$
- $M(\text{HI}) = 1.4 \times 10^8 M_{\odot}$
- Filamentary structure
- Hints of inflows/outflows
- Observed in every spectral range

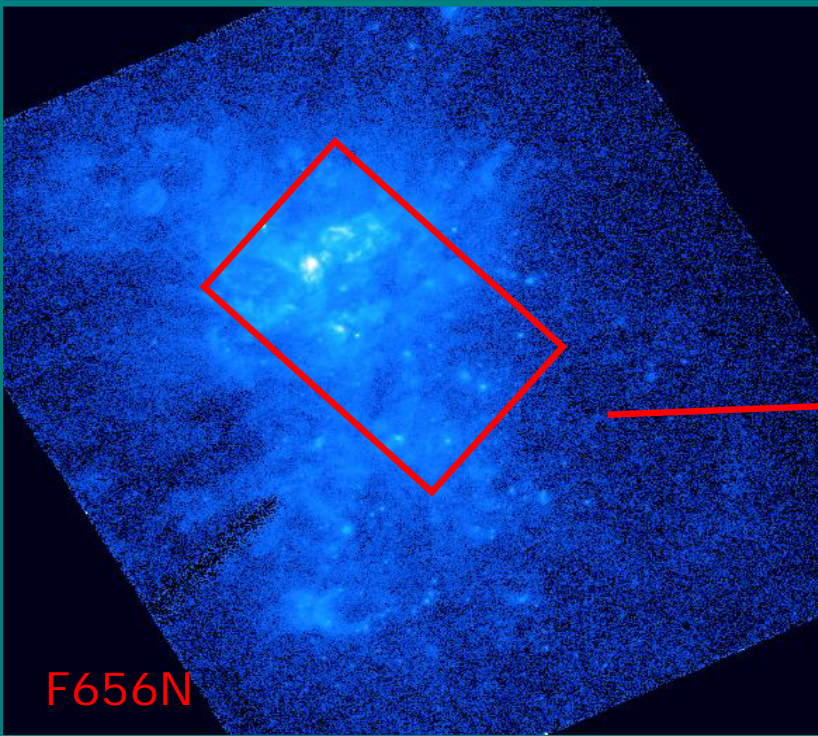
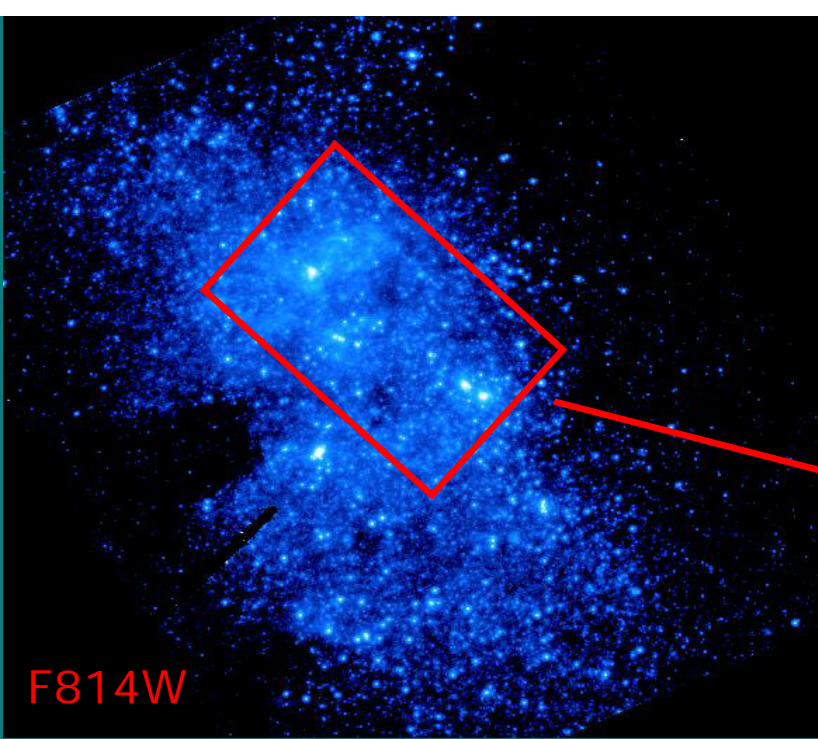
We want to see the details: let's look at it
with FLAMES

- scaling: 0.52''/spa; f.o.v.: 11.5''x7.3''
- L479.7 (R=12000) \rightarrow H β + [OIII]...
- L682.2 (R=13700) \rightarrow H α + [NII]+ [SII]...
- $t_{\text{exp}} = 5 \times 1500$ s each configuration

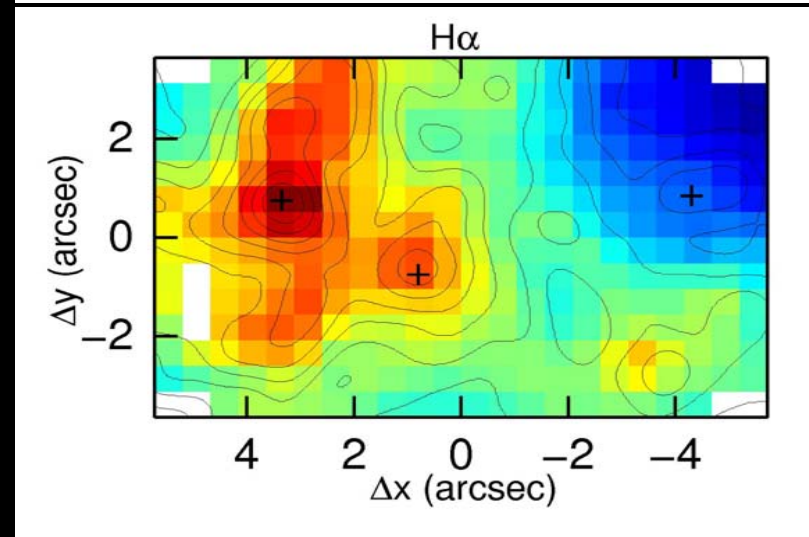
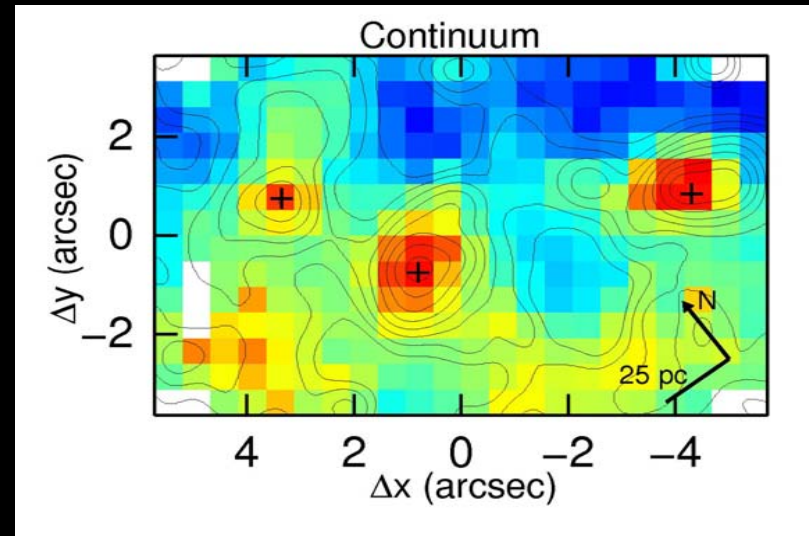
What do we want to do?

We want to determine the detailed physical link between SSCs and the ionized gas.

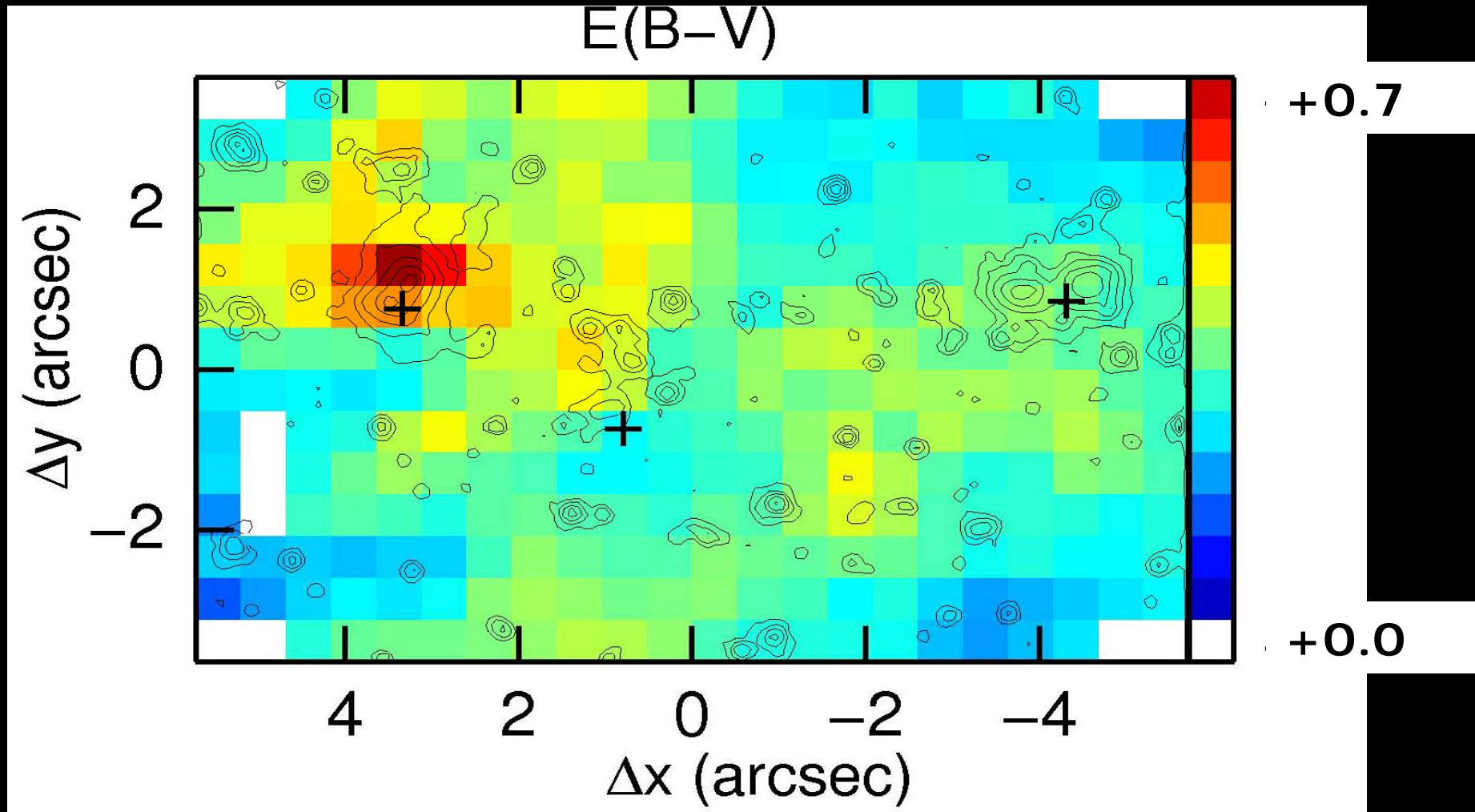
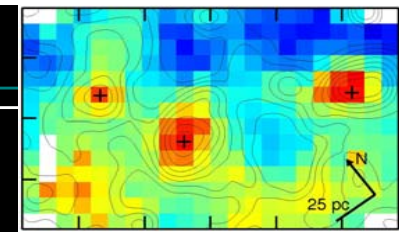
- Analyse the physical conditions (extinction, ionization and electronic density structure...) of the ionized gas.
- Analyse the kinematics of the gas using v and σ maps from $H\alpha$ (or $H\beta$) and $[OIII]\lambda 5007$.
- Identify the SSCs responsible of the gas structure.
- Using the results from these observations together with the HST images to constrain the 2D hydrodynamical models to try to understand under which conditions a SGW is created.



First look: Where are we?



Extinction in NGC5253

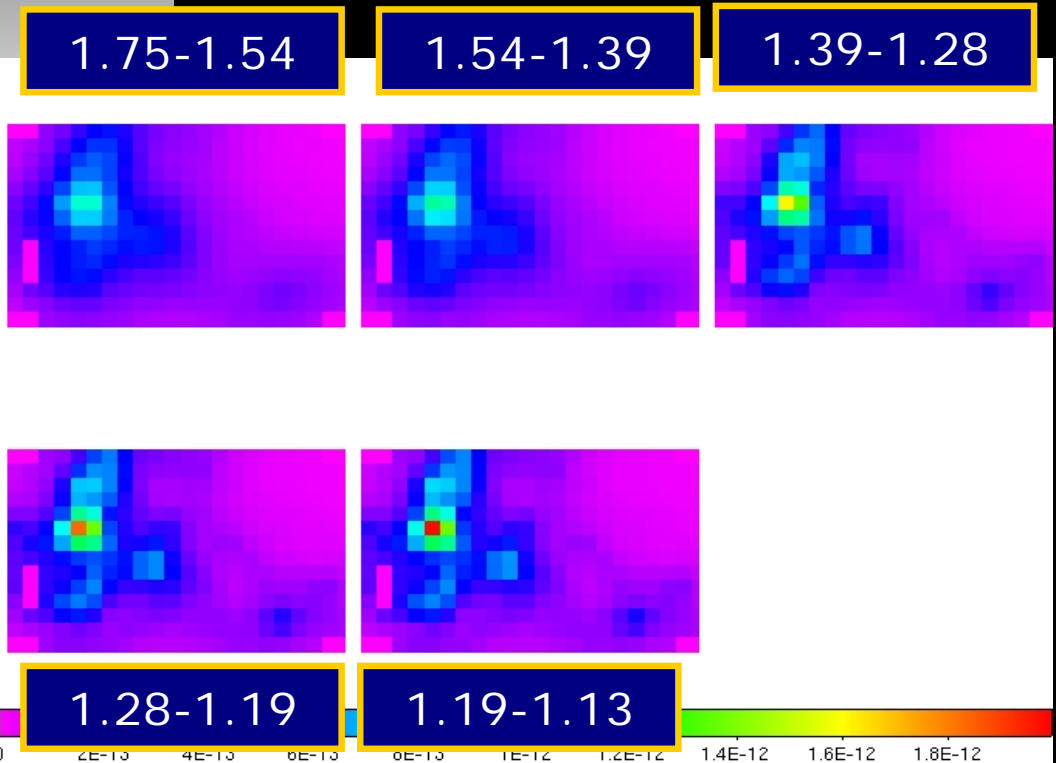
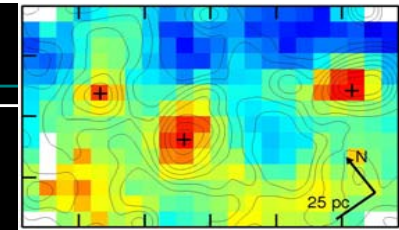


(Contours: HST-NICMOS, F160W, Alonso-Herrero 2004)

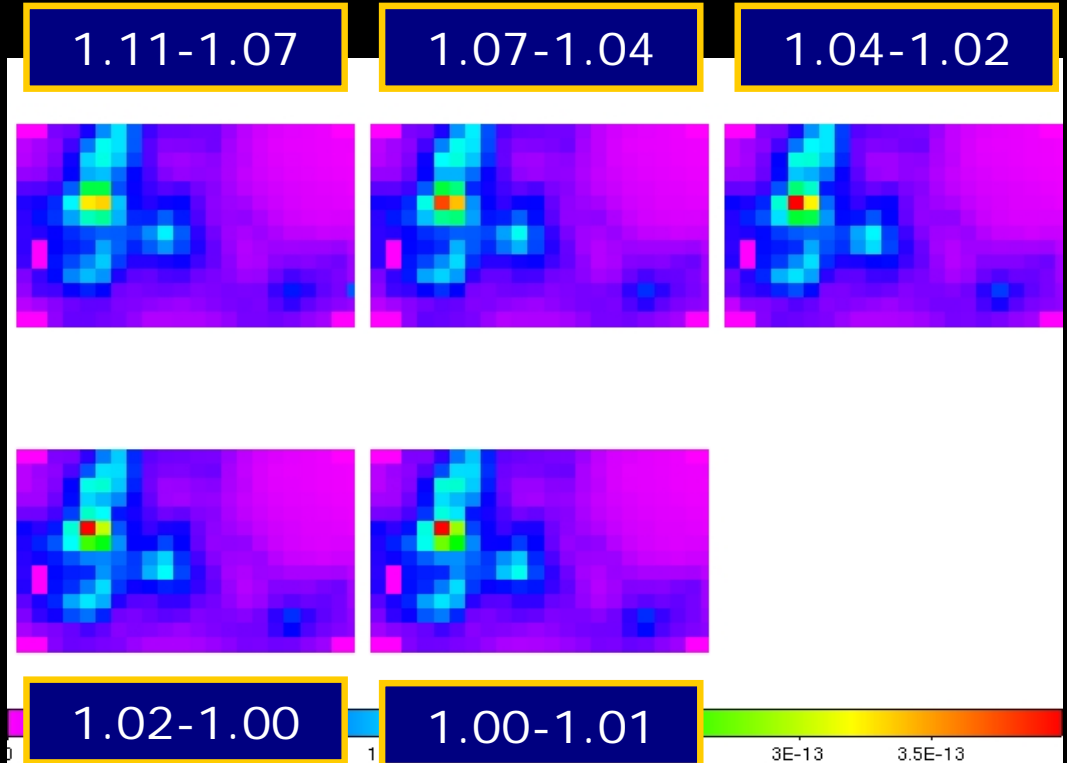
Peak of extinction doesn't coincide with optical nucleus but with the dominant source in IR, the very reddened C2 from Alonso-Herrero



A problem with d.a.r. (I)

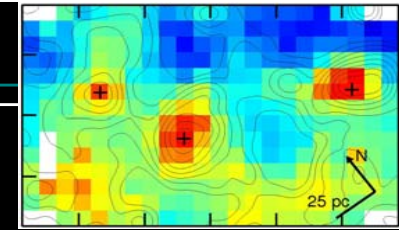


H α



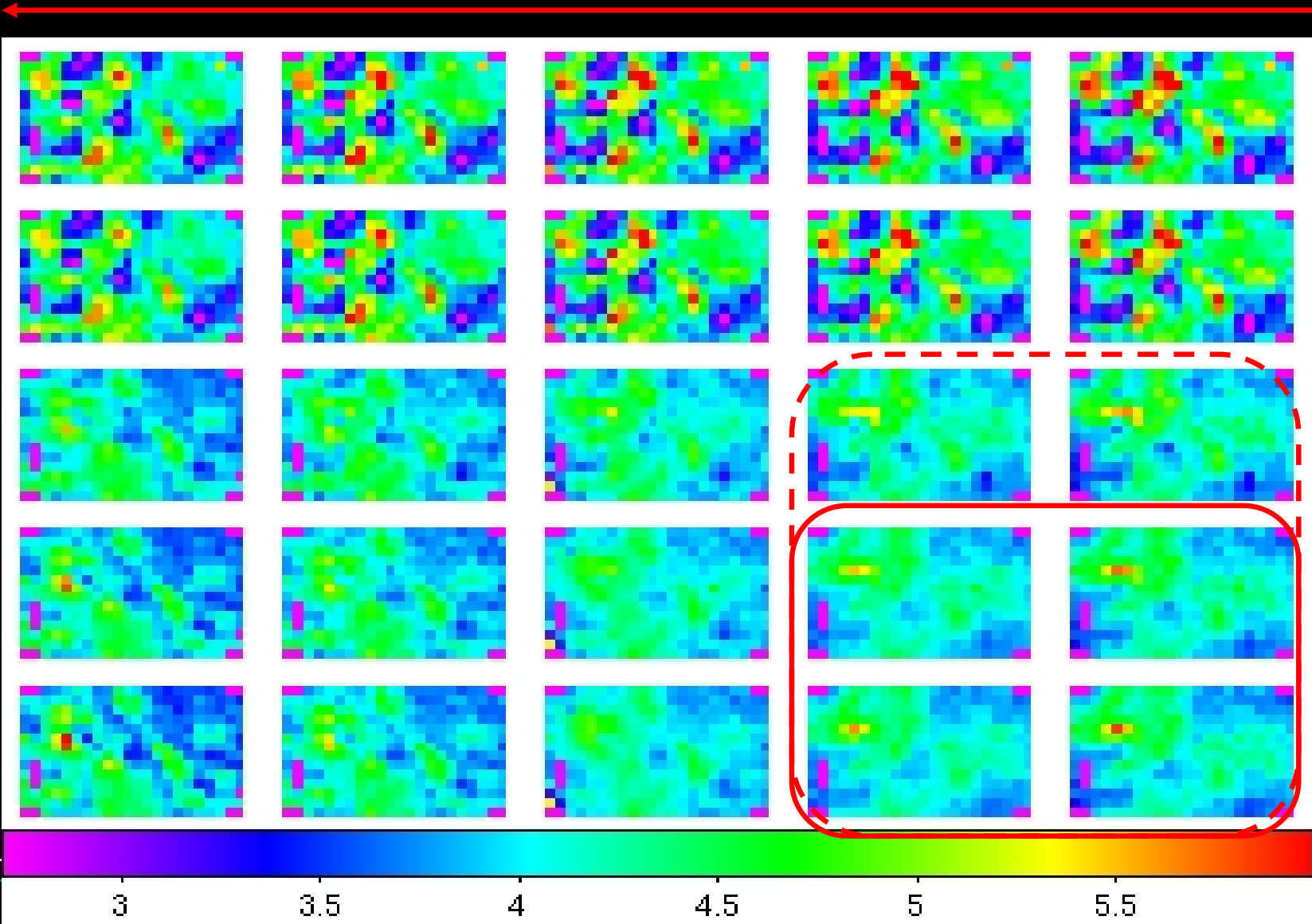
H β

A problem with d.a.r. (II)

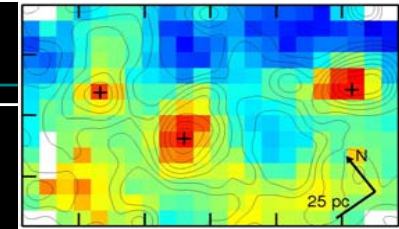


H β

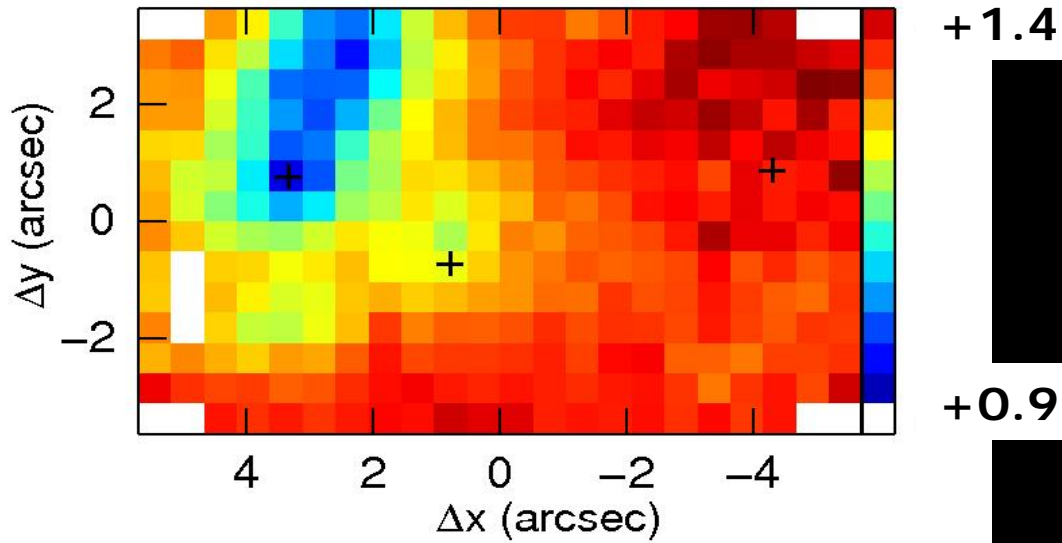
H α



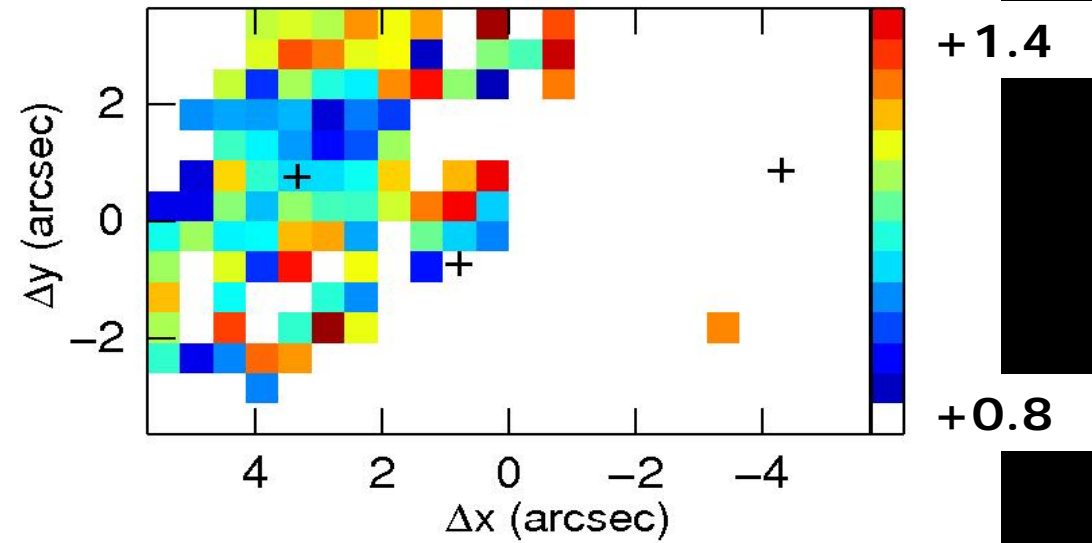
Electronic density



[SII] λ 6717/[SII] λ 6731



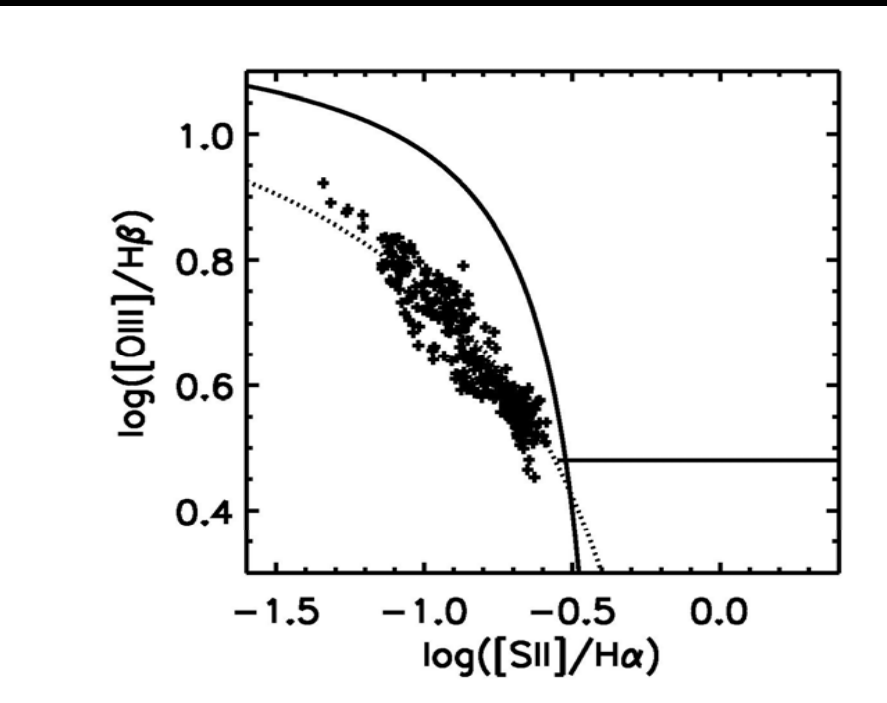
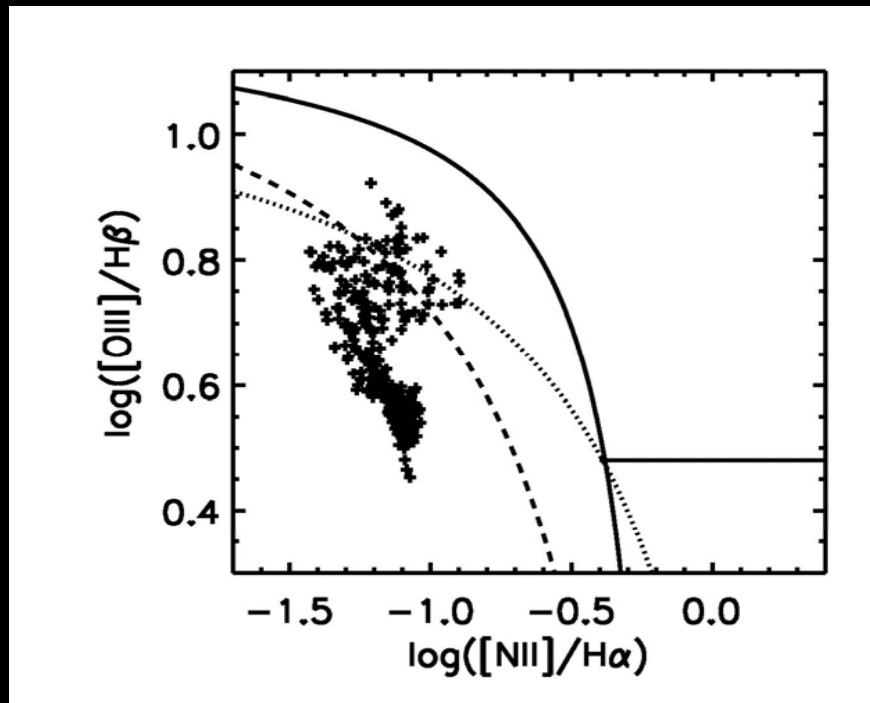
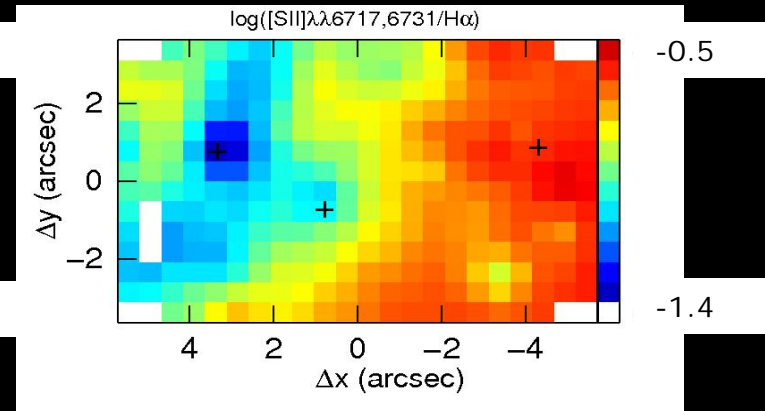
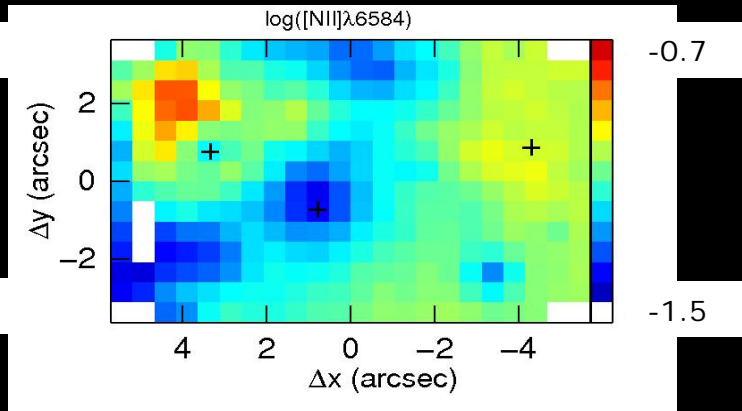
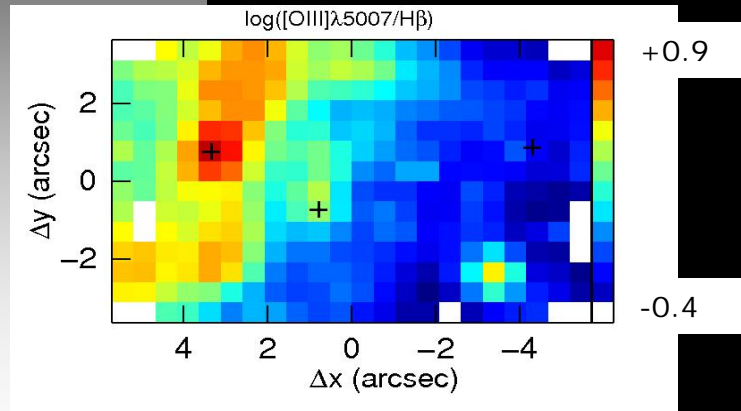
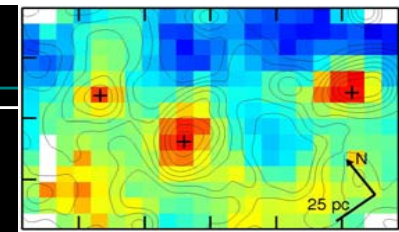
[ArIV] λ 4711/[ArIV] λ 4740



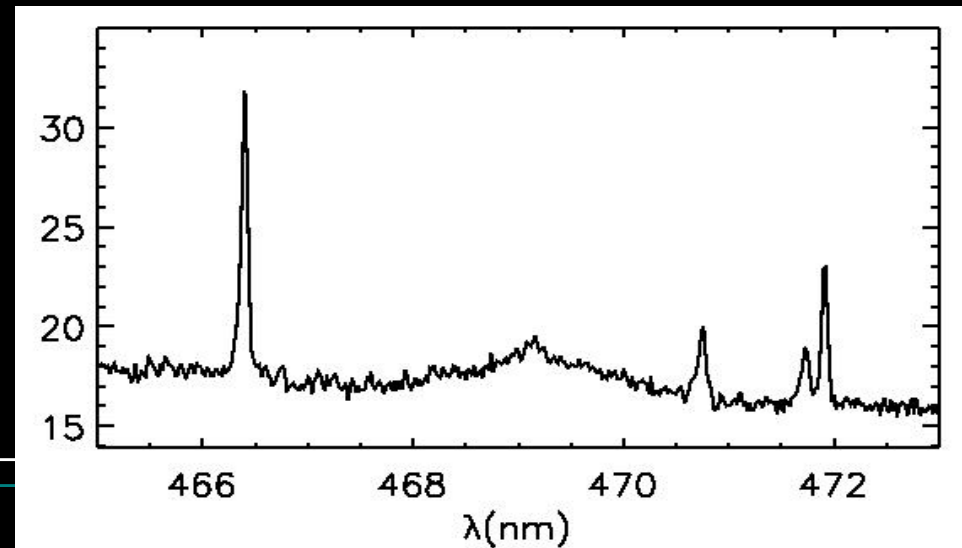
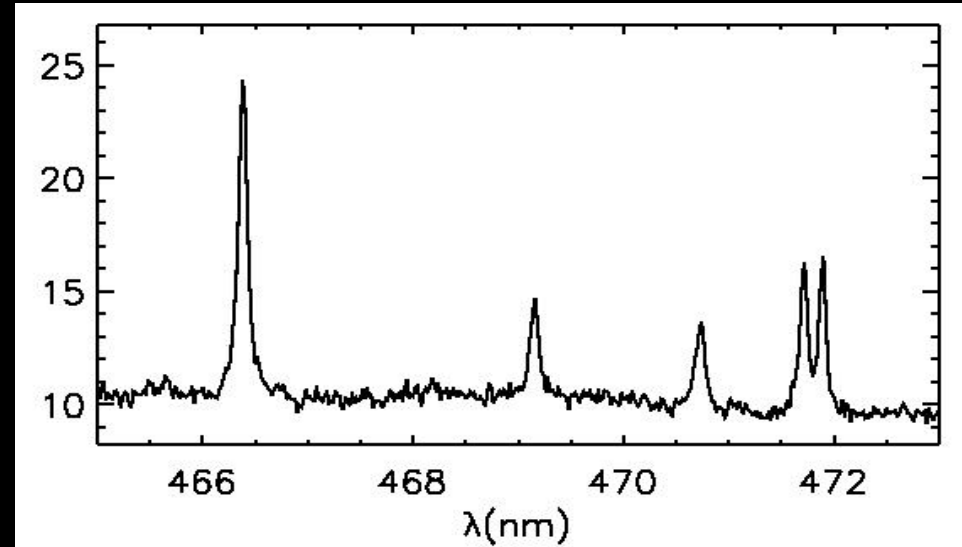
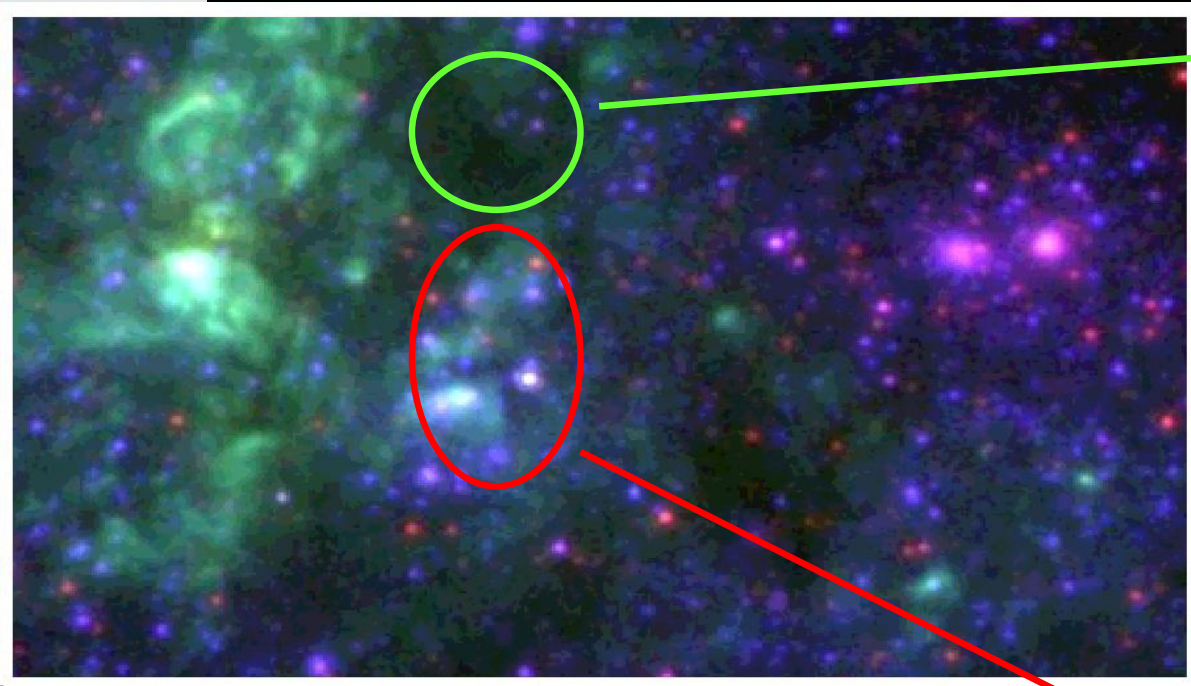
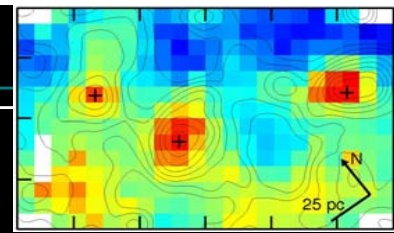
- mean = 130 cm⁻³
- median = 90 cm⁻³
- range = 30 - 790 cm⁻³
- giant HII region -> ~400 cm⁻³

- c1+c2 -> 6200 cm⁻³
- HII-2 -> 6100 cm⁻³
- HII-1 -> 4200 cm⁻³
- UV1 -> 3300 cm⁻³

Diagnostic diagrams



Next episode...





End