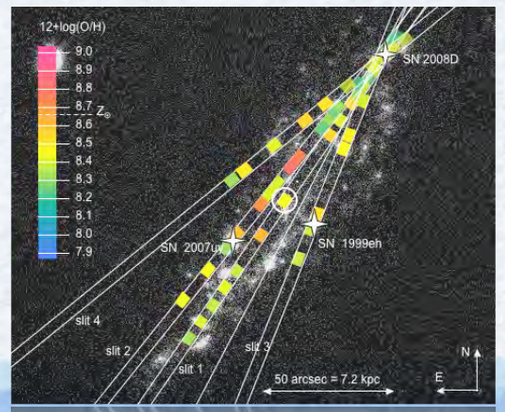
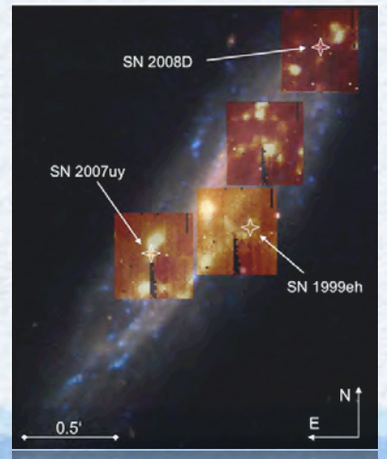
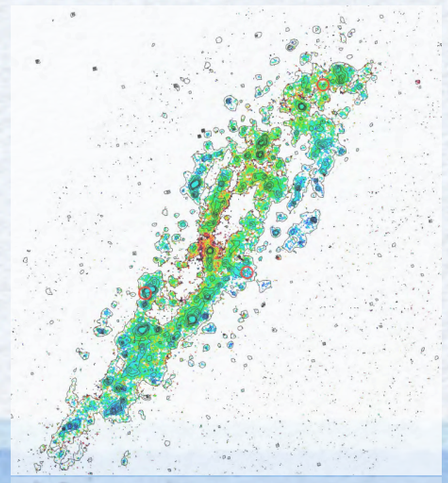






THE BEAUTY OF RESOLUTION

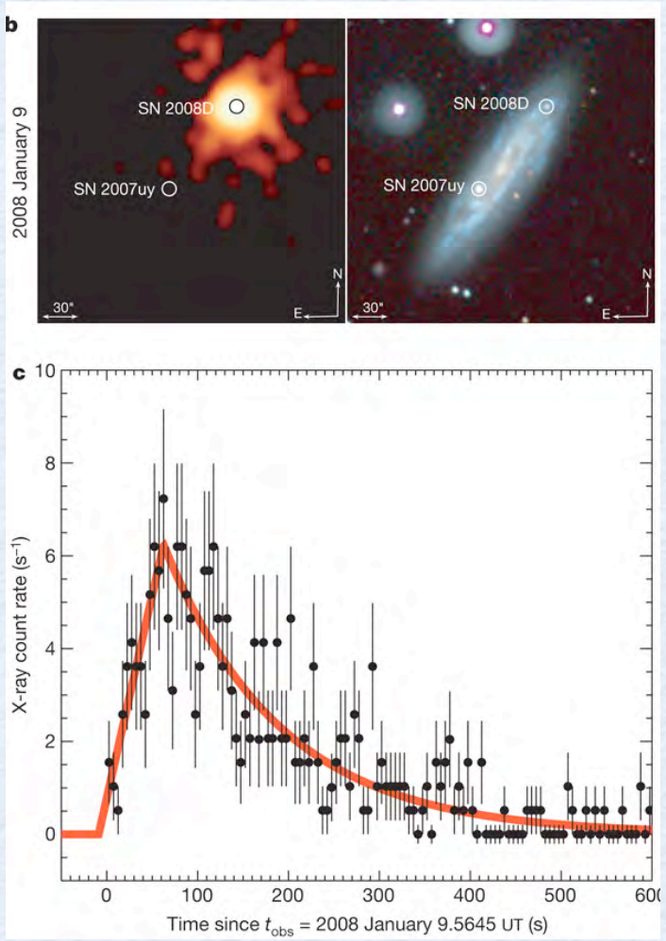
THE „SN IB FACTORY" NGC 2770 IN 3D

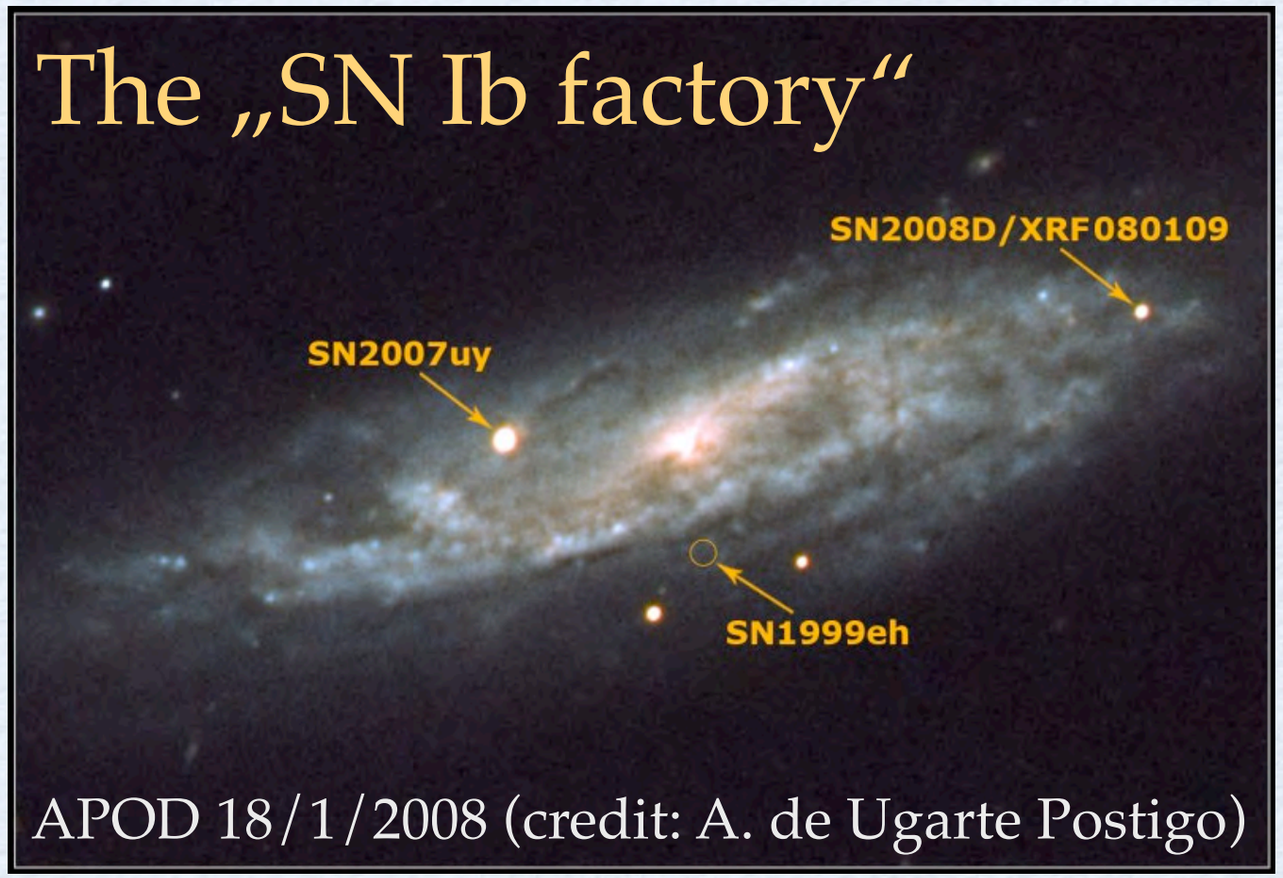
Christina Thöne (IAA Granada, RyC fellow)

Javier Gorosabel (IAA/UPV-EHU), Lise Christensen (DARK Copenhagen),
Antonio de Ugarte Postigo (IAA/DARK)

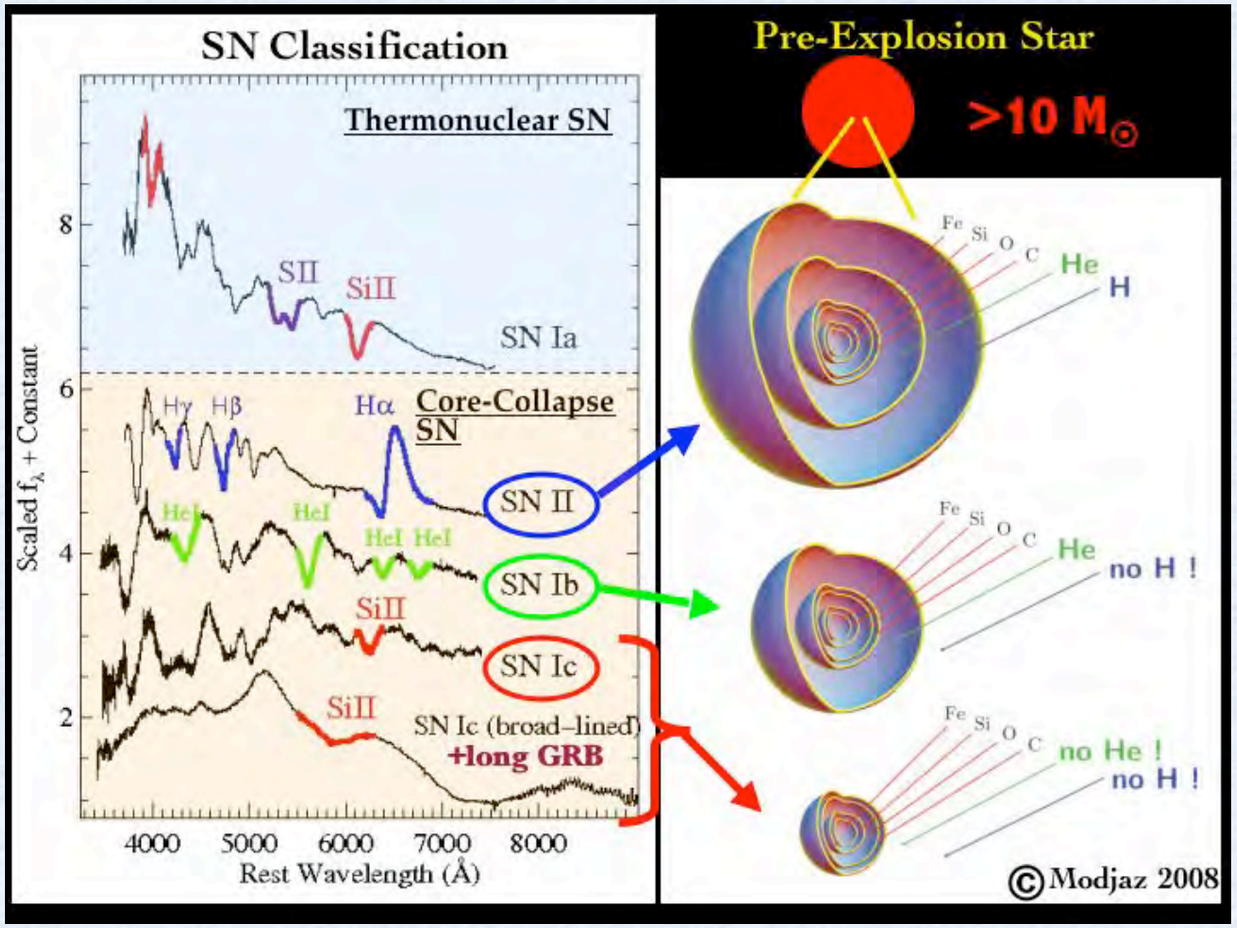
What's the deal with NGC 2770?

- Late-type spiral (.SAS5*.) at 27 Mpc, $2 \times 10^{10} M_{\odot}$
- Host of SN 2008D / XRF 080109 (Soderberg et al. 2008, Nature) discovered while *Swift* observed X-rays from SN 2007uy shock break out from a SN? -> very onset of the SN
- Why so many SNe in <10 years and why only Ibs? Any reason??





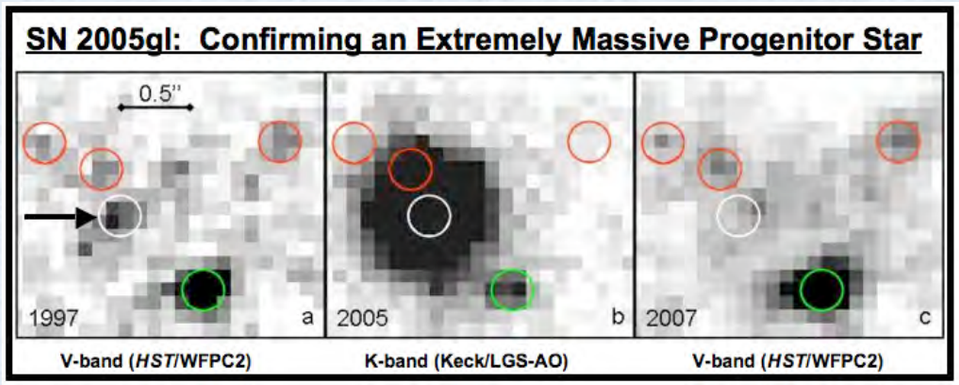
THE PROGENITORS OF STELLAR EXPLOSIONS



...plus some special classes (IIP, IIL, IIn, IIb...)
and H-rich/H-poor super-luminous SNe

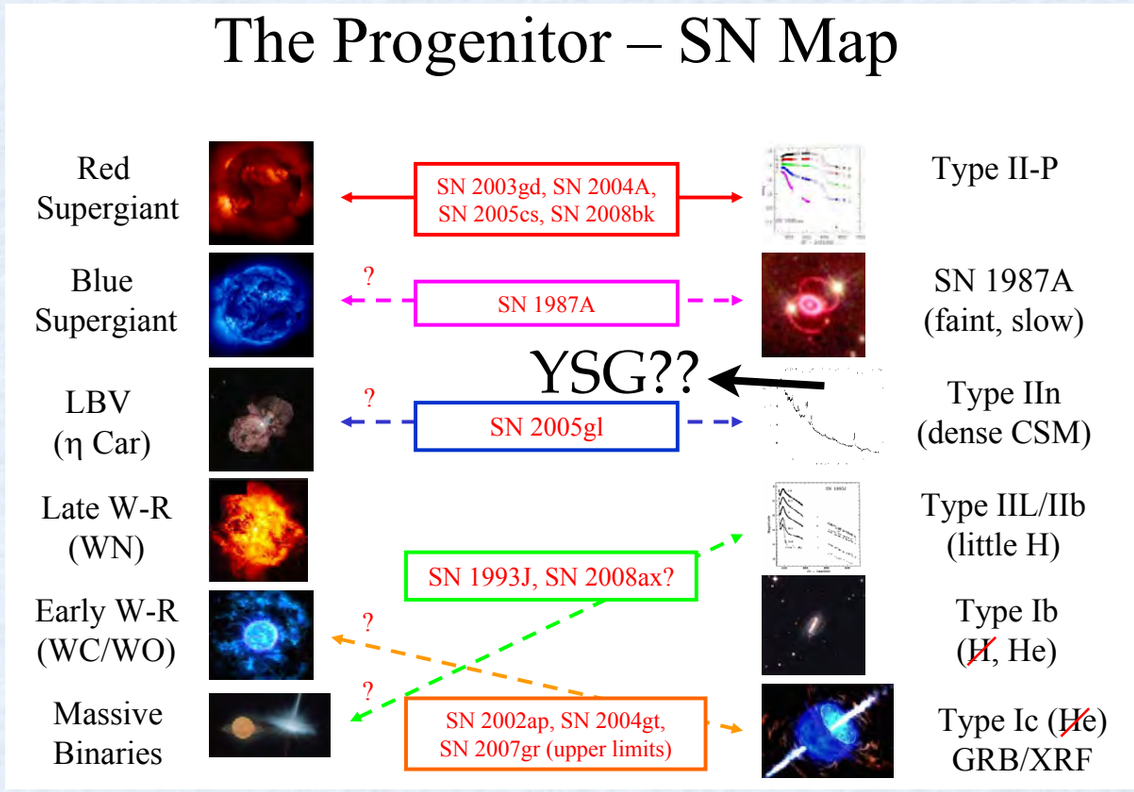
maybe CSM interaction also plays a role?

Pre-explosion imaging



Gal-Yam et la. 09

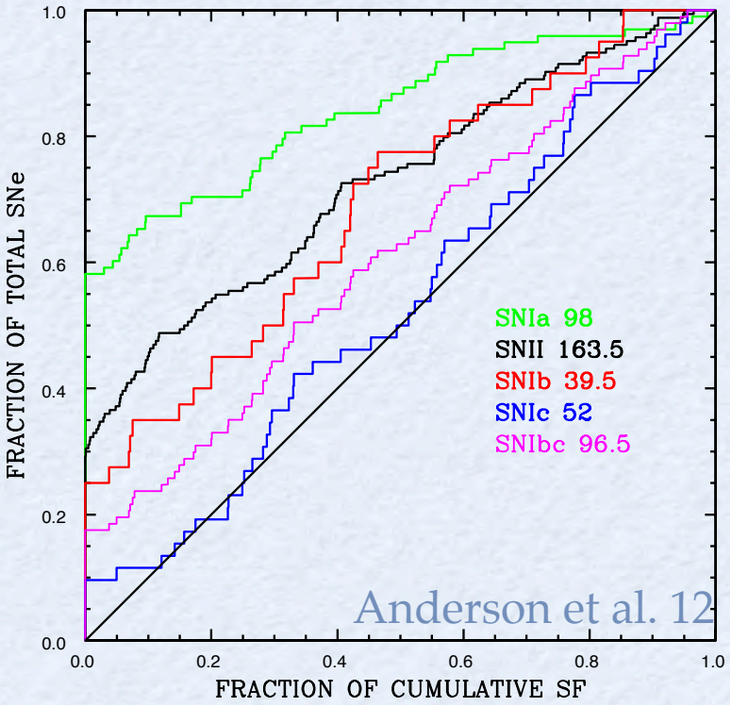
Only Type II detected!
Nondetections for Ibc



THE PROGENITORS OF STELLAR EXPLOSIONS - FROM THE ENVIRONMENT

Correlation with SF

~age ~progenitor mass

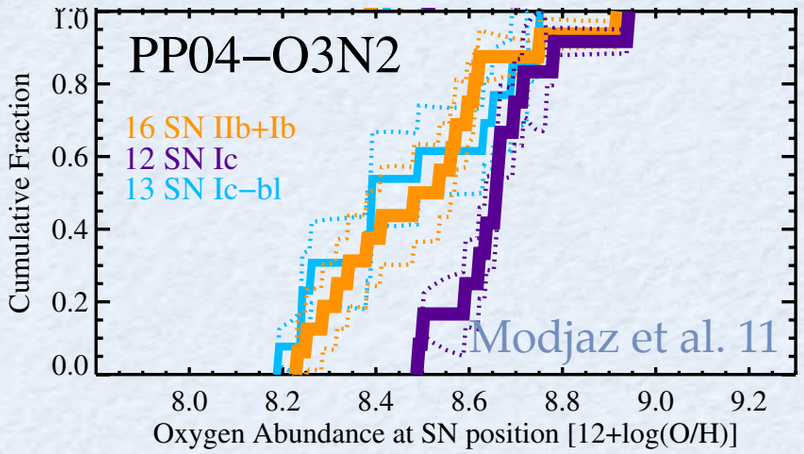


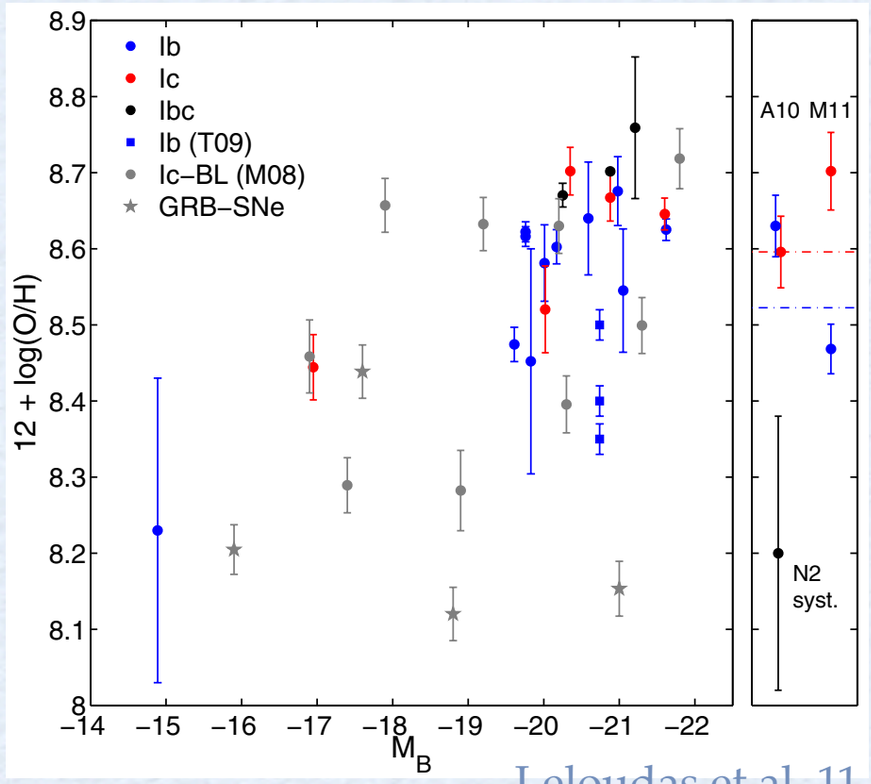
SNIa⇒SNII⇒SNIb⇒SNIc

SN II live so long that the SF region around has dispersed

SN types cluster in one host (episodes of SF?)

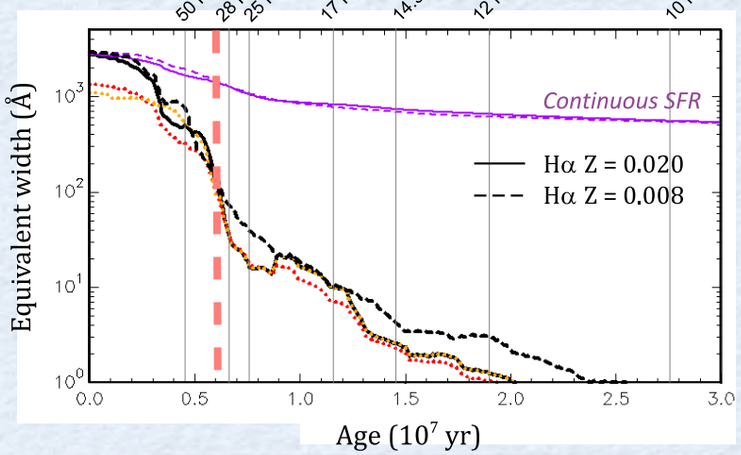
Metallicity

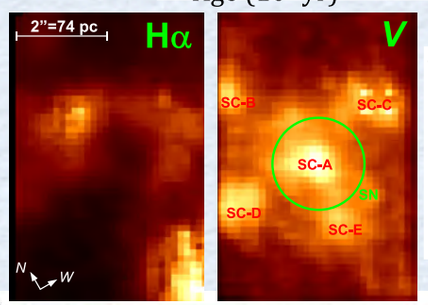


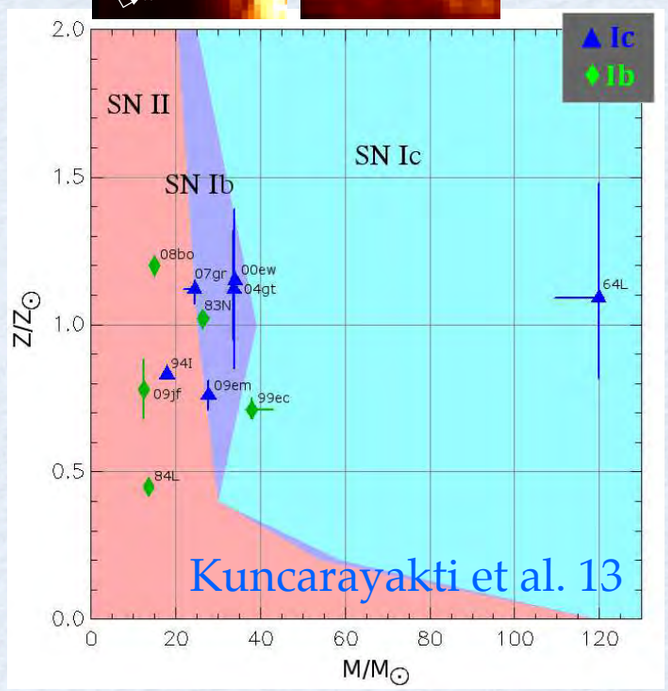


SN Ib single stars

Ha EW

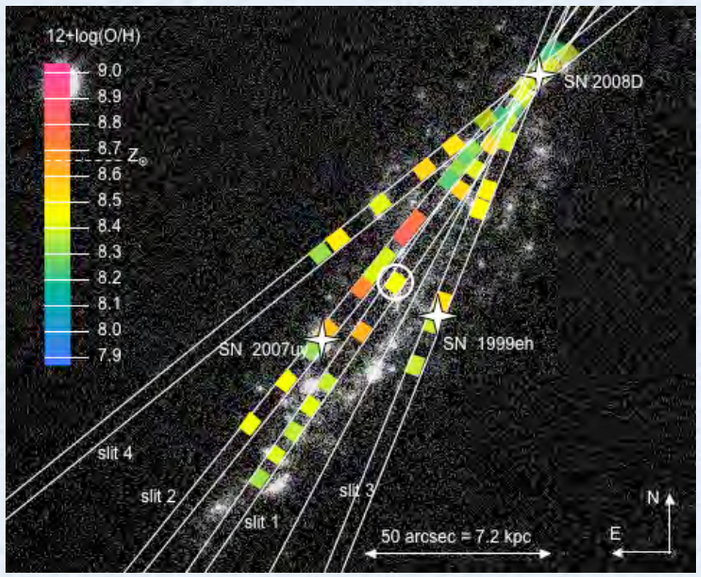




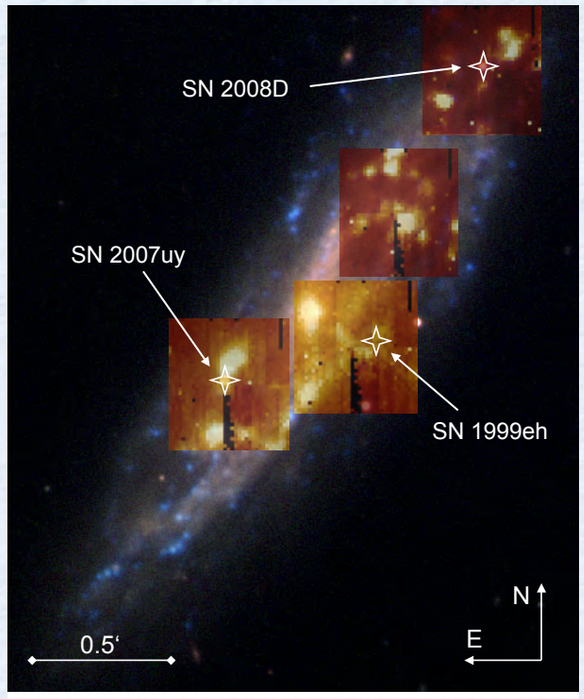


THE DATA

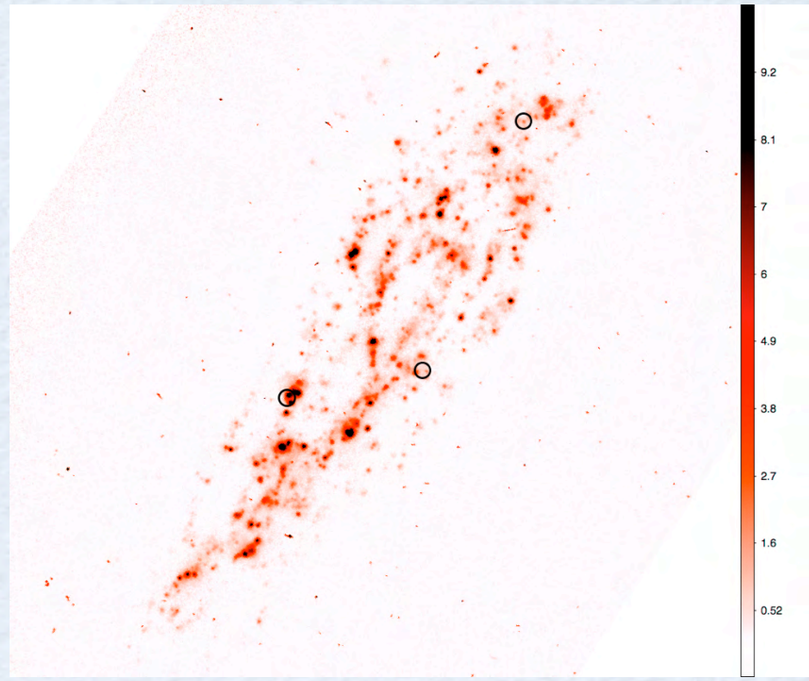
Resolution!!



4 LS spectra
SN sites + major axis
[OII] to [SII]
res. ~0.4kpc (along slit)



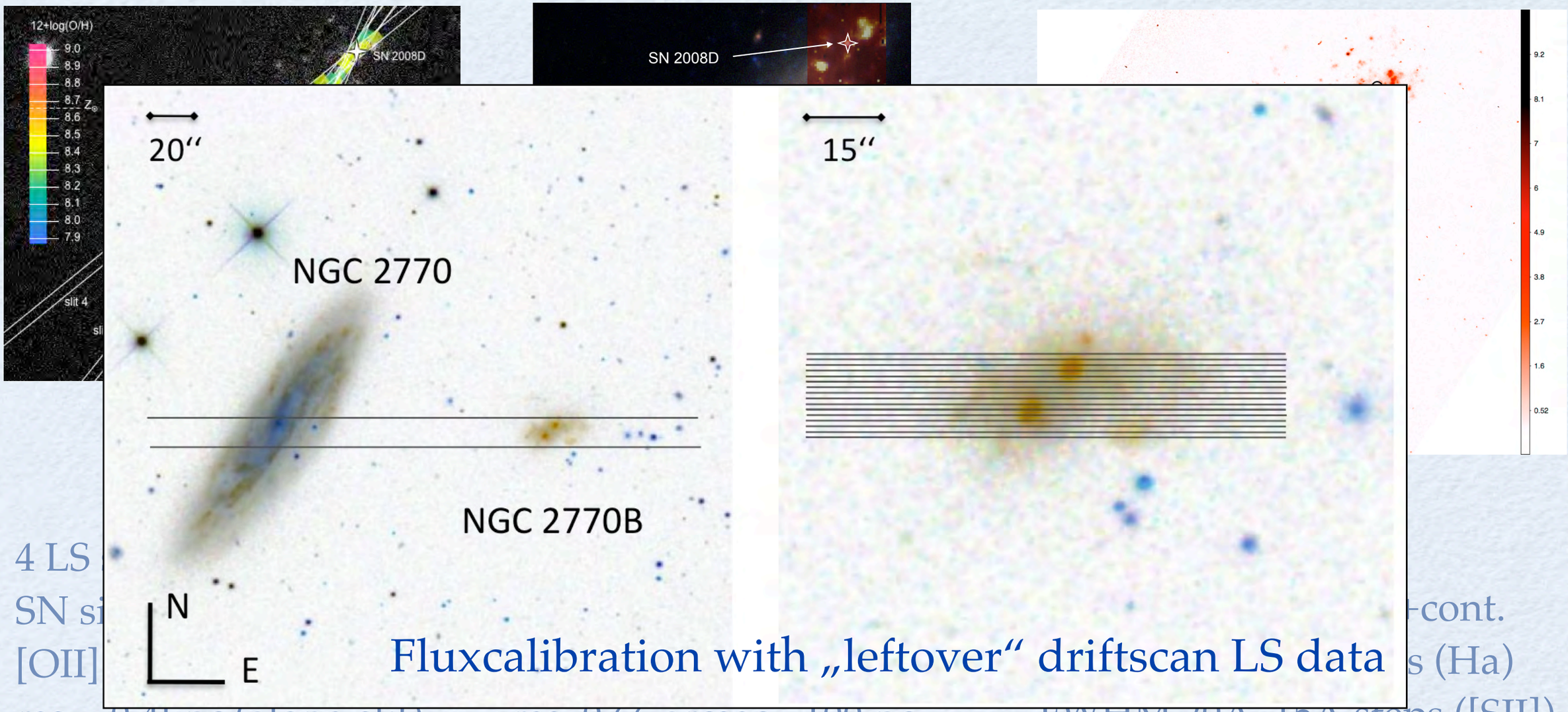
4 VIMOS pointings
SN sites + half major axis
[OIII] to [SII]
res. 0.66 arcsec ~100 pc



OSIRIS/TF imaging
entire galaxy
Ha, NII, SII doublet +cont.
FWHM 12Å, 8Å steps (Ha)
FWHM 20Å, 15Å steps ([SII])
res. 0.25 arcsec ~35pc
!!wavelength shift !!
- dist. from optical axis
- rotation curve of galaxy

THE DATA

Resolution!!



4 LS

SN si

[OII]

res. ~0.4kpc (along slit)

+cont.

s (Ha)

res. 0.66 arcsec ~100 pc

Fluxcalibration with „leftover“ driftscan LS data

FWHM 20A, 15A steps ([SII])

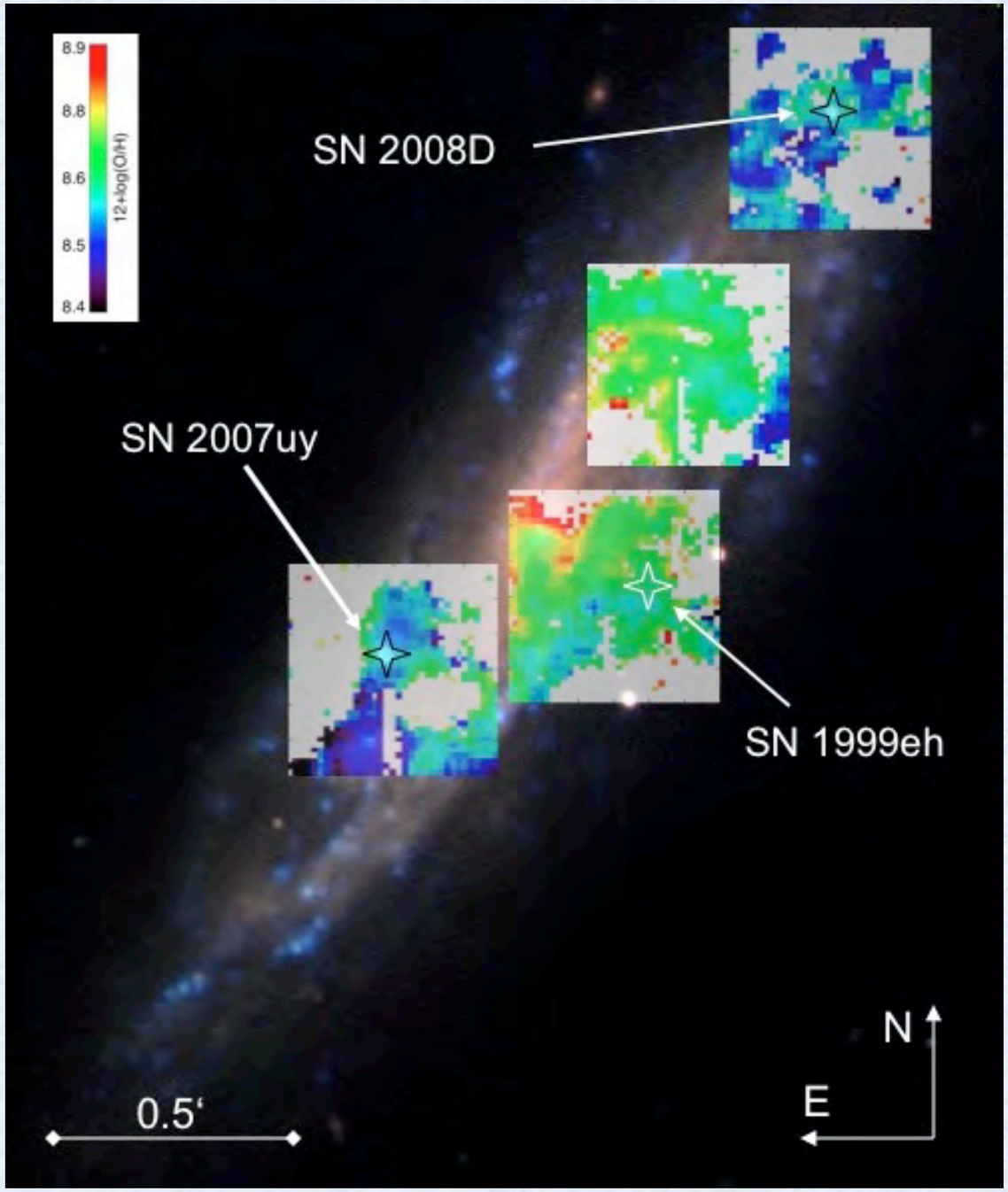
res. 0.25 arcsec ~35pc

!!wavelength shift !!

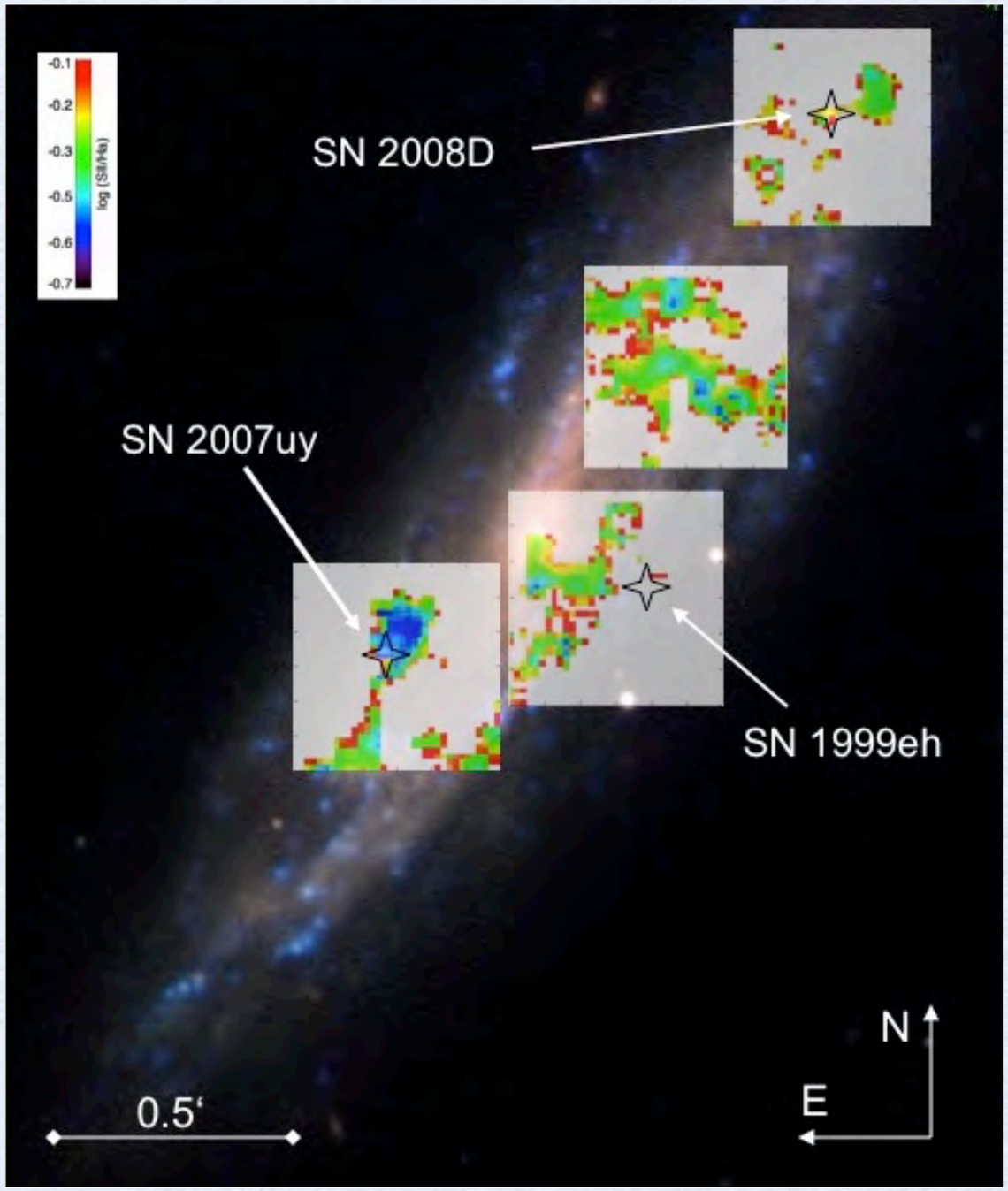
- dist. from optical axis
- rotation curve of galaxy

RESULTS FROM VIMOS

metallicity gradient

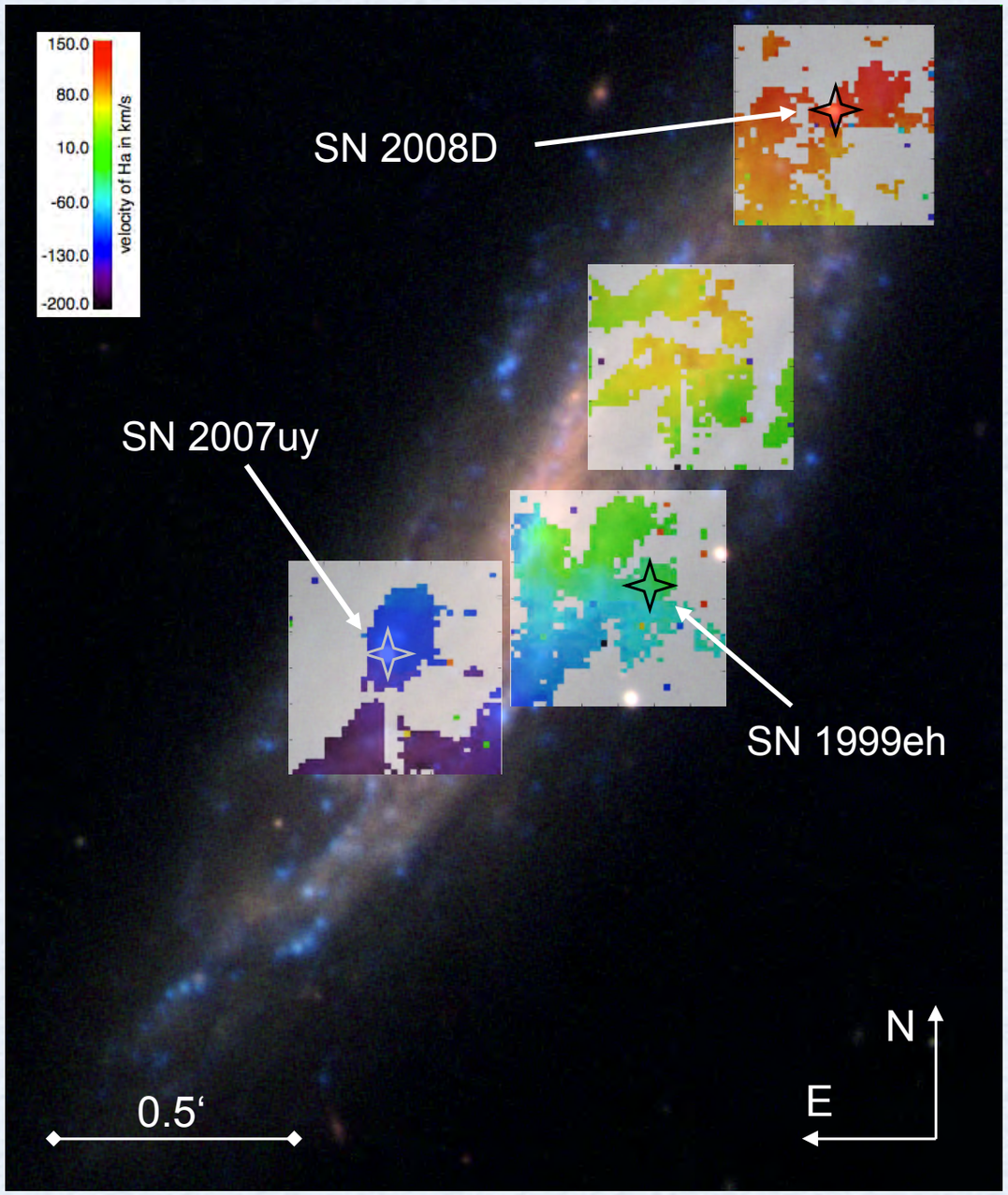


shocked material at the edge of SF regions (expected)

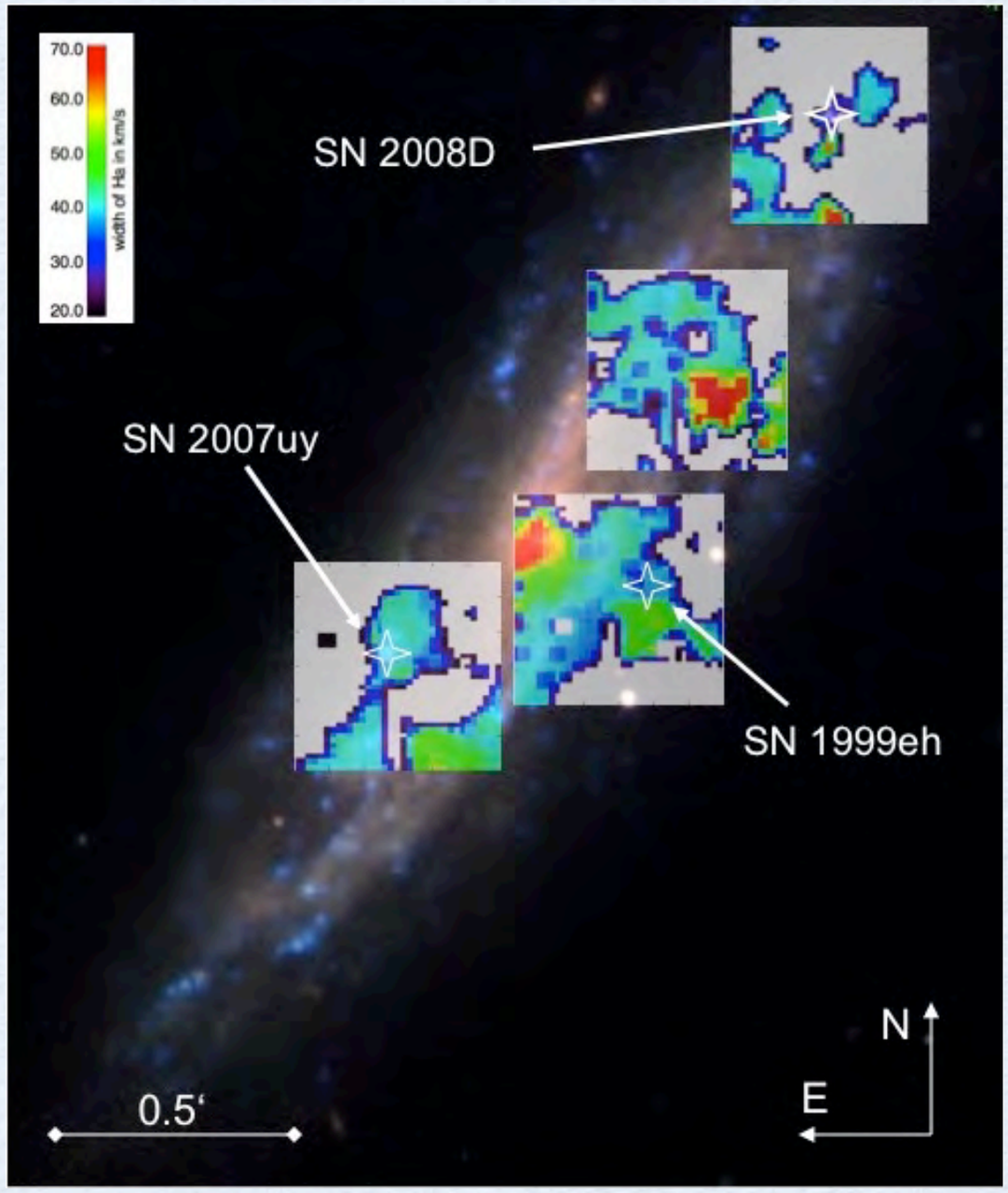


RESULTS FROM VIMOS
(THIS YOU CANNOT DO WITH TF!)

regular velocity field
(has to be analyzed in detail)

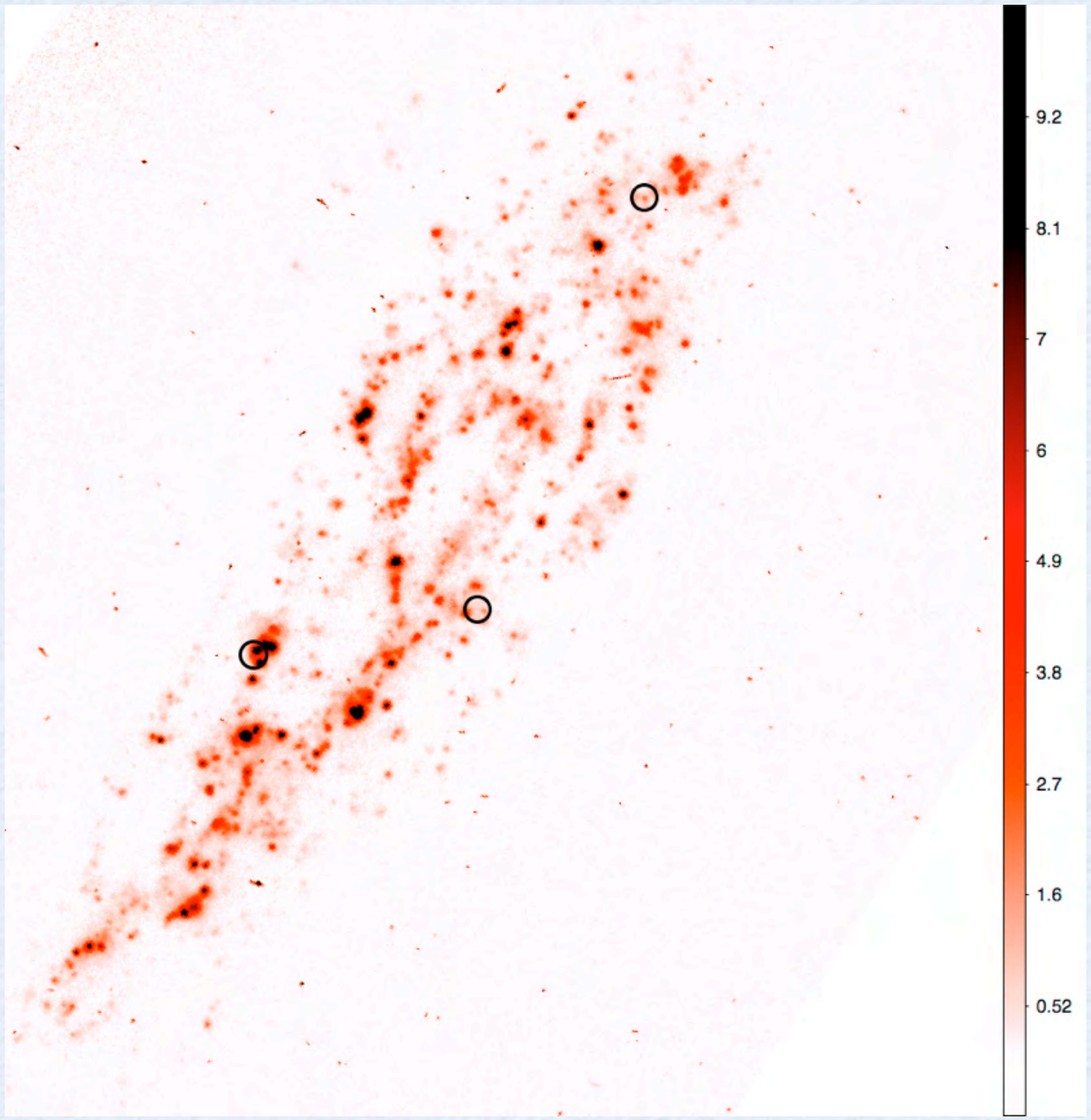


some more turbulent
(=younger?) SF regions?

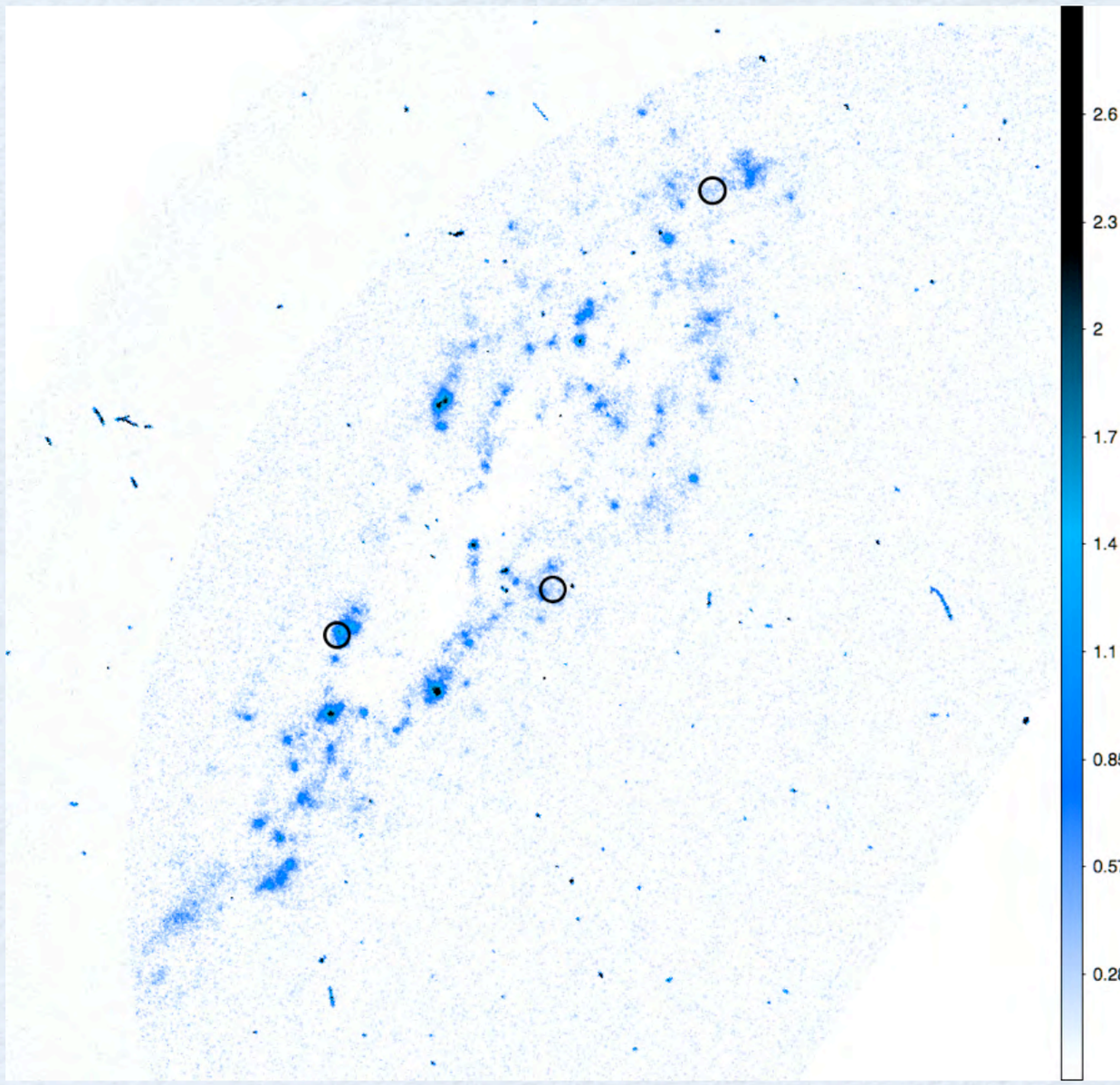


TF-> IMAGES OF ...

Ha

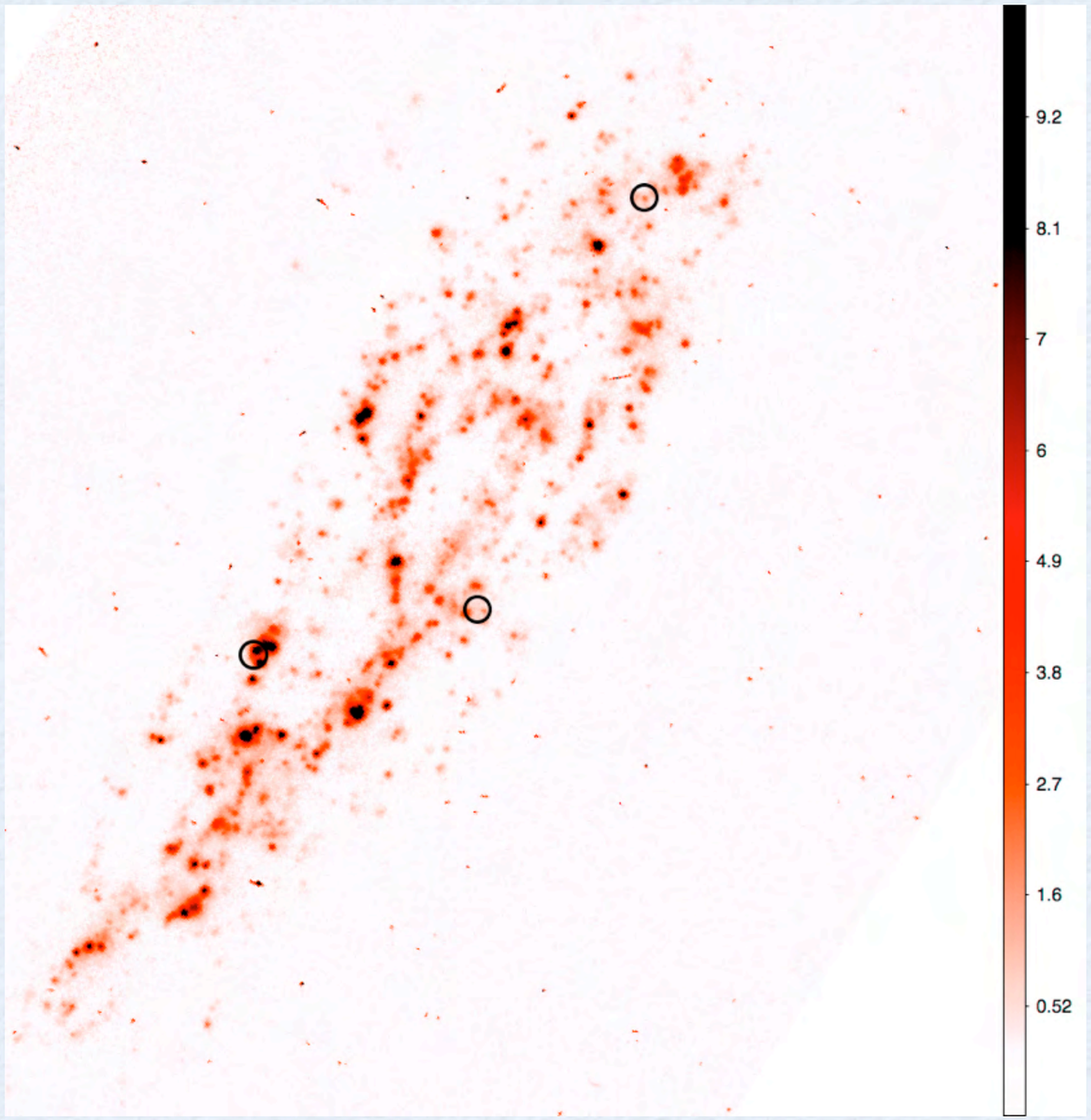


[SII]

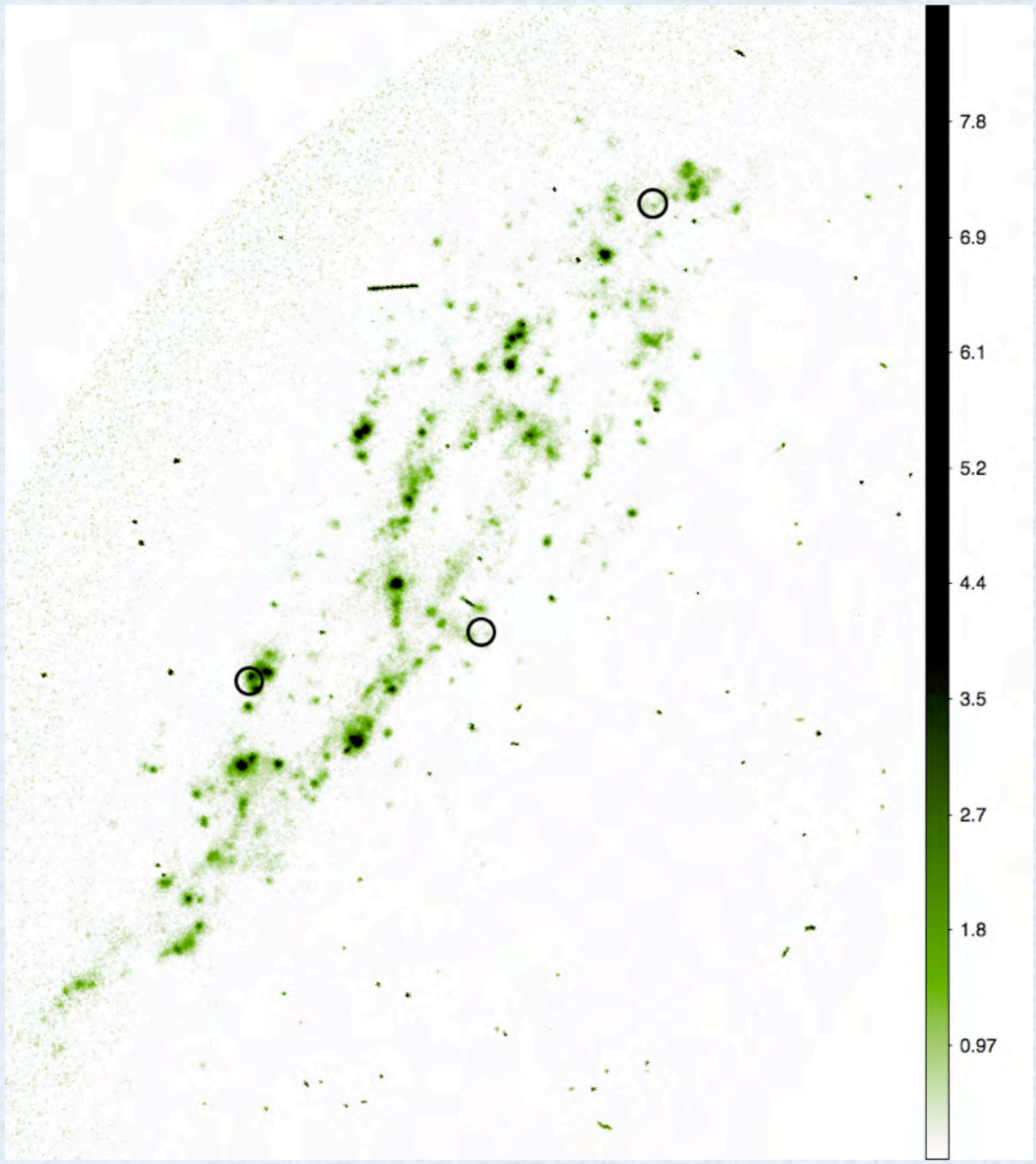


TF-> IMAGES OF ...

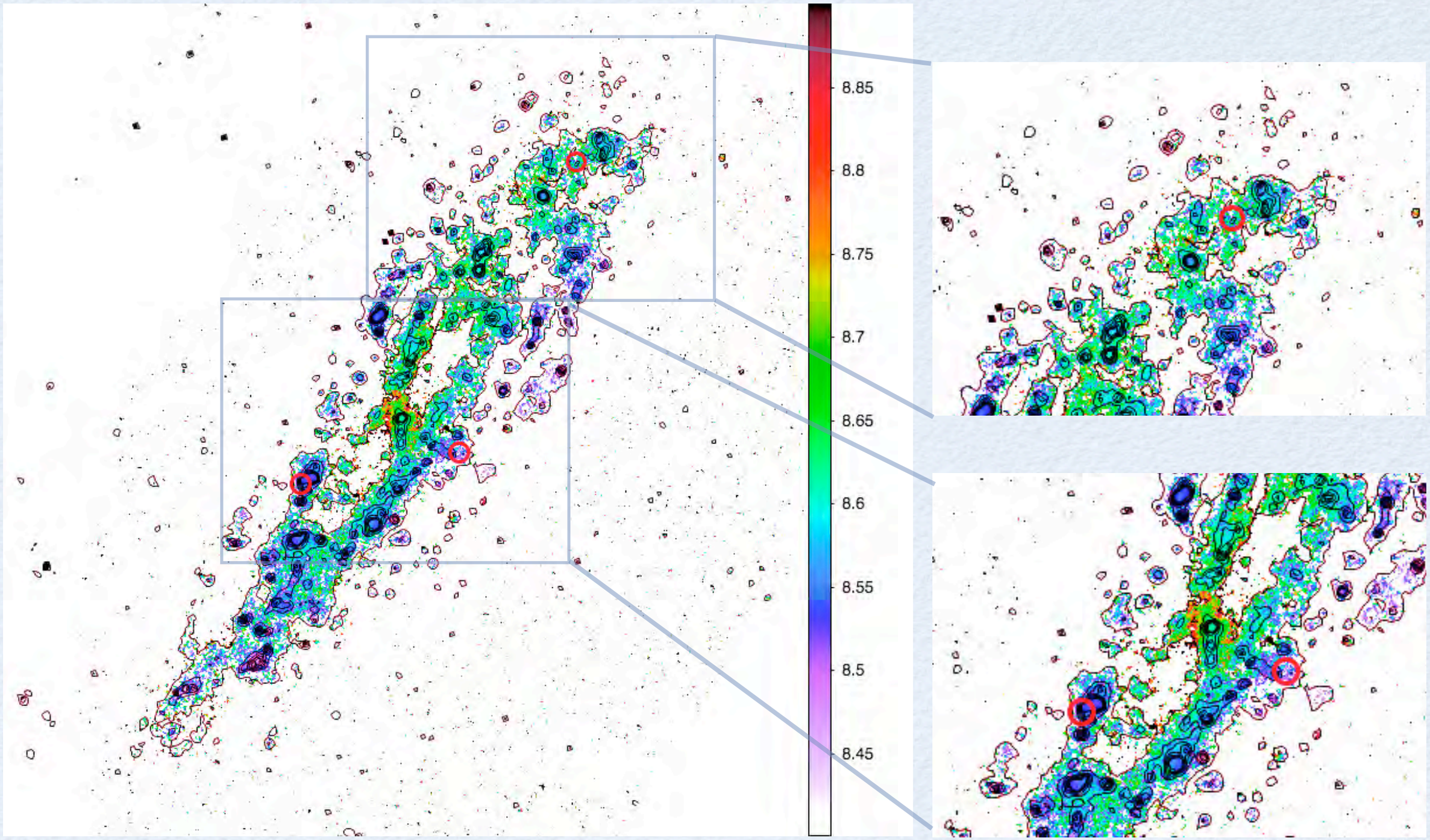
Ha



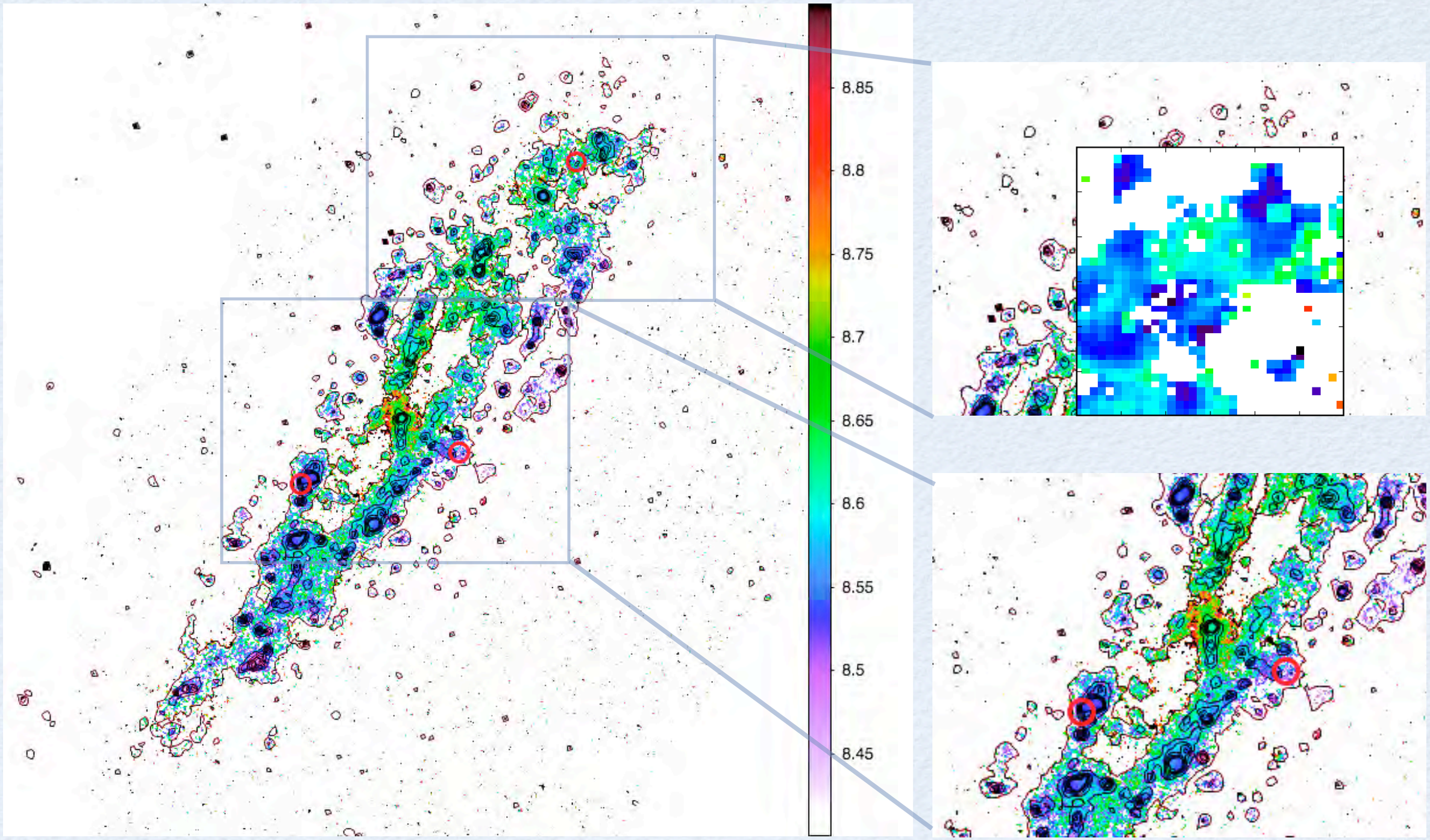
[NII]



A METALLICITY IMAGE

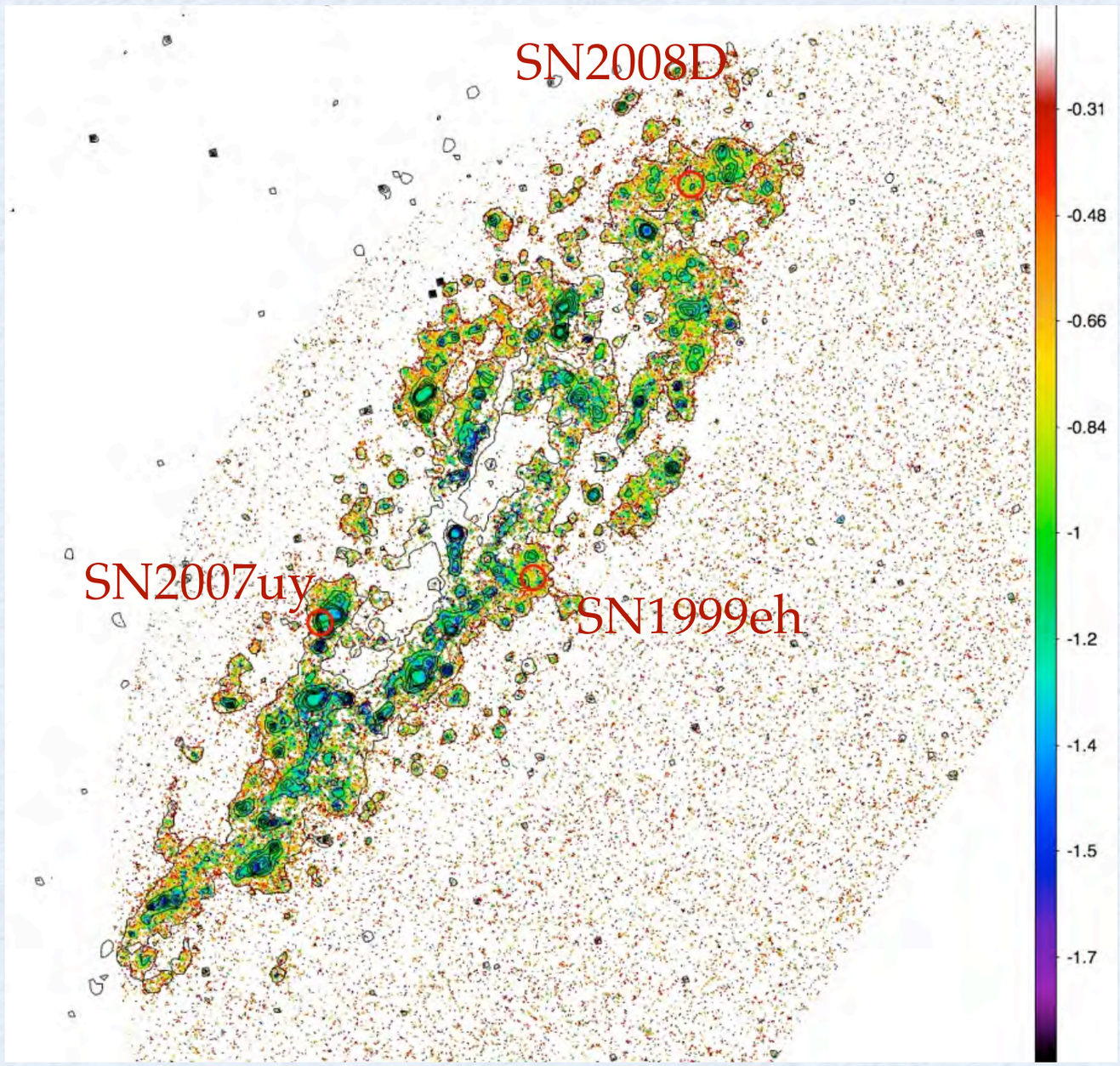


A METALLICITY IMAGE

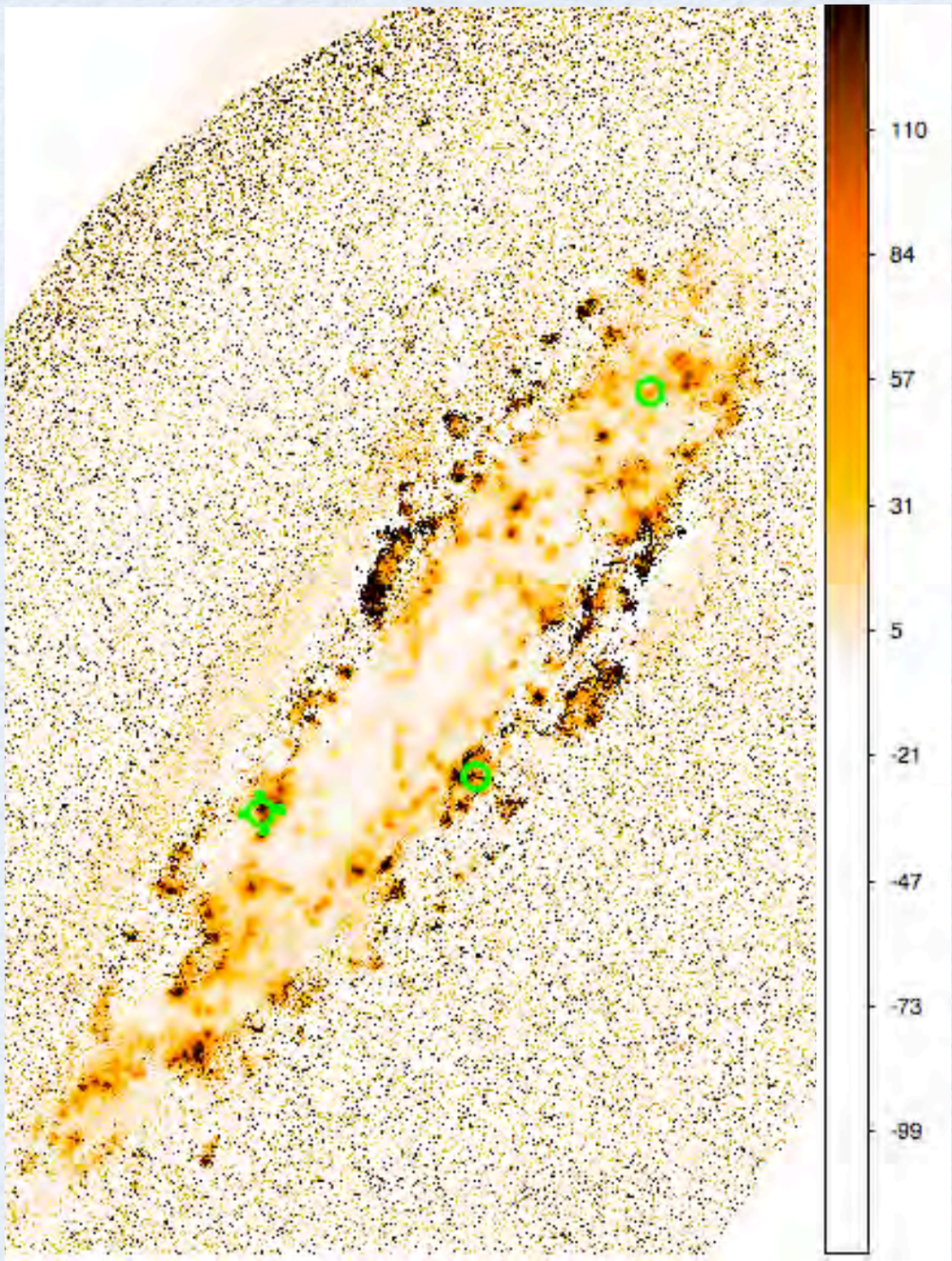


SHOCKS AND EW - IMAGES!

log([SII]/Ha)

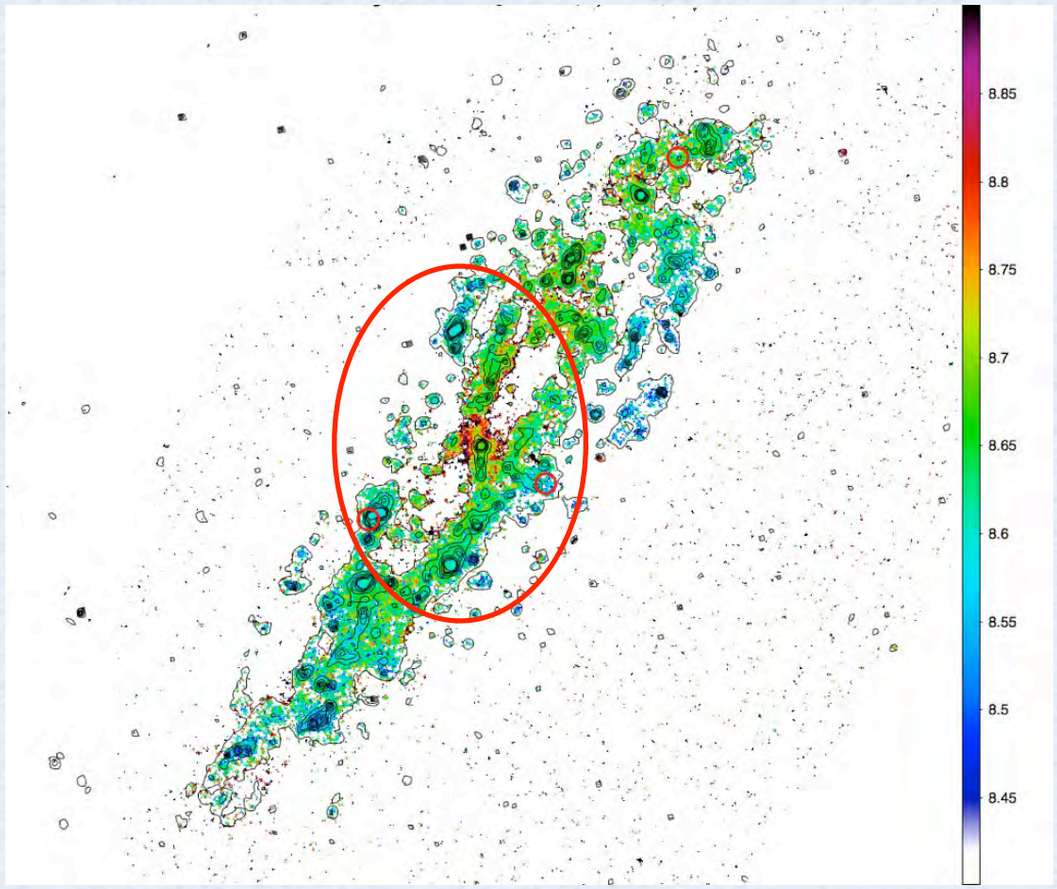


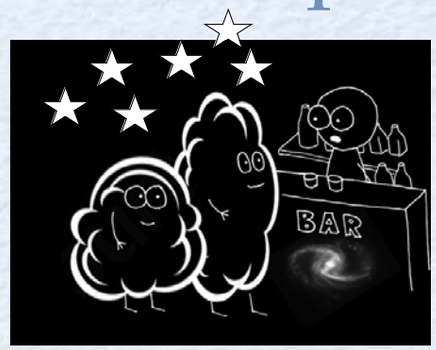
Ha EW

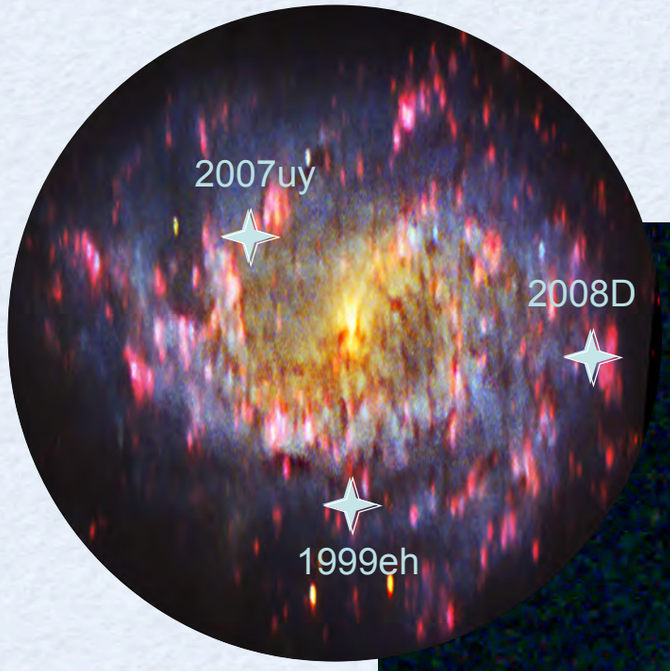


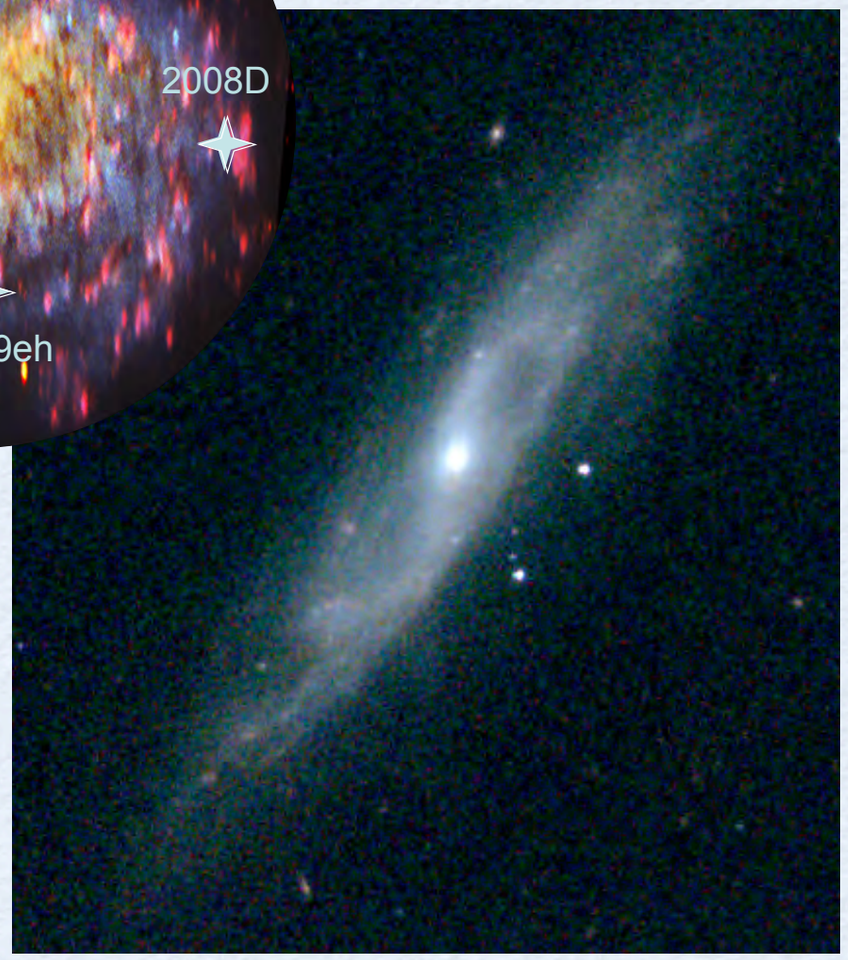
OTHER INTERESTING STUFF...

NGC 2770 has a bar! (classified as SA) - and maybe a warp







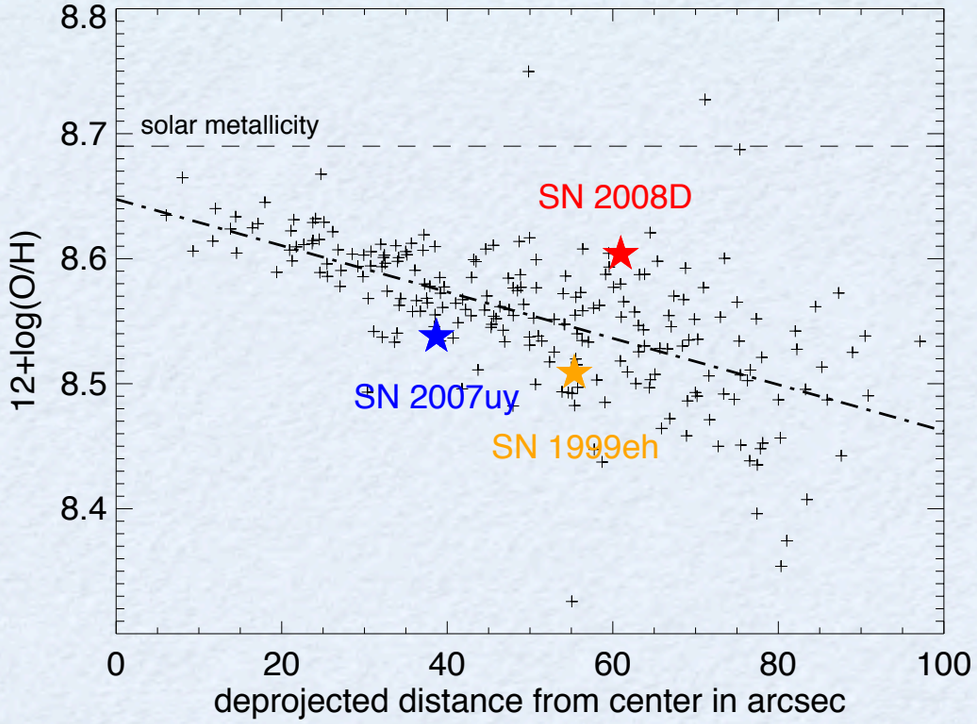


Would be interesting to get some HI/CO images to determine the velocity field

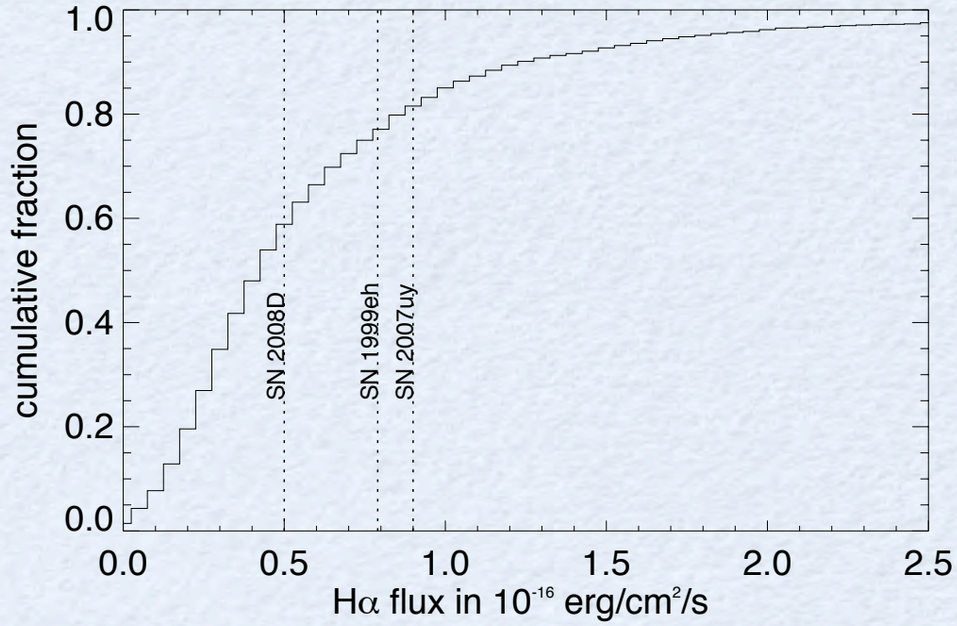
UKIDSS IR color composite

SOME RESULTS

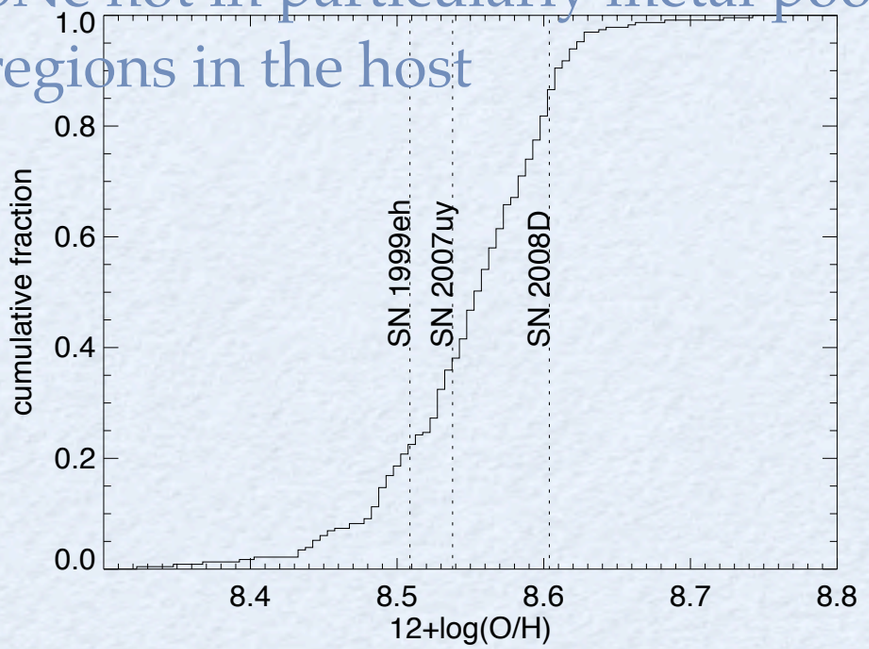
Metallicity gradient

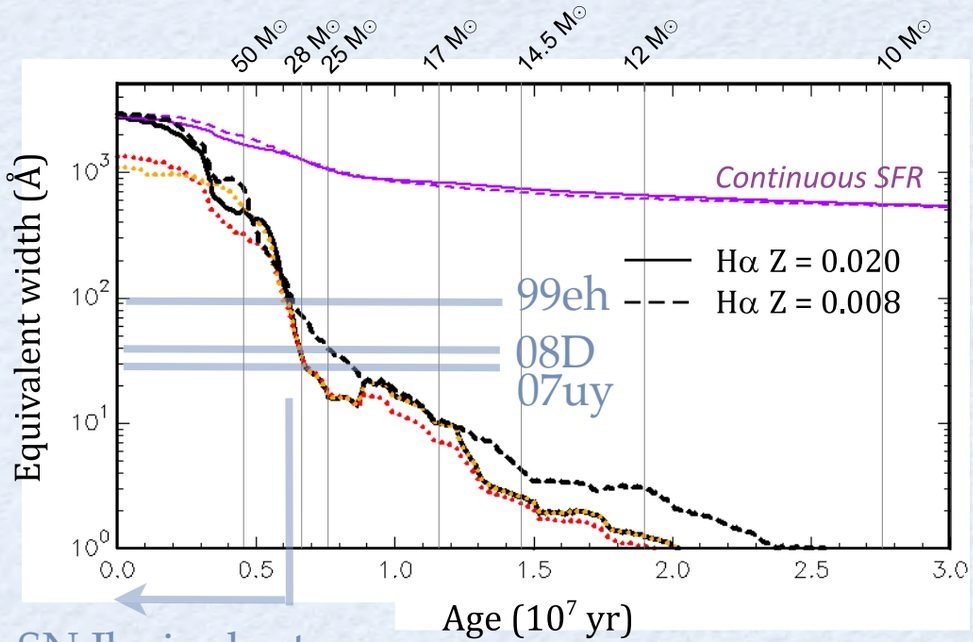


SNe in the brightest 50% of the SF regions, not all have low ages



SNe not in particularly metal poor regions in the host





SN Ib single stars

CONCLUSIONS

- Resolution is important, only if we resolve the SF region we can be sure about the result
  -> need for as high resolution as possible
  TFs can be useful for large galaxies, adapt method to science you need
  -> more studies+comparisons needed to interpret results at high z

- Environment can contribute to know what was the progenitor
  (need to team up with stellar evolution modelers, SN observations...)

- NGC 2770 not highly SF but low-ish in metallicity
  -> SFH of that galaxy could be interesting
  Progenitors probably binaries (at least some)

- SN hosts in 3D give lots of interesting side stuff (morphology, velocity field, metallicity gradient ...)

  Stay tuned for Thöne et al. hopefully some time this fall!

Early conference annoucement!

Focus meeting

„Stellar explosions in an ever changing environment“

Bring together people working on SF, galaxies, GRBs & SNe to explore the mutual influence between stellar explosions and their galactic environment

SOC

C. Thöne (chair), L. Christensen (co-chair), S. Vergani, L. Kewley, A. Gal-Yam, C. Belczynski, K. Maeda, F. Matteucci, G. Östlin, J. Prochaska, N. Tanvir, P. Papaderos

Honolulu, Hawai‘i

Some time between Aug. 3 and 14, 2015