El impacto de la formación estelar en galaxias HII compactas

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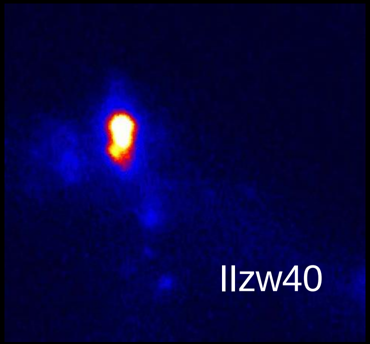
HII Galaxies

Telles et al. (1997)

Type I

High Luminosity and velocity dispersion

Irregular morphology

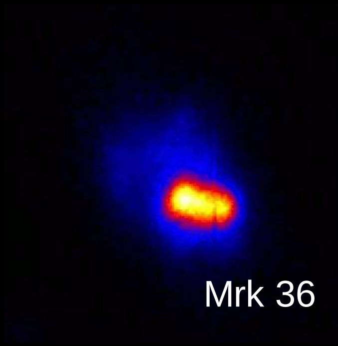


Log L(Hβ) > 40 erg s^-1
σ 40-100 km s^-1

Type II

Low Luminosity and Velocity dispersion

regular and compact objects



Log L(Hβ) < 40 erg s^-1
σ 16-40 km s^-1

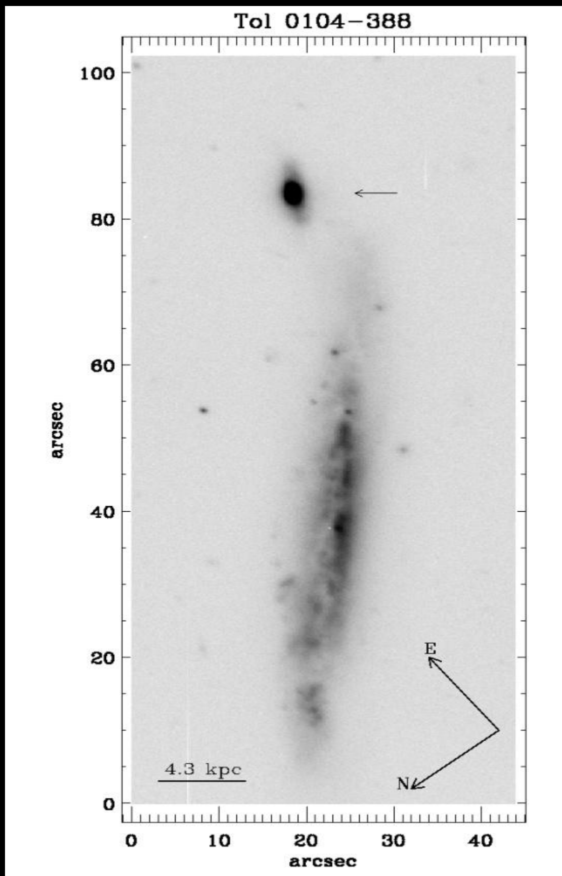
Most compact and distance objects

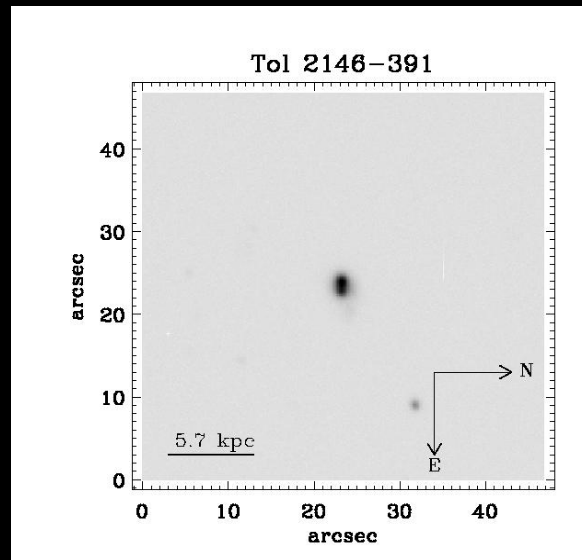
Some low metallicty
12+log(O/H)<7.8

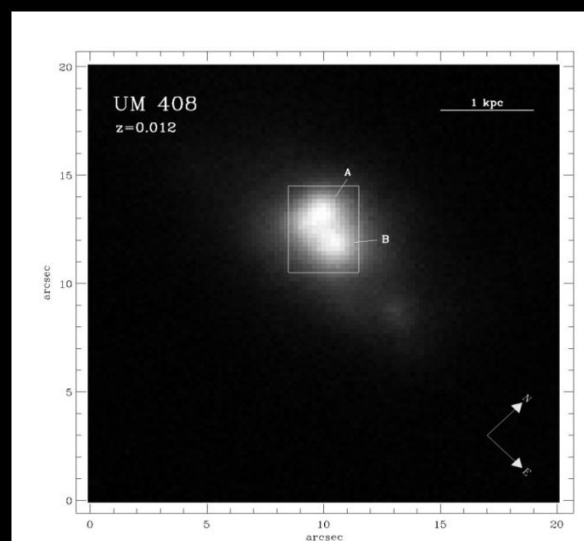
Goals
Using Large Ground-based Telescopes (Gemini):

1. **Resolve the stellar cluster population (Mass, age, extinction)**
2. **Feedback Mechanism between the cluster stellar population and the ISM**

Our sample: GMOS-IFU and NIRI





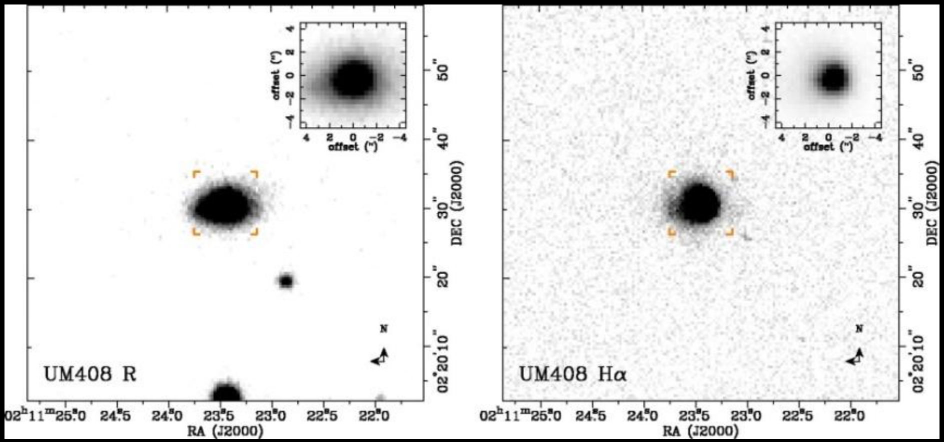


Some Gemini acquisition images

	GMOS-IFU	NIRI
UM 408 7.66-7.87	☺	☺
Tol 0104-388 7.90-8.19	☺	✗
Tol 2146-391 7.62-7.78	☺	✗
Mrk 36 7.86	✗	☺
IIZw 40 8.13	✗	☺
UM 461 7.77	✗	☺

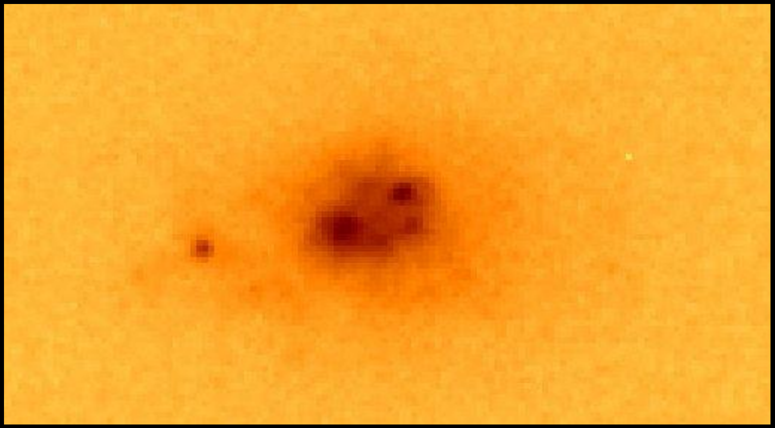
Resolving the stellar cluster population in compact HII galaxies Using Larges Telescopes

UM 408



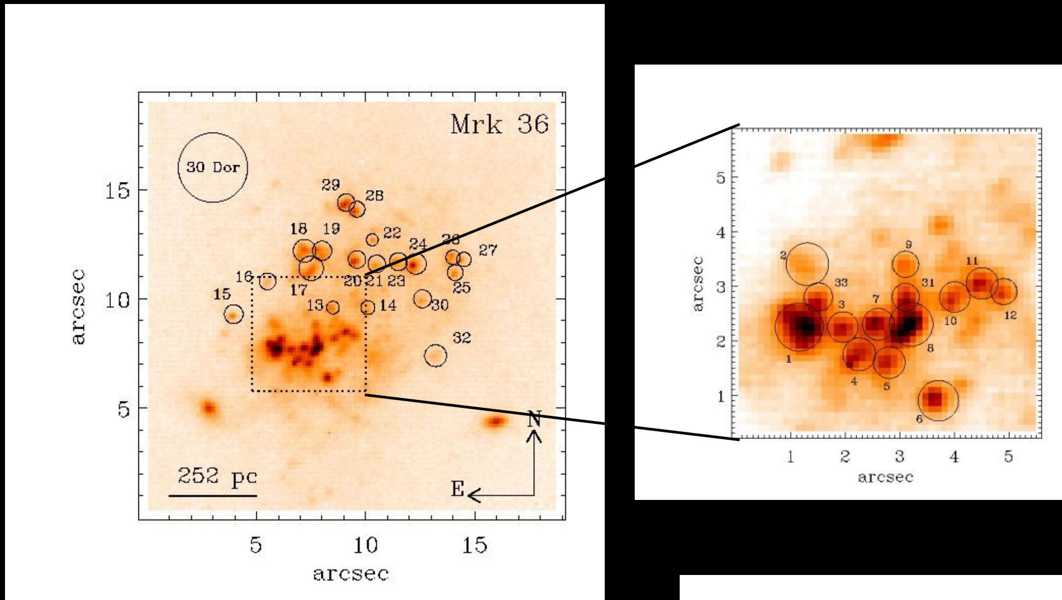
Palomar/Las Campanas

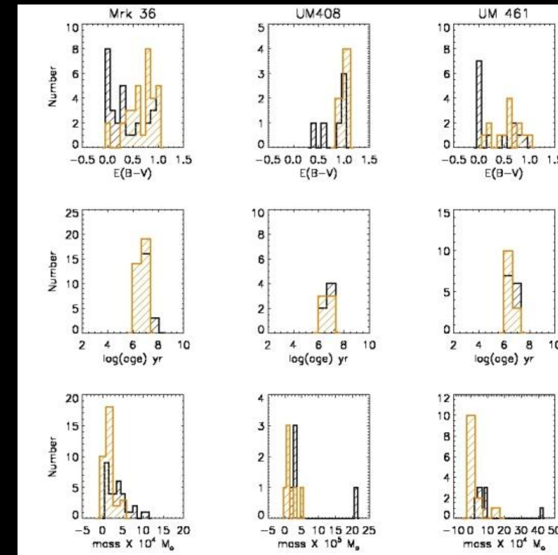
Gil de Paz et al. 2003

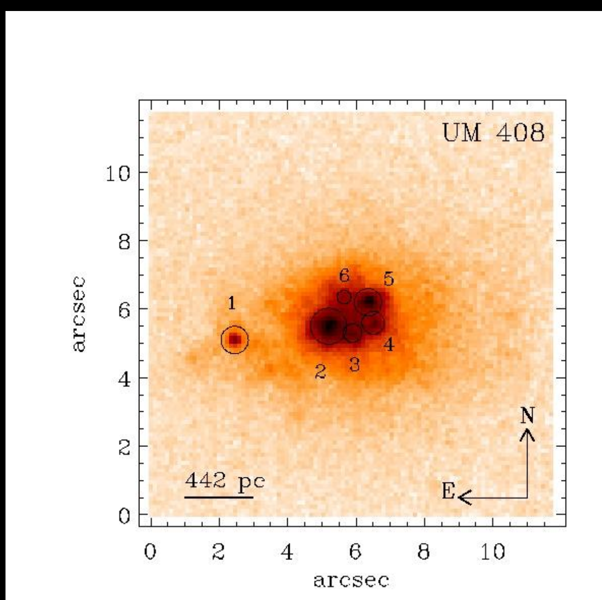


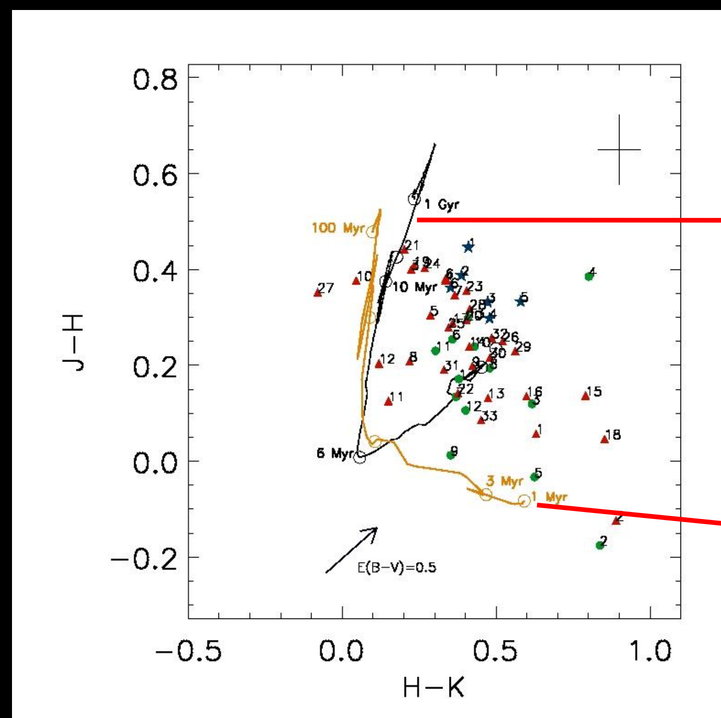
Gemini North + NIRI

The stellar cluster population (NIRI – Gemini north)









STARBURST99:
Stellar Continuum
+
Nebular continuum

GALEV:
Stellar Continuum
+
Nebular continuum
+
Emission lines

Physical properties of the gas in compact galaxies
GMOS-IFU Gemini Sur (8m)

The Astronomical Journal, 137:5068–5079, 2009 June
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ON THE COMPACT H II GALAXY UM 408 AS SEEN BY GMOS–IFU: PHYSICAL CONDITIONS

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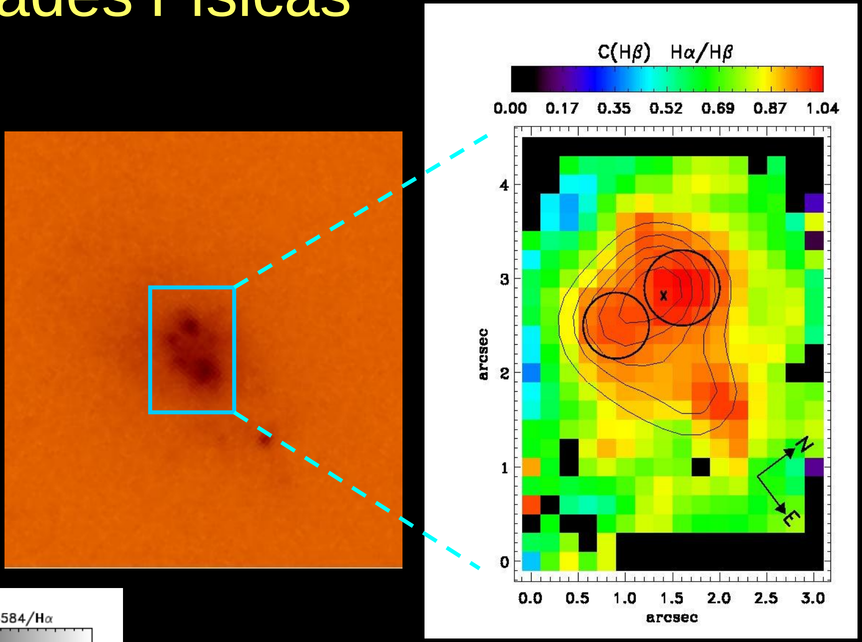
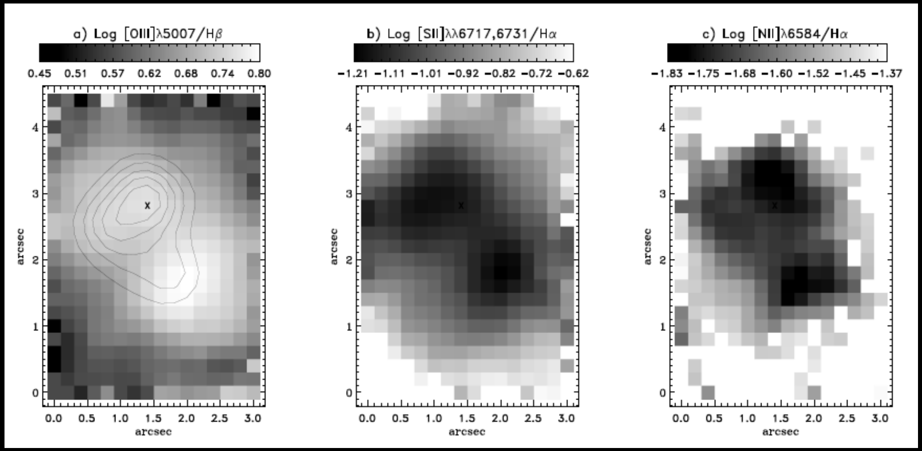
ABSTRACT

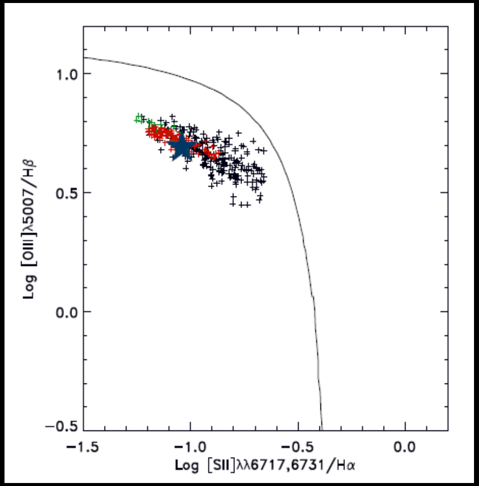
We present Integral Field Unit GMOS–IFU data of the compact H II galaxy UM 408, obtained at the Gemini South telescope, in order to derive the spatial distribution of emission lines and line ratios, kinematics, plasma parameters, and oxygen abundances as well the integrated properties over an area of 3″ × 4″.4 equivalent with ∼750 pc × 1100 pc located in the central part of the galaxy. The starburst in this area is resolved into two giant regions of about 1″.5 and 1″ (∼375 and ∼250 pc) diameter, respectively and separated 1.5–2″ (∼500 pc). The extinction distribution concentrate its highest values close but not coincident with the maxima of Hα emission around each one of the detected regions. This indicates that the dust has been displaced from the exciting clusters by the action of their stellar winds. The ages of these two regions, estimated using Hβ equivalent widths, suggest that they are coeval events of ∼5 Myr with stellar masses of $\sim 10^4\ M_\odot$. We have also used [O III]/Hβ and [S II]/Hα ratio maps to explore the excitation mechanisms in this galaxy. Comparing the data points with theoretical diagnostic models, we found that all of them are consistent with excitation by photoionization by massive stars. The Hα emission line was used to measure the radial velocity and velocity dispersion. The heliocentric radial velocity shows an apparent systemic motion where the east part of the galaxy is blueshifted, while the west part is redshifted, with a relative motion of ∼10 km s^{-1}. The velocity dispersion map shows supersonic values typical for extragalactic H II regions. We derived an integrated oxygen abundance of 12+log(O/H) = 7.87 summing over all spaxels in our field of view. An average value of 12+log(O/H) = 7.77 and a difference of Δ(O/H) = 0.47 between the minimum and maximum values (7.58 ± 0.06–8.05 ± 0.04) were found, considering all data points where the oxygen abundance was measured. The spatial distribution of oxygen abundance does not show any significant gradient across the galaxy. On the other hand, the bulk of data points are lying in a region of ±2σ dispersion (with σ = 0.1 dex) around the average value, confirming that this compact H II galaxy, like other previously studied dwarf irregular galaxies, is chemically homogeneous. Therefore, the new metals processed and injected by the current star formation episode are possibly not observed and reside in the hot gas phase, whereas the metals from previous events are well mixed and homogeneously distributed through the whole extent of the galaxy.

Propriedades Físicas

- Extinción c(Hβ): Hα/Hβ
- Razones de ionización:
  - [OIII]λ5007/Hβ
  - [SII]λλ6731,6717/Hα
  - [NII]λ6548/Hα







- Temperatura: [OIII]λλ5007,4959/[OIII]λ4363
  Densidad: [SII]λ6717/λ6731
- Abundancias: Oxigeno Nitrógeno

Stellar clusters and the spatial distribution of Oxygen abundances: the case of UM 408

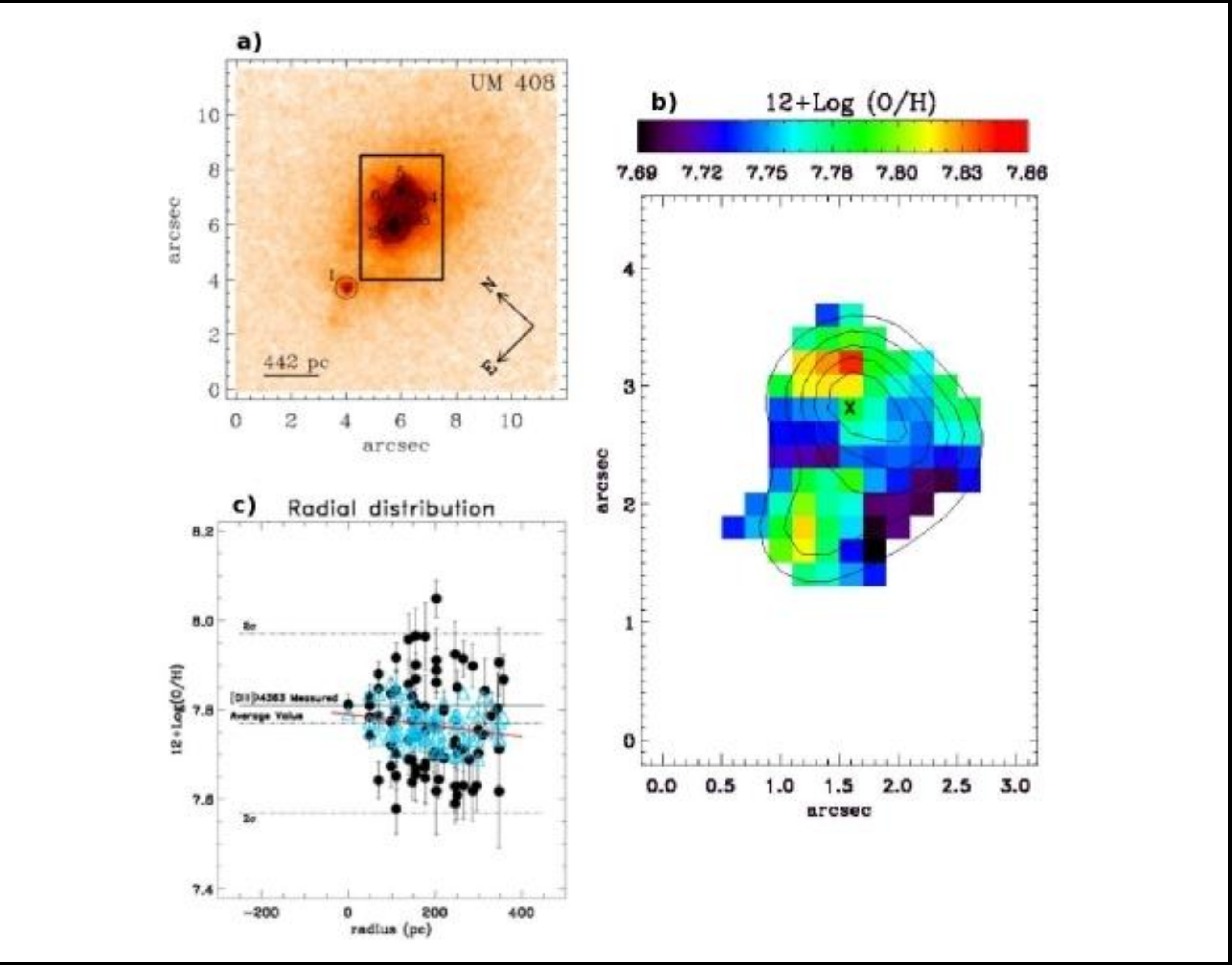


Figure obtained from Lagos et al. (2010), Star clusters: basic galactic building blocks throughout time and space, Proceedings of the IAU.

Unveiling the spatial distribution of high-ionization emission in blue compact dwarf galaxies: The case of Tol 0104-388

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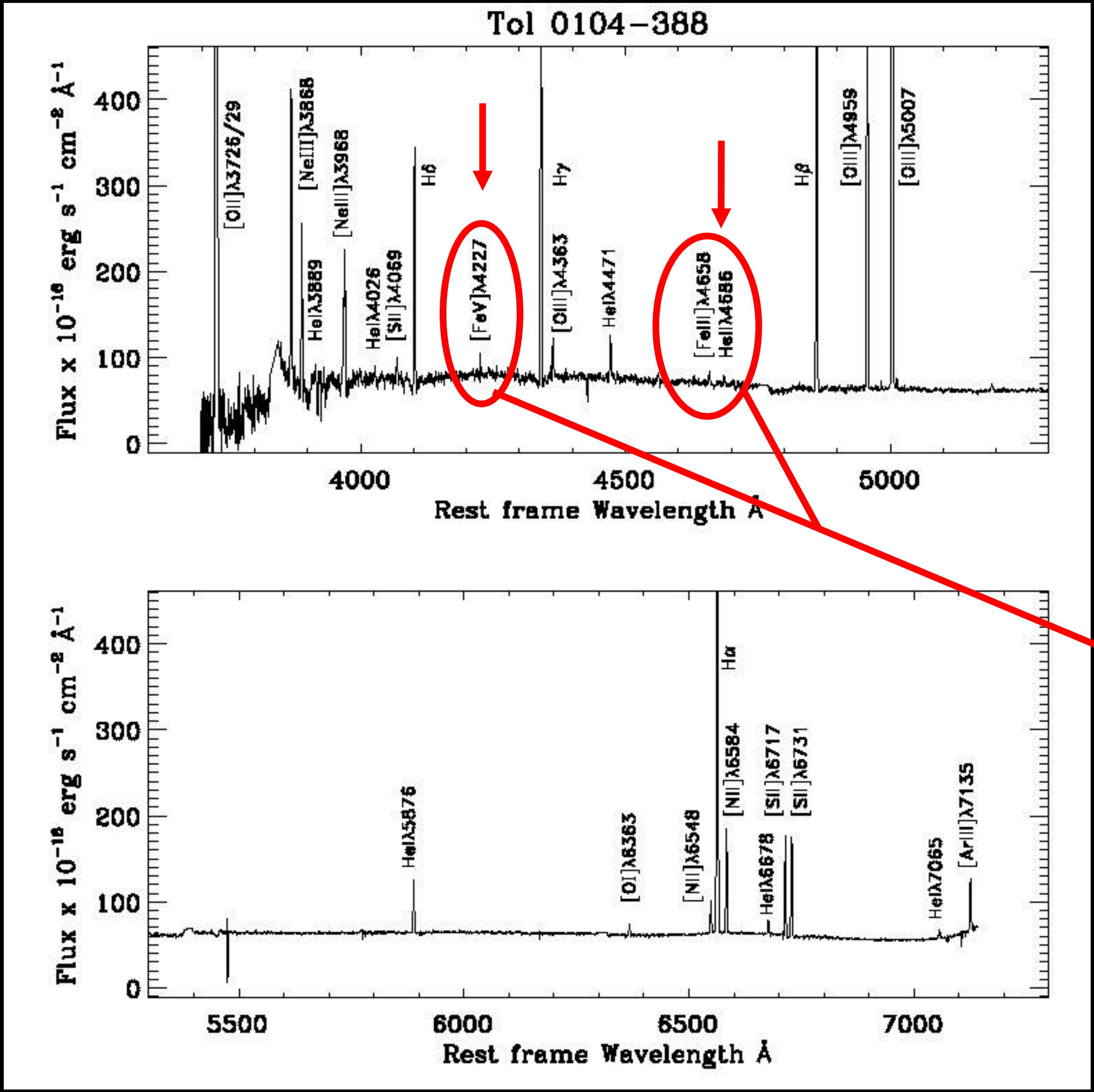
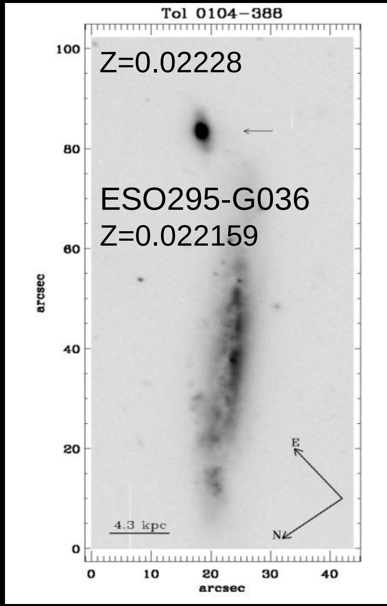


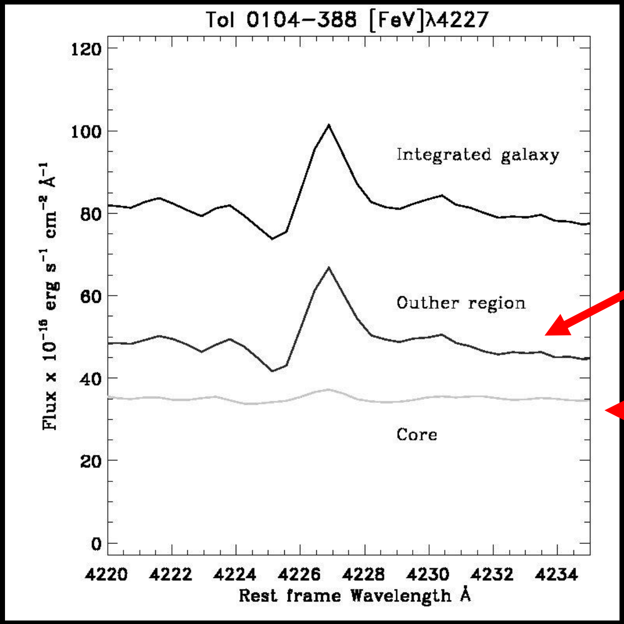


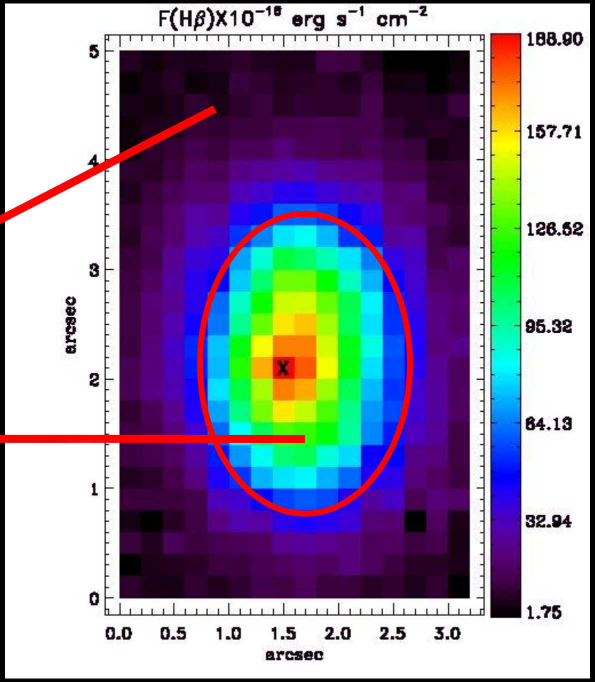
High ionization radiation
54.4 eV (4 ryd)

[FeV]l4227
HeII4686

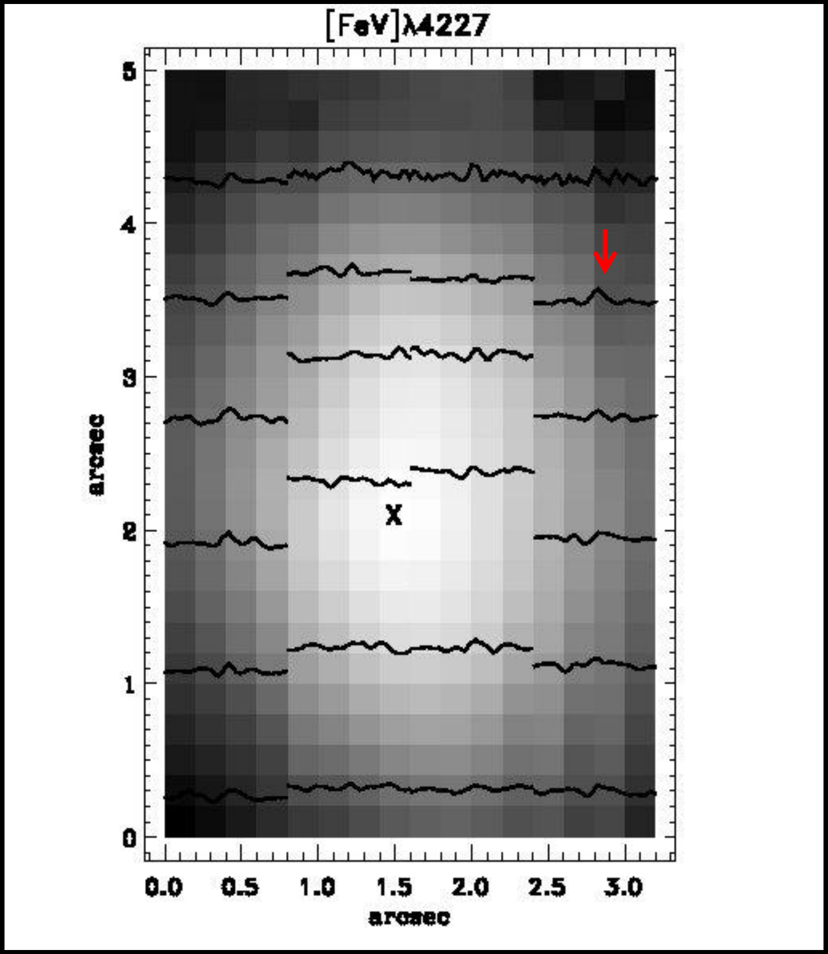
What is the source of these Emission lines?

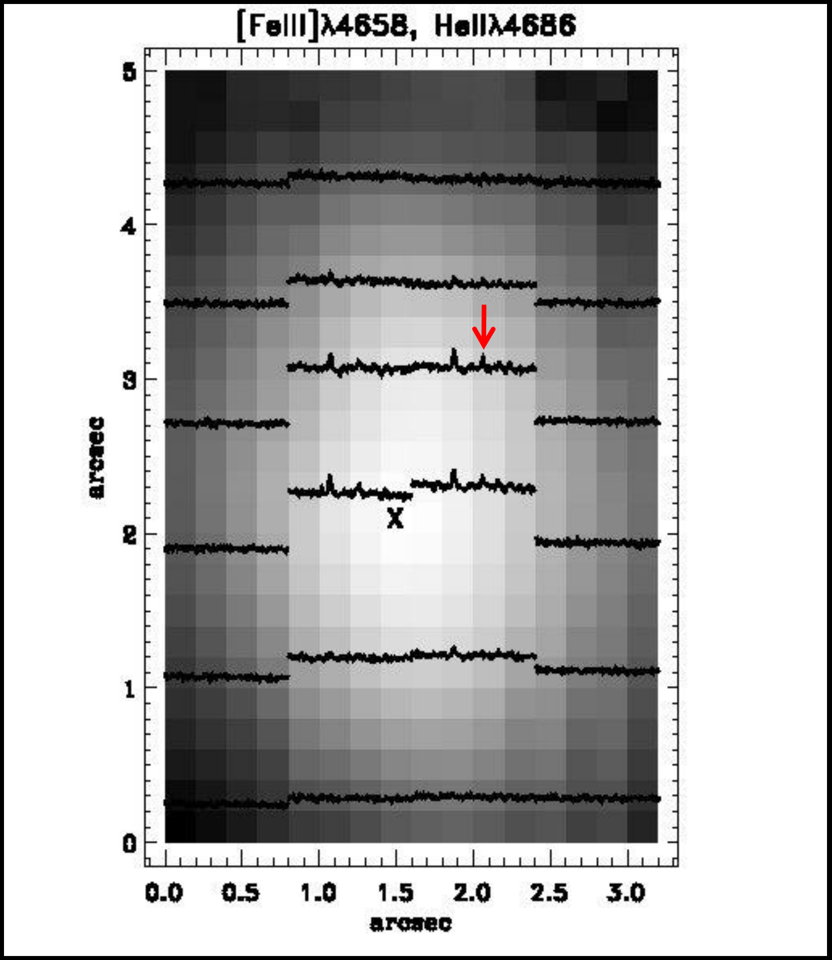
Where is located the hard ionization emission?



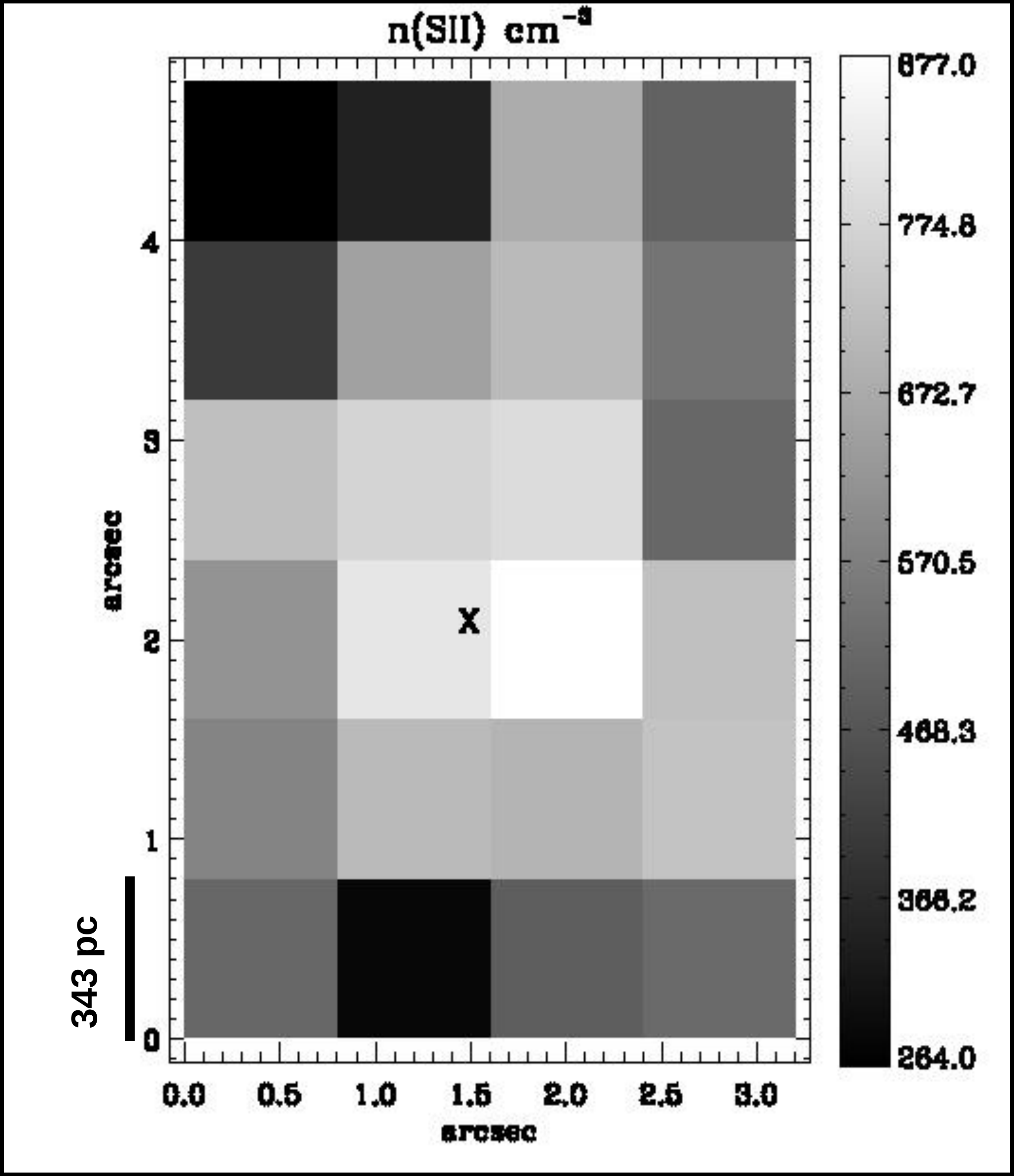


The spatial distribution of [FeV]λ4227 and HeIIλ4686



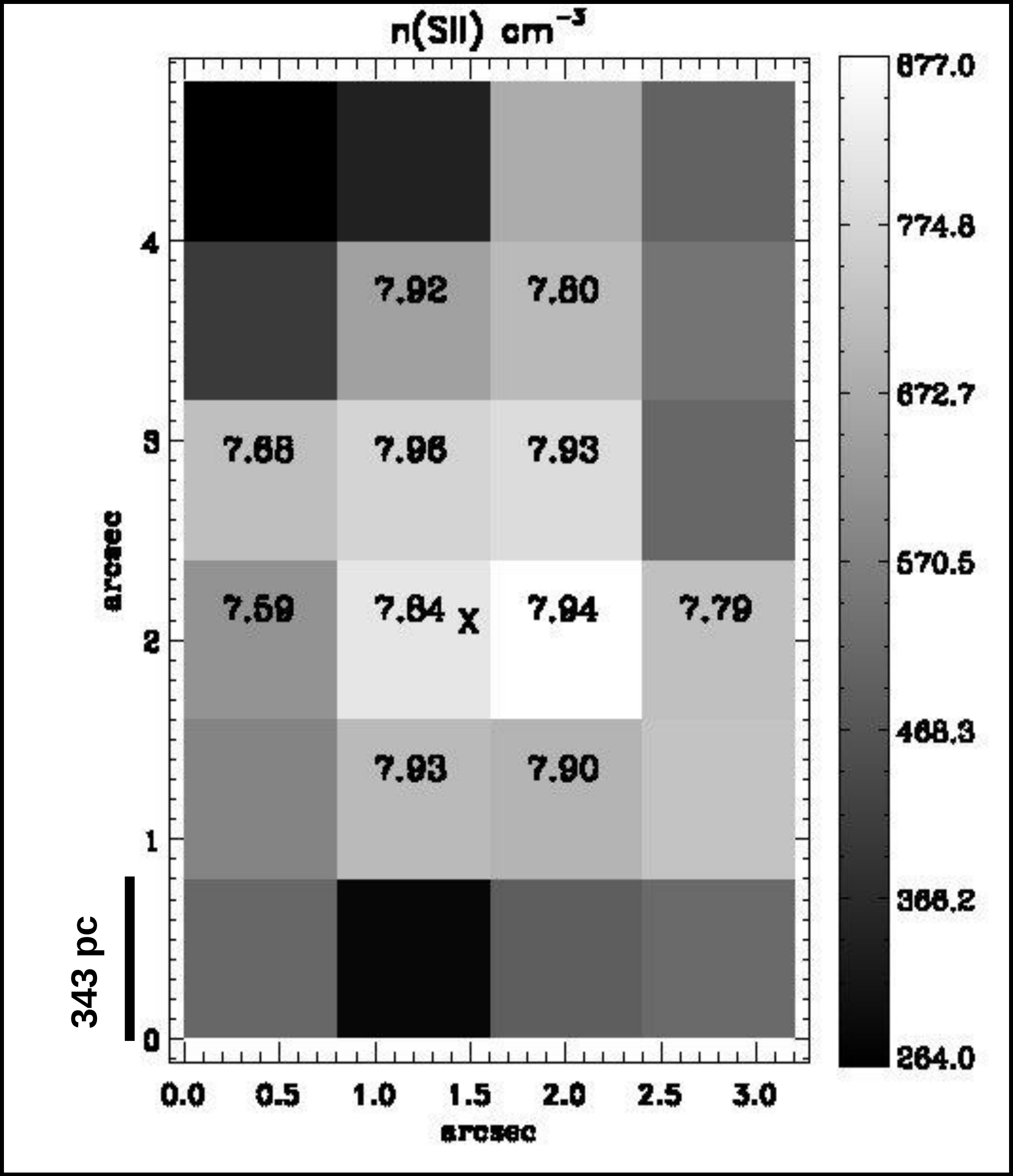


Spatial properties



Density (SII):
264-877 cm^-3

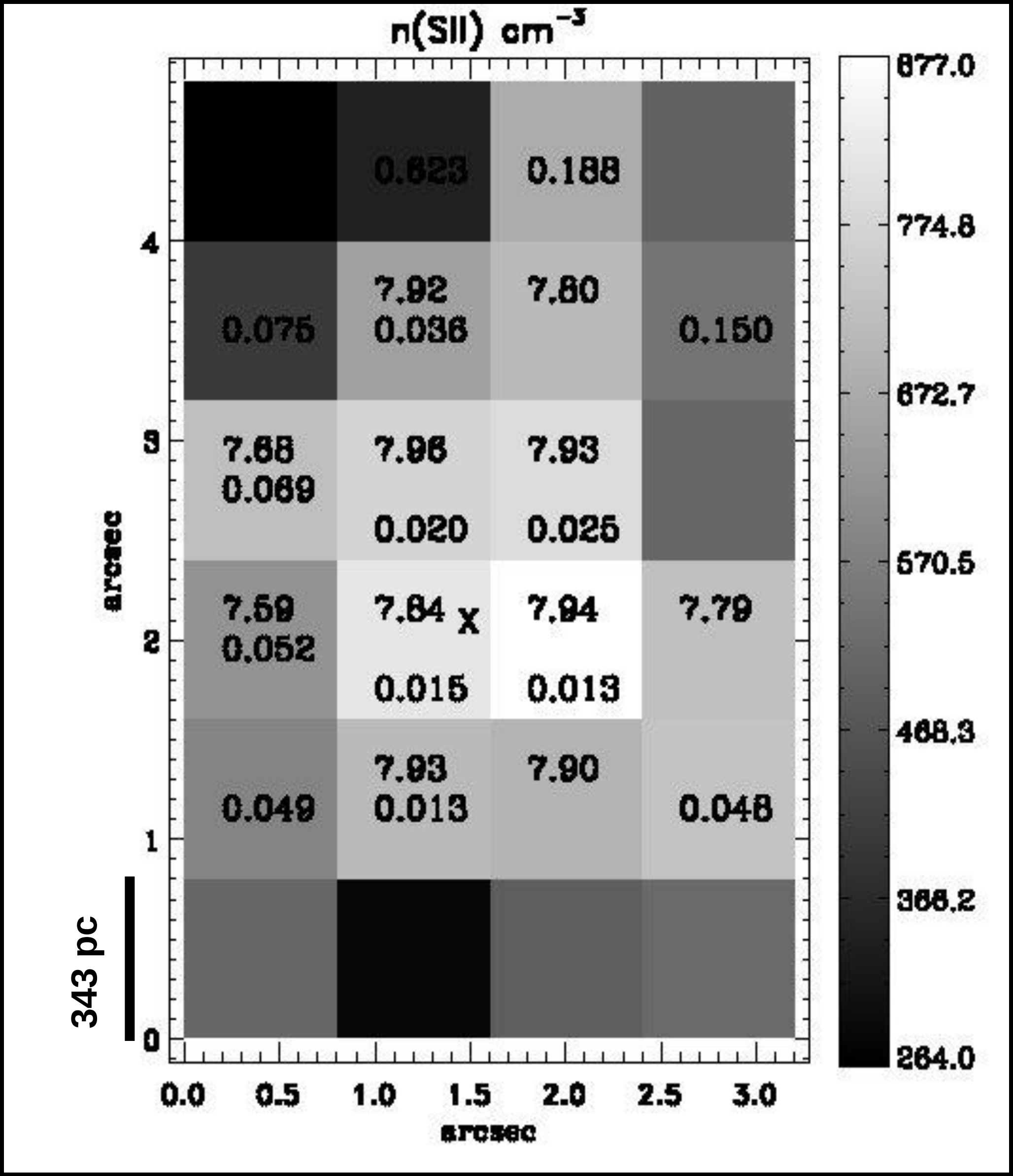
Spatial properties



Density (SII):
264-877 cm^-3

Oxygen distribution:
12+log(O/H)= 7.59-7.94
Δ(O/H)=0.35

Spatial properties



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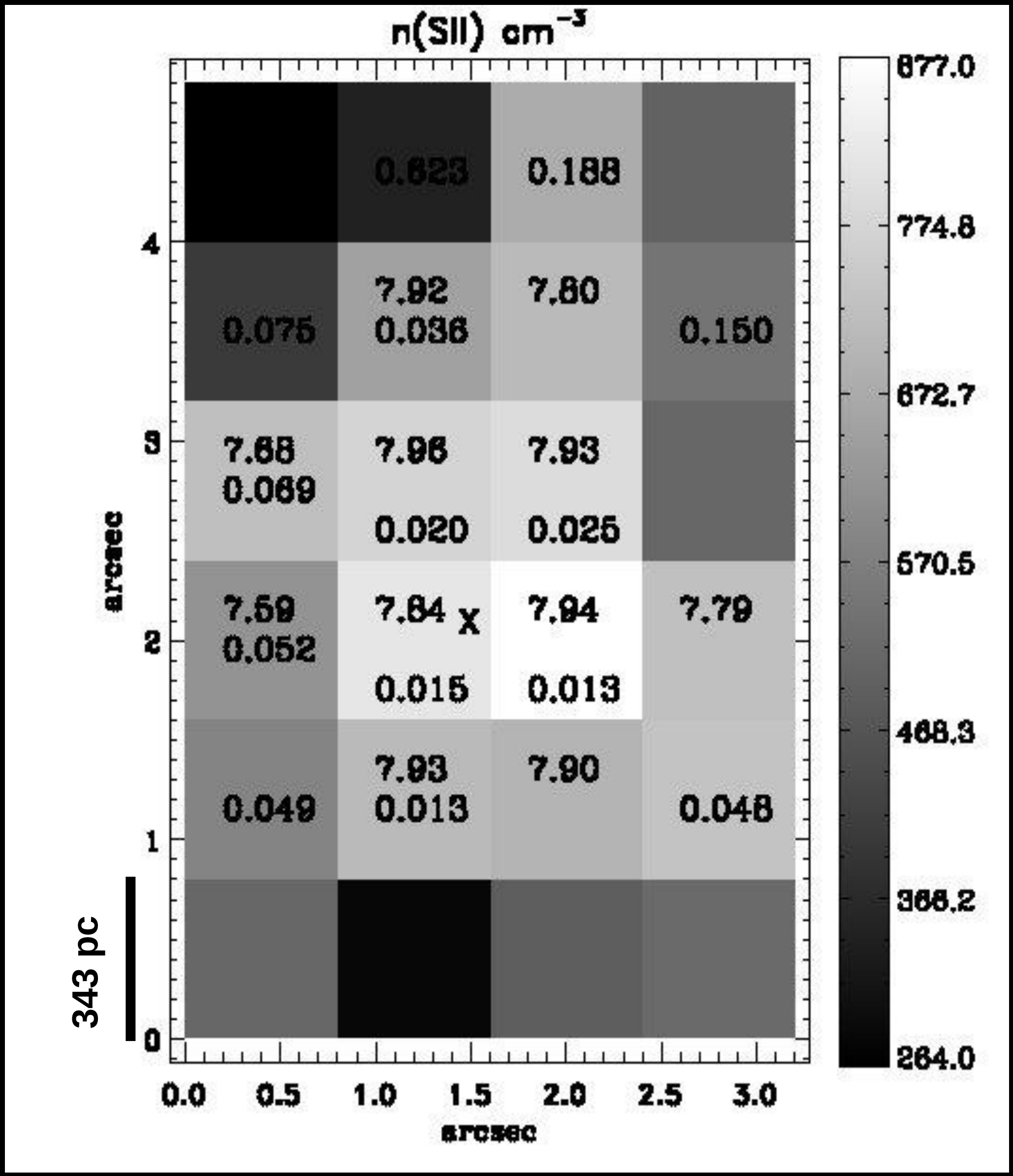
[FeV]/Hβ and HeII/Hβ spatial distribution:
[FeV] Low luminosity regions
HeII High luminosity regions

different sources??

Spatial properties



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[FeV]/Hβ and HeII/Hβ spatial distribution:
[FeV] Low luminosity regions
HeII High luminosity regions

different sources??

No Wolf Rayet stars signature

Fast Radiative shocks:

Dense star formation regions
and/or unresolved SSCs
+
??

What about the Future?

Recycling of the interstellar medium in a low metallicity sample of HII galaxies
2010, CAHA PMAS+Larr

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H. Plana (OAMP/France), A. Nigoche (IAC/Spain)

&

You

General conclusions

Compact HII galaxies are formed by myriad of unresolved Star Clusters where the most compact and massive can be considered SSCs

Compact HII galaxies are considered chemically homogeneous.
A marginal trend is observed: highest O/H abundances are observed near the peak of Hα emission (or stellar cluster).

The spatial distribution of HeIIλ4686 is more compact than [FeV]λ4227 indicating that these emission lines are produced in different places.

The source of high-ionization radiation is localized in dense ambients possibly associated with the presence of SSCs