Studying the ISM at ~10 pc scale in NGC 7793 with MUSE - I. Data description and properties of the ionised gas

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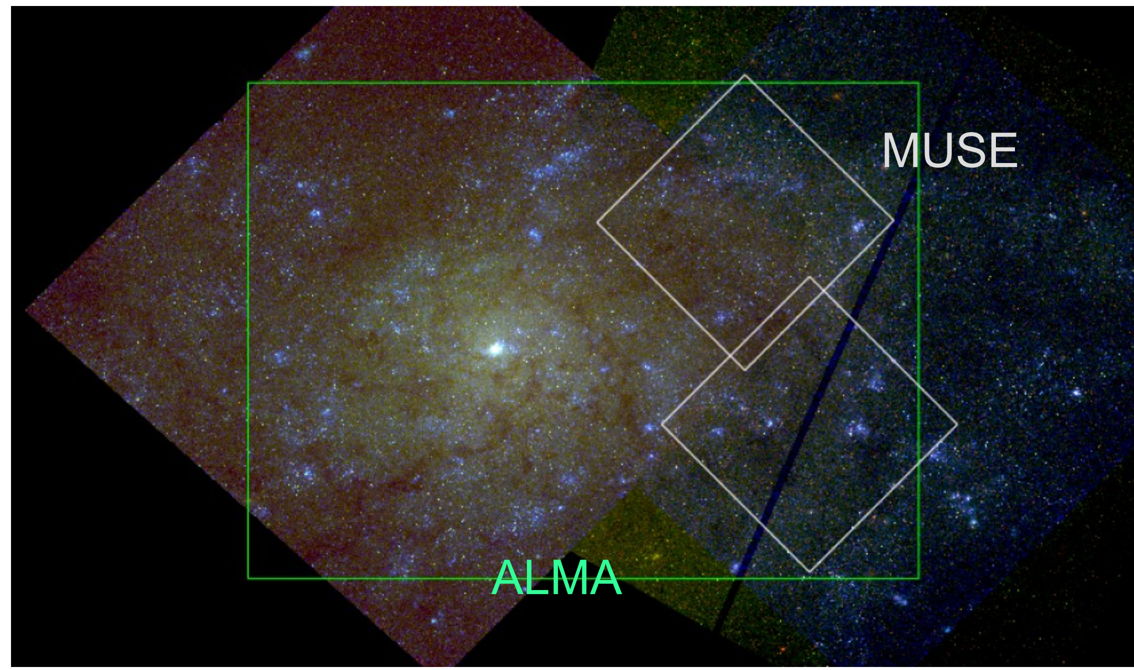
MUSE AO, WF-mode, seeing =0.71"
Science Verification run
extended wavelength setting:
4650 - 9300 Å

at 1.25 Å sampling. In the extended wavelength AO mode, the wavelength range ~ 5760 - 6010 Å is blocked in order to avoid contamination by sodium light from the laser guide system; at our redshift, this rules out several important lines such as the [NII]5755 'auroral' line used for temperature diagnostics. The



Область снималась на HST
Еще будет ALMA-LEGUS data

Table 1. Properties of NGC 7793.

Parameter	Value	Ref.
Morphological Type	SA(s)d	(1)
Systemic velocity	227 km/s	(2)
Inclination angle	47°	(2)
Stellar mass	$3.2 \times 10^9\ M_\odot$	(2)
SFR(UV)	$0.52\ M_\odot$/yr	(3)
Central 12 + log(O/H)	8.50 ± 0.02	(4)
12 + log(O/H) gradient	-0.0662 ± -0.0104 dex/kpc	(4)

Texp = 2100 sec/field

+ 4x120 sec sky frames

3.2. Improved sky subtraction

We perform sky subtraction using ZAP (Soto et al. 2016, v2.0). This software implements a principal component analysis (PCA)

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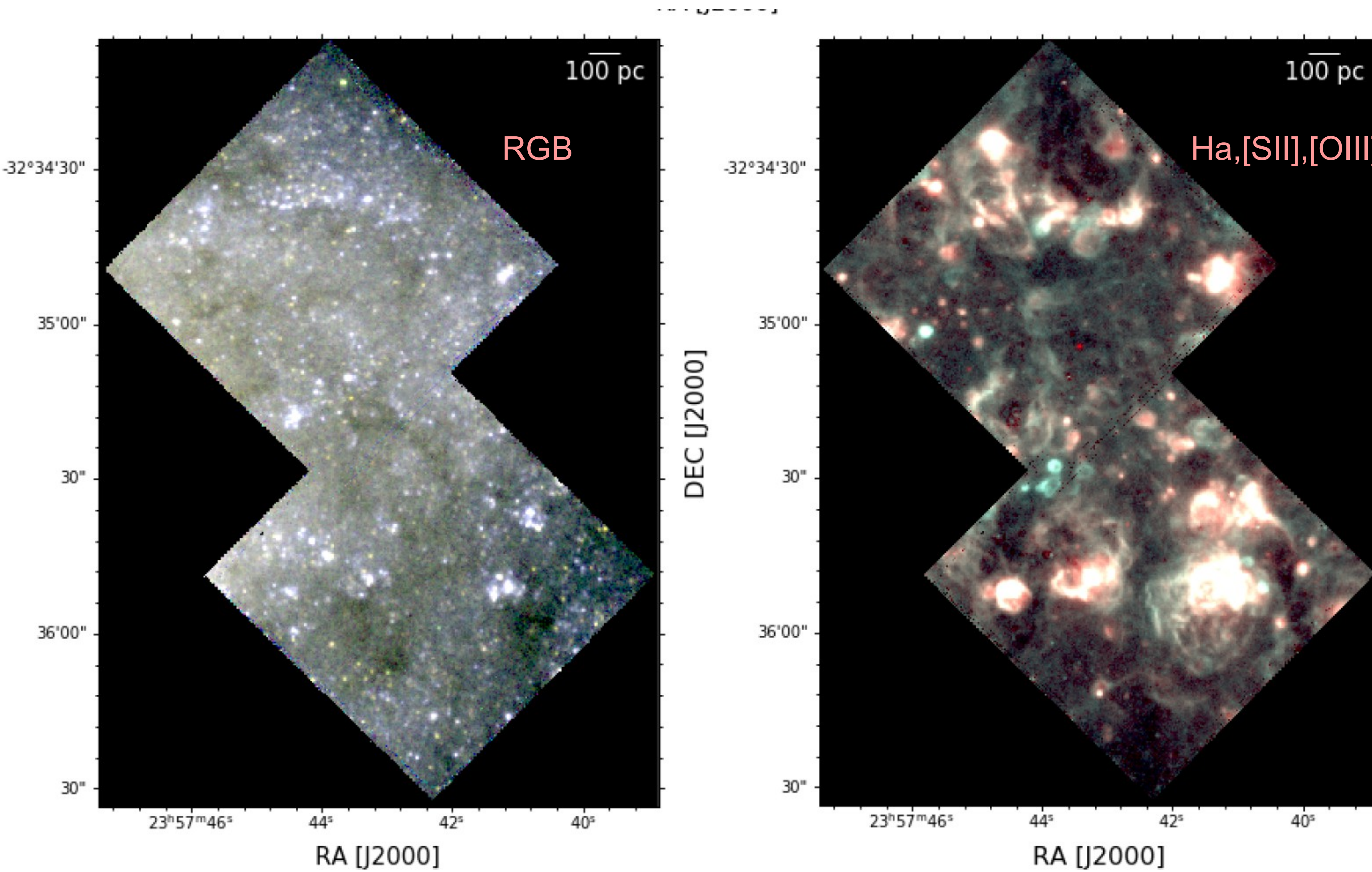


Voronoi + pPXF + reddening + BPT...

Velocity dispersion

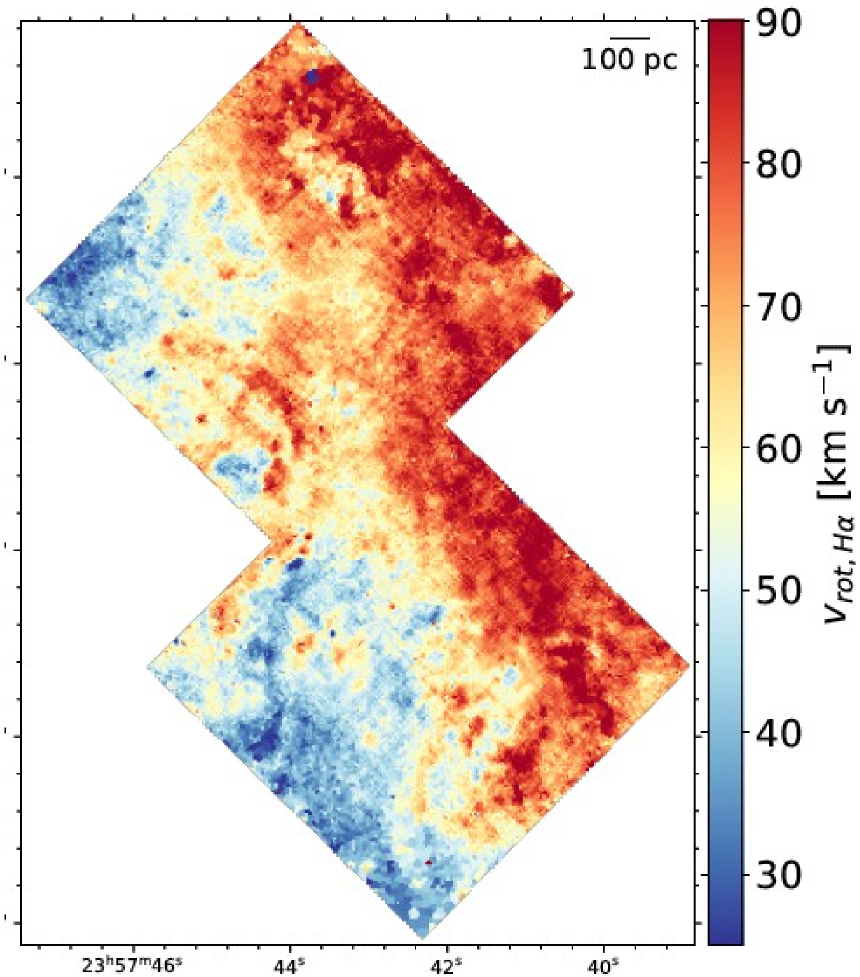
Gaussian instrumental LSF:

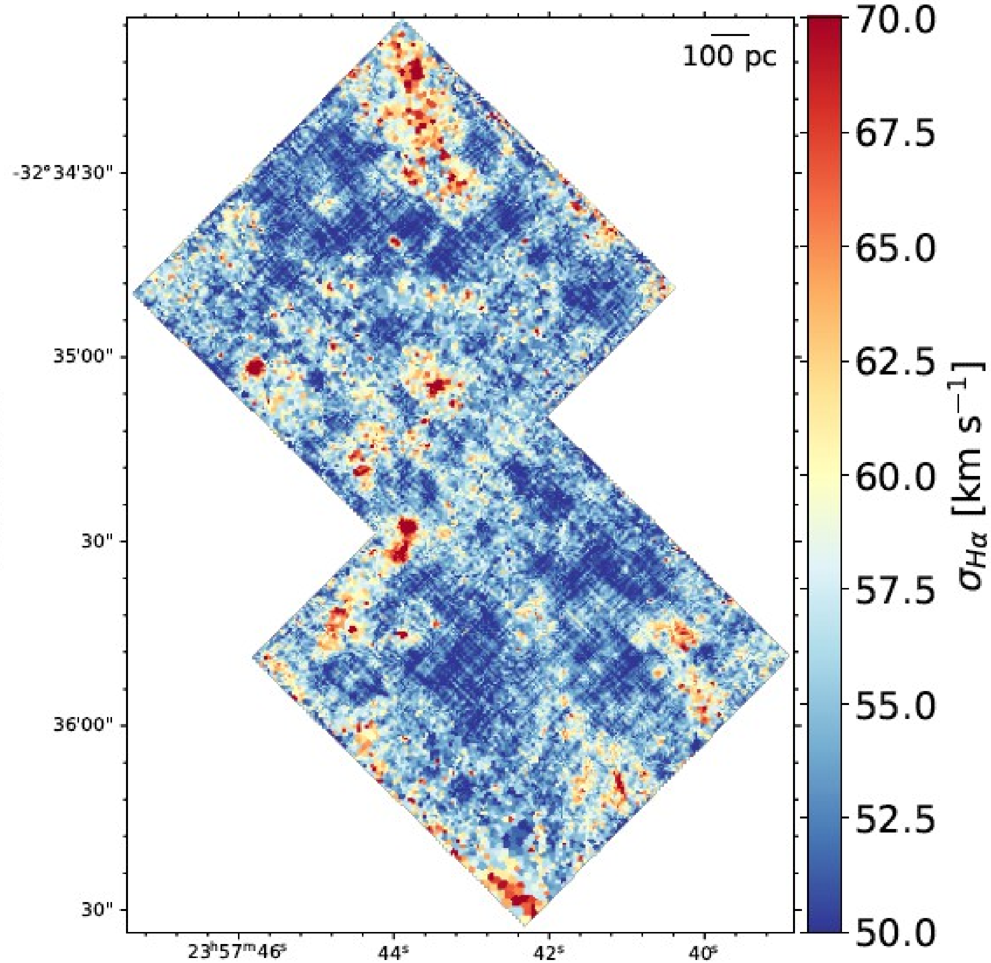
$$\mathrm{LSF}(\lambda_{H\alpha.obs}) \approx 2.54\ \text{Å}$$

[3] We use the parametrization of the MUSE LSF by Guérou et al. (2017): $\sigma_{LSF} = 6.266 \times 10^{-8}\lambda^2 - 9.824 \times 10^{-4}\lambda + 6.286$.

$$\sigma_{tot} = \sqrt{\sigma_{LSF}^2 + \sigma_{gas}^2},$$

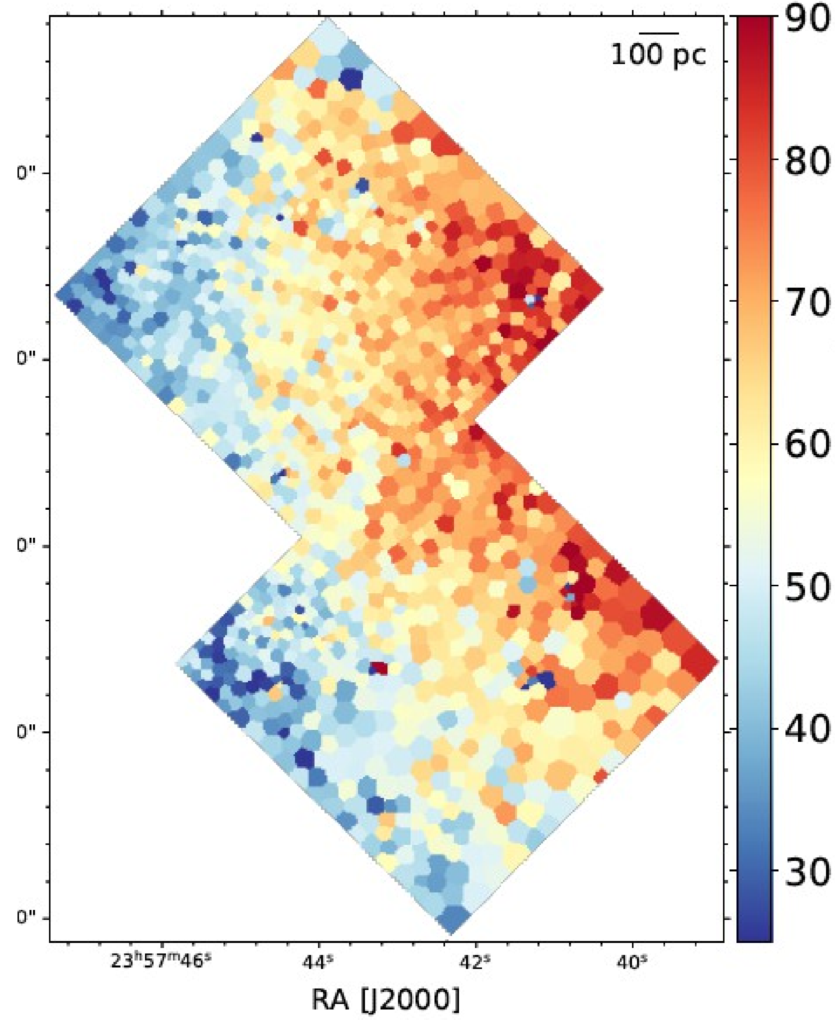
Предел: Sigma>47 км/с

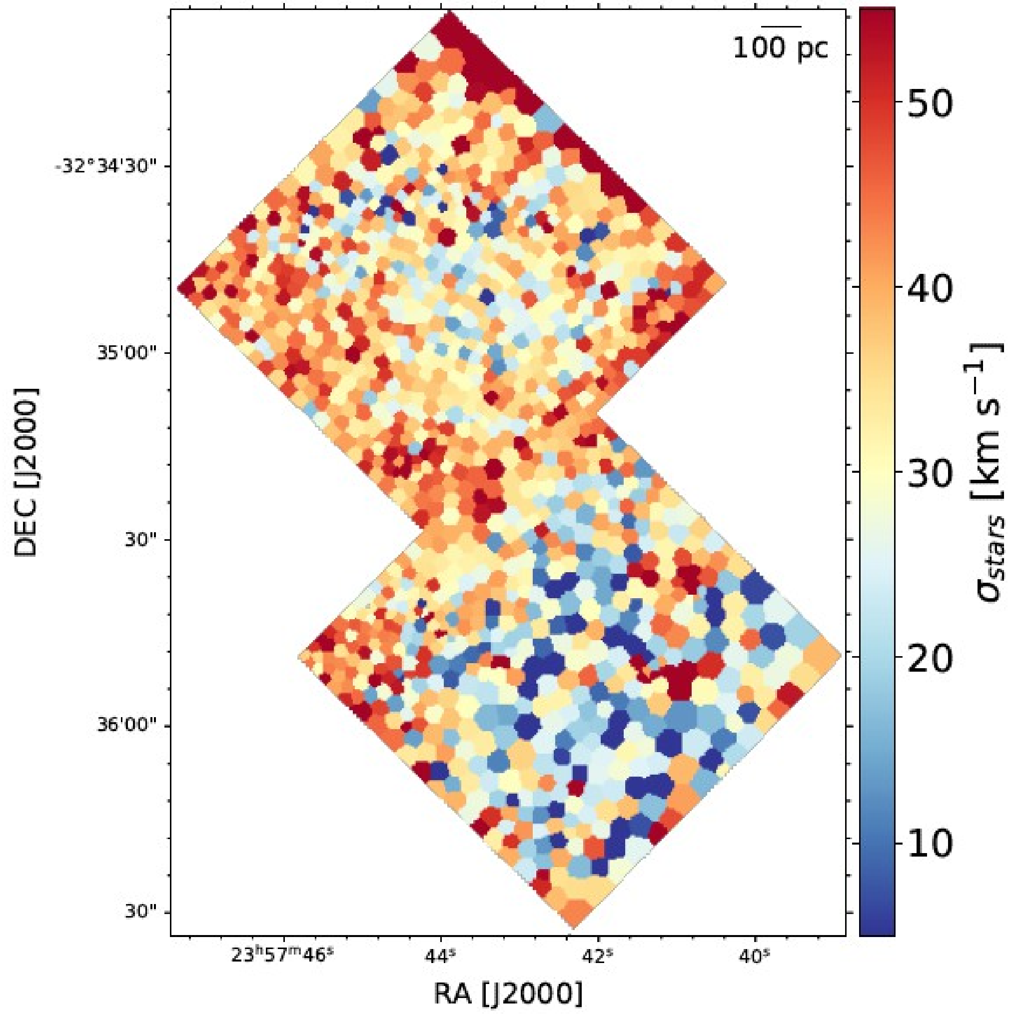




Stellar velocity and sigma

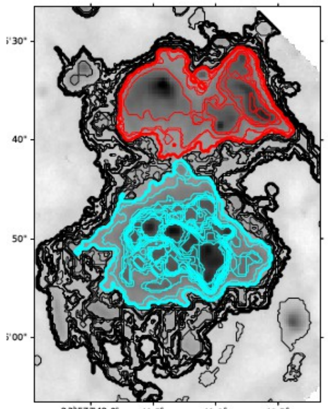
Vrot, почему-то коррекция без учета PA: $v_{rot} = (v_{obs} - v_{syst})/sin(i).$

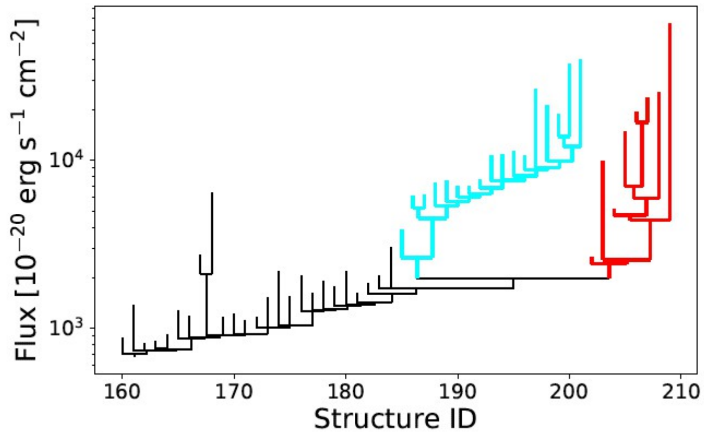




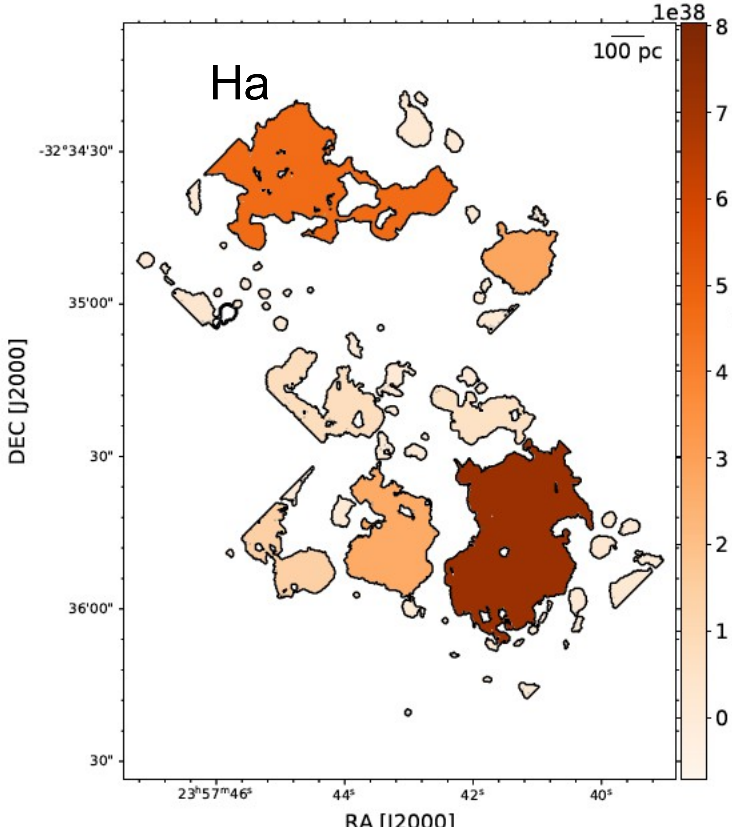
DIG – HII regions

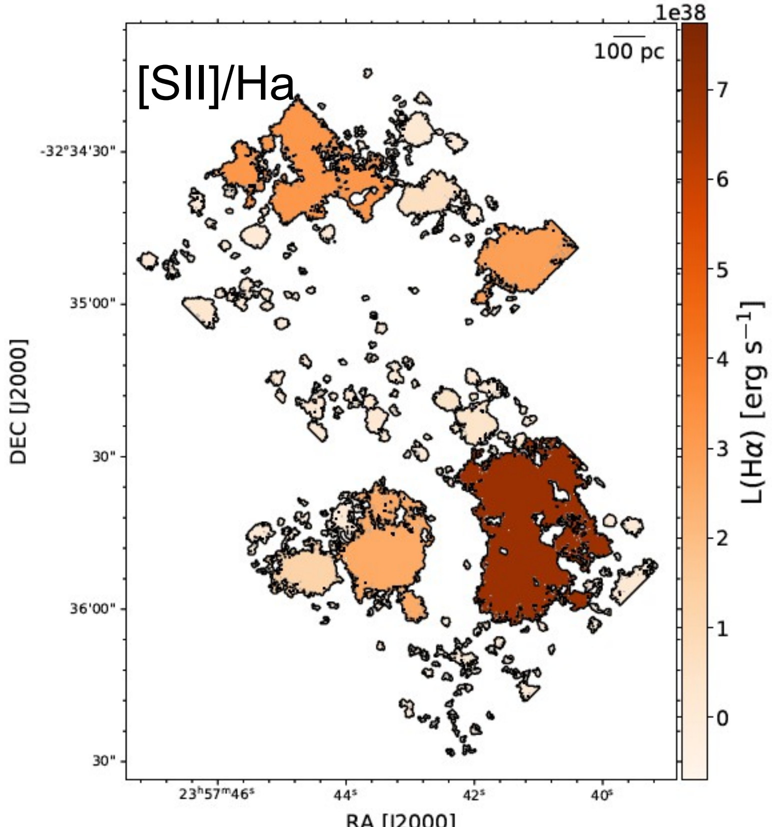
Методика сходна с Krekel + 2016:
Диаграмма ветвления + проверка BPT





f_{DIG} ~ 27% (42 %) for regions selected on the Hα (Hα/[SII])





Уникальные объекты

Obj. ID	Ra (J2000)	Dec (J2000)	Ref.	Ref. ID
SNR1	23:57:43.82	-32:35:27.8	1	N7793-S6
SNR2	23:57:45.80	-32:35:01.9	1	N7793-S10
SNR3	23:57:44.00	-32:35:32.1		
PN1	23:57:42.71	-32:35:39.2		
PN2	23:57:44.01	-32:34:41.2		
WR1	23:57:40.81	-32:35:36.5	2	10 (WN2-4b)
WR2	23:57:41.43	-32:35:35.9	2	14 (WC4)
WR3	23:57:45.74	-32:34:37.4		
WR4	23:57:44.75	-32:34:25.1		
WR5	23:57:40.90	-32:35:35.6		
WR6	23:57:40.53	-32:35:33.1		
WR7	23:57:41.37	-32:35:52.5		
WR8	23:57:43.27	-32:35:49.6		
WR9	23:57:40.94	-32:34:47.3		

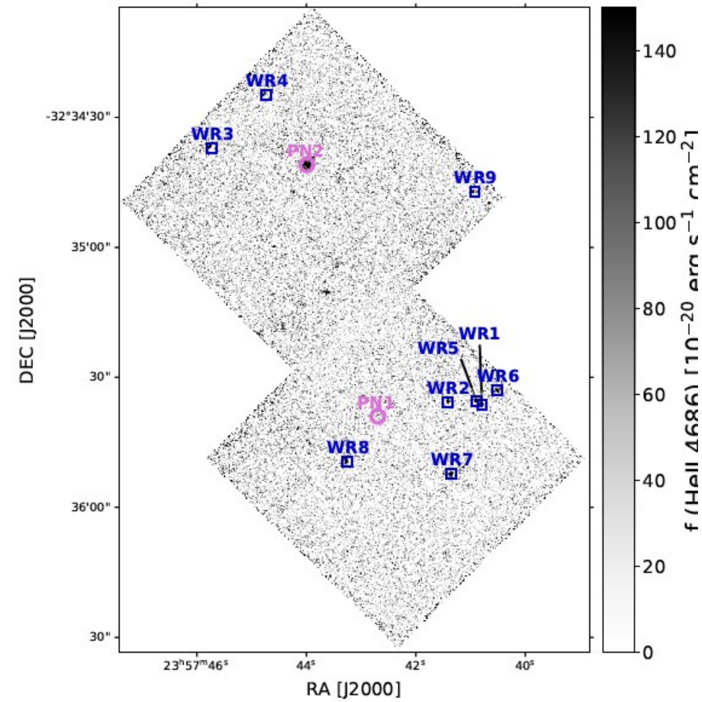
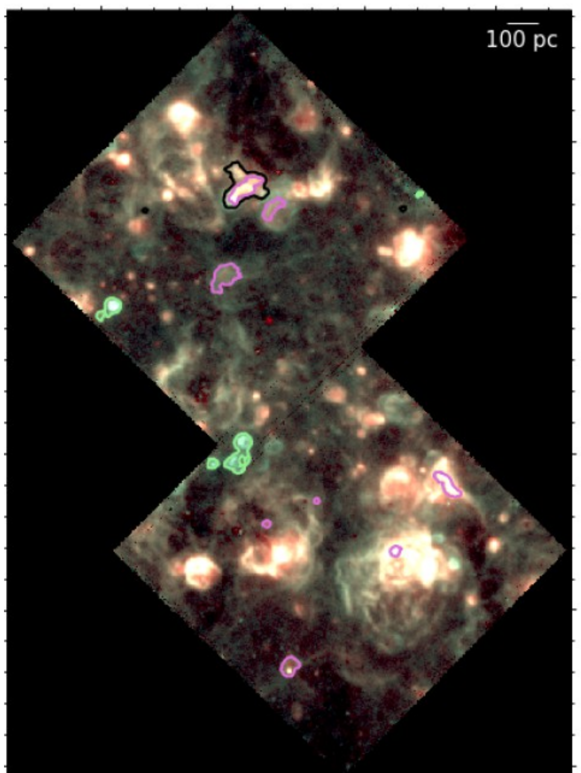
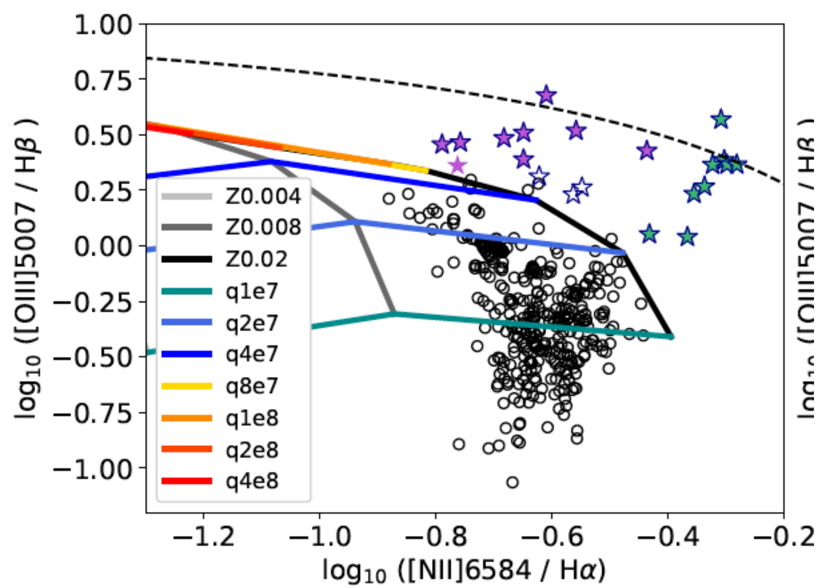


Fig. 10. HeII 4686 linemap obtained by integrating the full cube (g

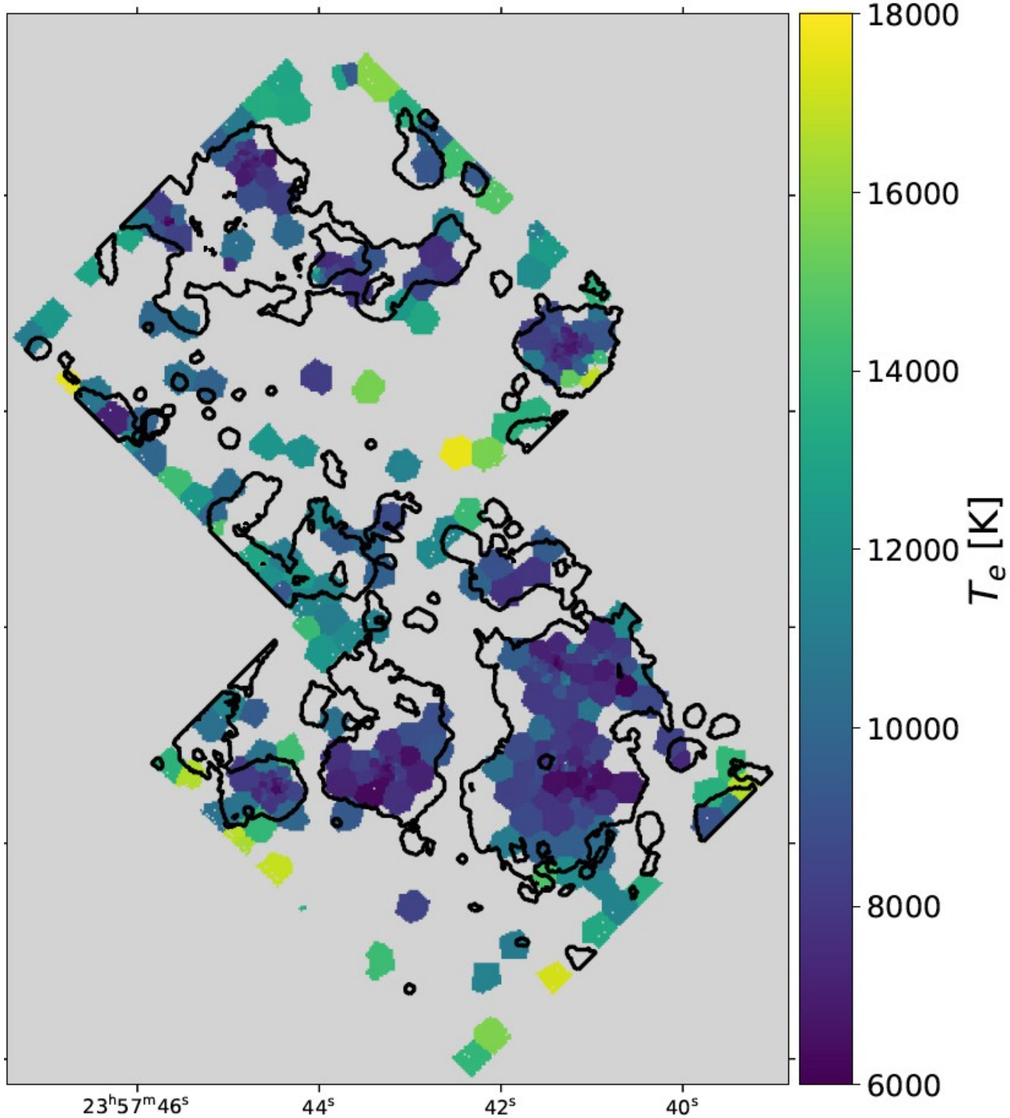


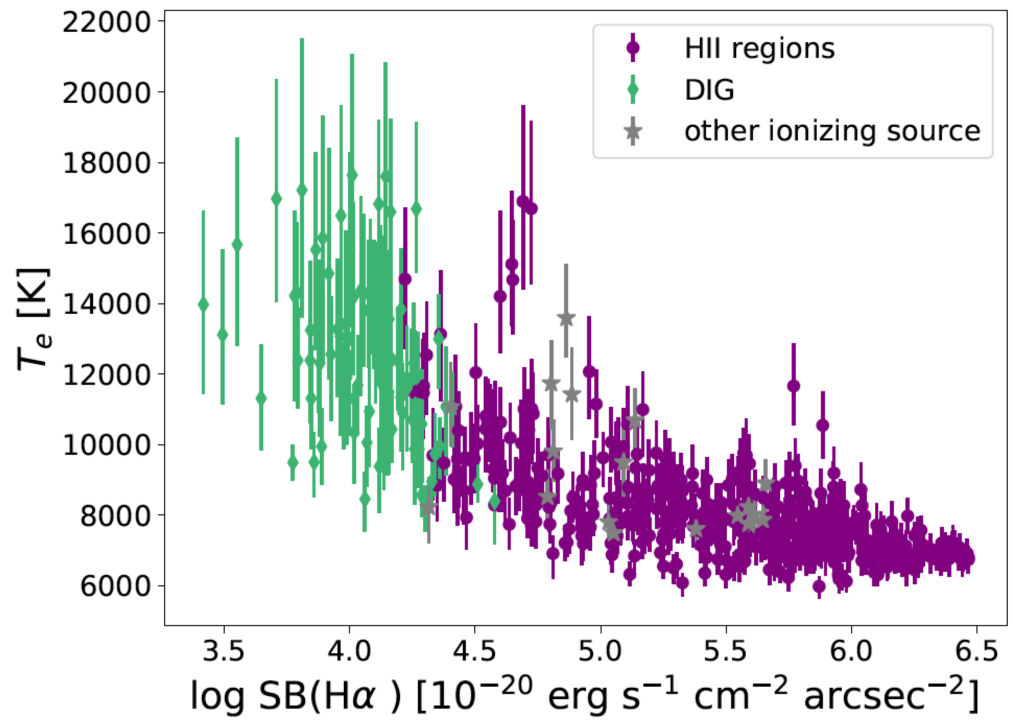


Оставшиеся неточечные источики: “ионизация ударом”

DIG: Te from [SIII]6312/9069 , ne=10 (?)

Te в DIG выше на ~2000 K, чем в HII областях, то же, что и в Галактике

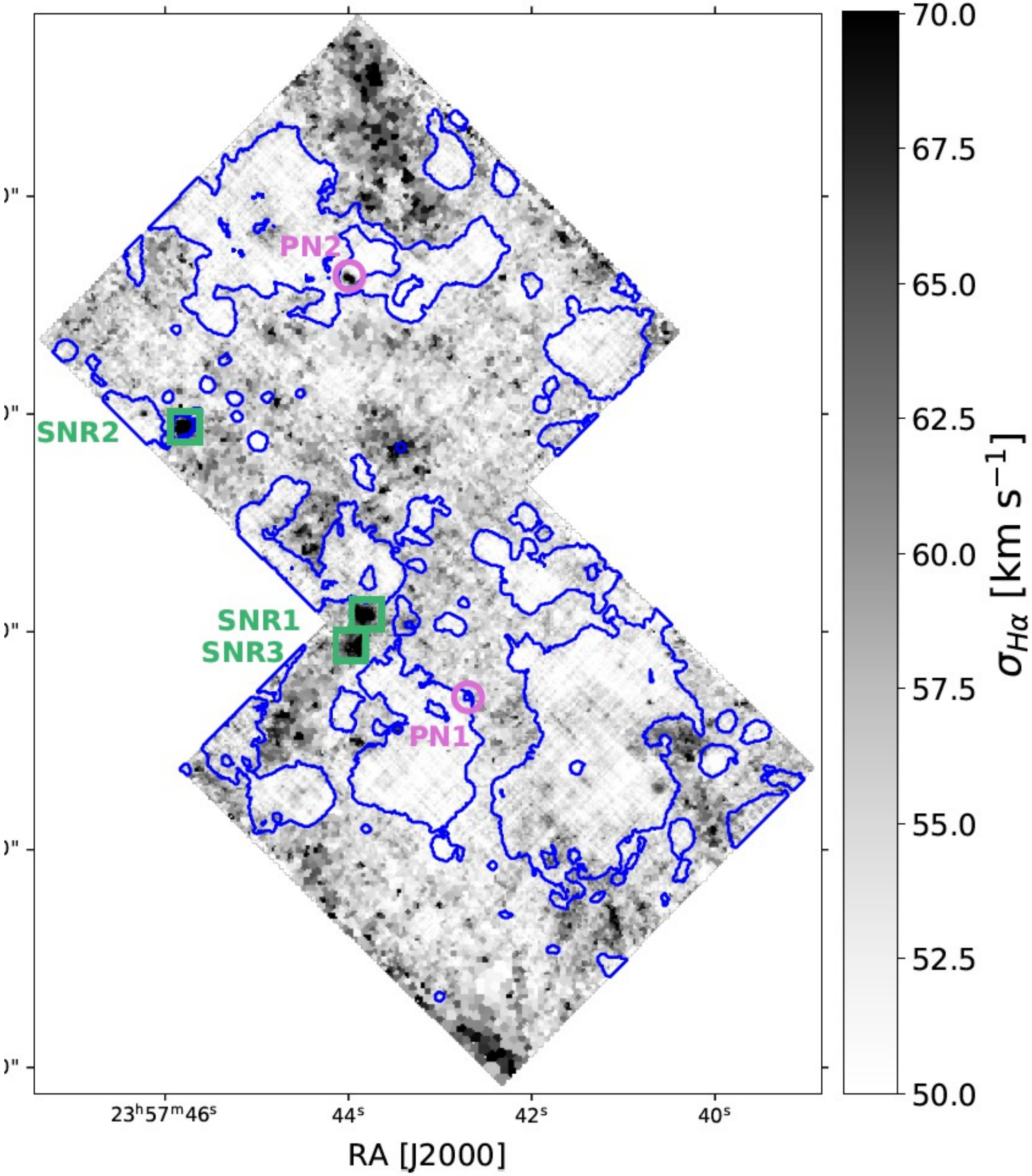




Возможно, эффект селекции:

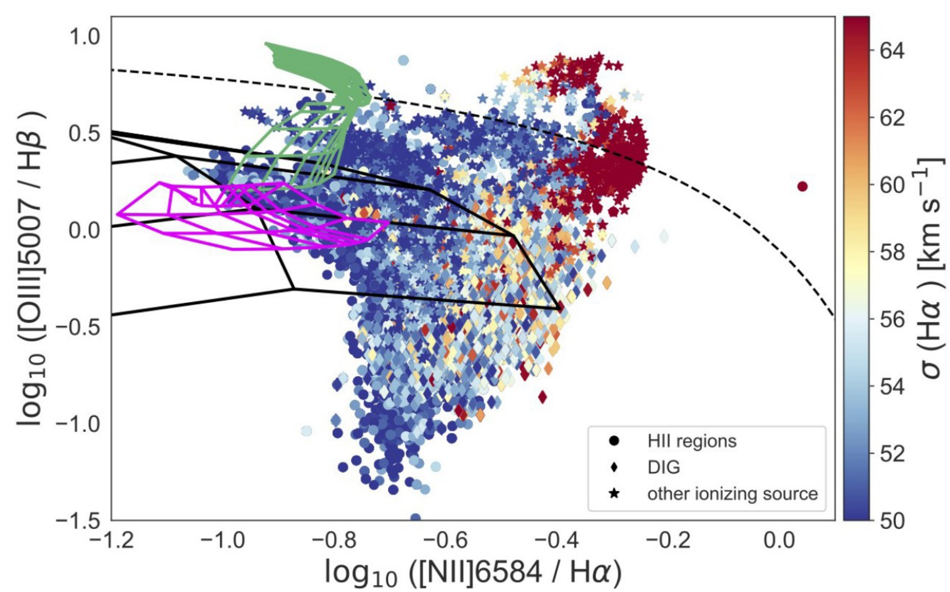
due to the sensitivity limit in the weak [SIII]6312 line, we cannot rule out the existence of a population of lower Hα surface brightness regions at low T_e. Thirdly, by comparing the DIG

BPT-sigma



all spaxels by their Hα velocity dispersion; the addition of the line of sight velocity dispersion as an ulterior parameter in the BPT diagram has been recently proposed by Oparin & Moiseev (2018). In agreement with their work, we observe a clear trend between velocity dispersion and strength of the radiation field. In general, we observe that spaxels in other ionising sources (marked as stars in Fig. 18) exhibit the highest velocity dispersions, confirming that they are shock-dominated regions. Spaxels within HII regions have lower velocity dispersion than spaxels located outside. We also observe that spaxels labelled as DIG

Но самая высокая дисперсия скоростей (и уход от ЗО) – в “других источниках”, которые не относят к DIG?



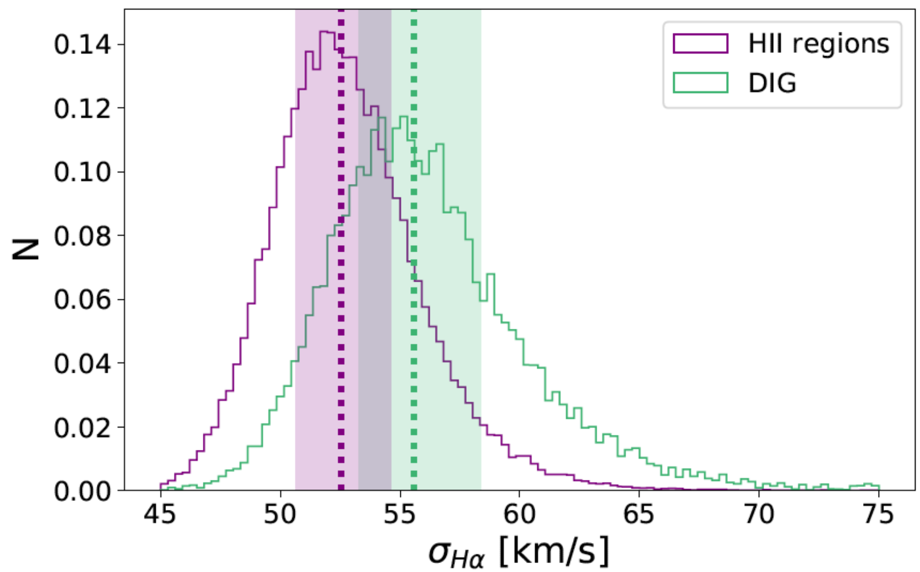


Fig. 19. Normalized distribution of the measured Hα velocity dispersion for spaxels located in HII regions (purple) and in the DIG (green). The coloured area spans the first to third quartile of the distribution; the median is indicated as a dashed line.

Колмогоров – Смирнов говорит о значимой разнице в sigma DIG-HII
“Либо турбуленция выше, либо смотрим сквозь более толстые области с разной кинематикой по лучу зрения..”

Статья интересна в методическом плане, но научные выводы пока осторожны:
“Эффекты, отличные от фотоионизации могут играть заметную роль в DIG”