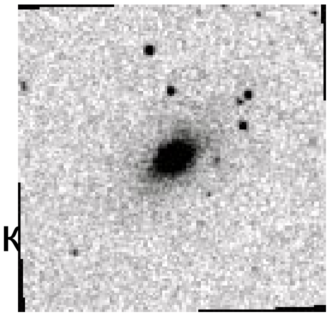
A close look at the well-known Seyfert galaxy: extended emission f laments in Mrk6

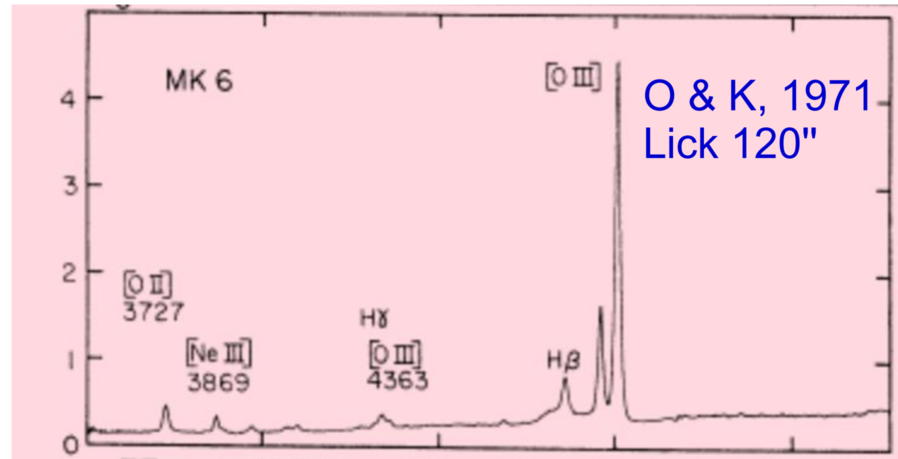
Smirnova, Moiseev & Dodonov, MNRAS, accepted arXiv:1809.05950

z=0.019
D=80.6 kpc, 0.39 kpc/"



Маркарян, 1967: UV избыток

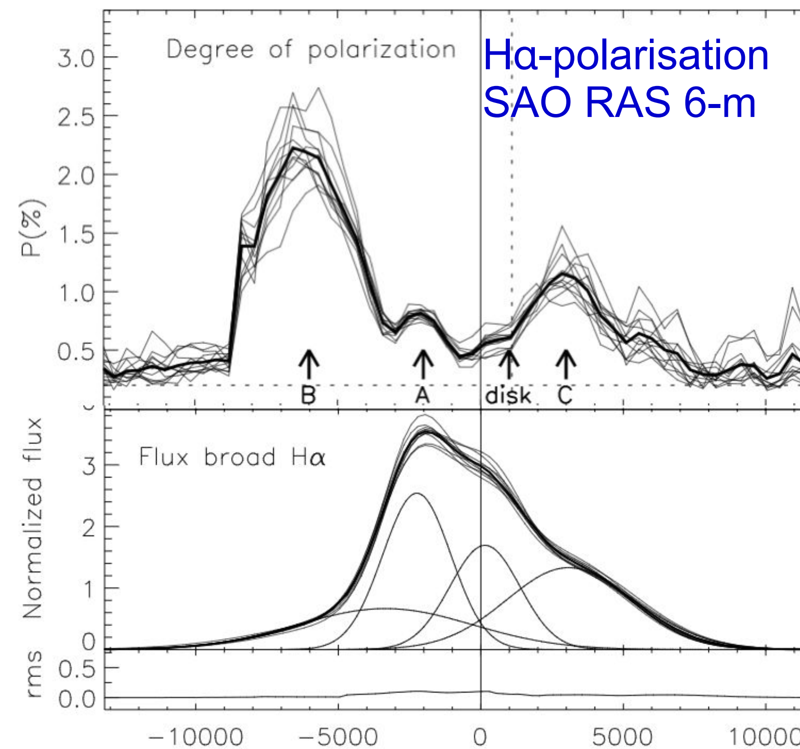
Один из первых известных Сейфертов!
Khachikian & Weedman, 1971: Sy!
Osterbrock & Koski, 1976: Sy1.5



Long-time spectral/optical monitoring, reverberation mapping:
Glier et al 2012; Doroshenko et al 2012

New method for the SMBH estimation from spectropolarimetric data
(Afanasiev +14, MNRAS)

$$M_{BH} \sim 1.53 \cdot 10^8 M_\odot$$



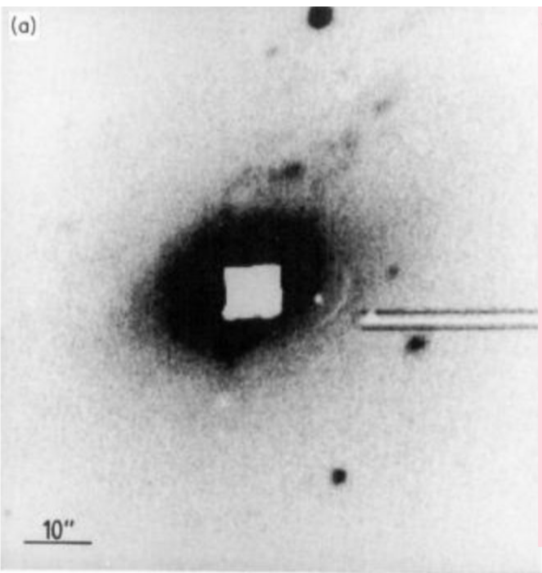
Семинар VOLGA 24/09/2018, Моисеев

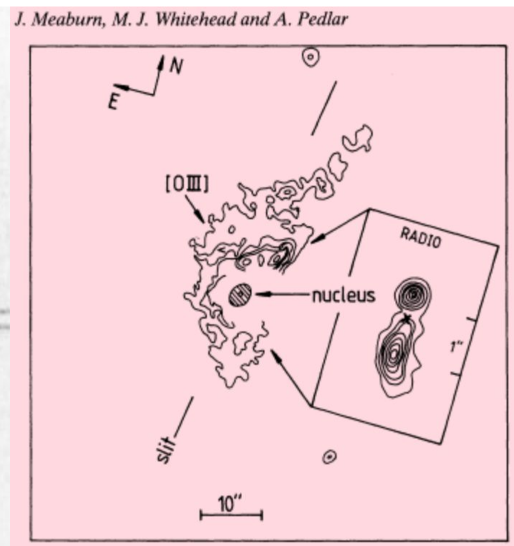
EELR & radio structures

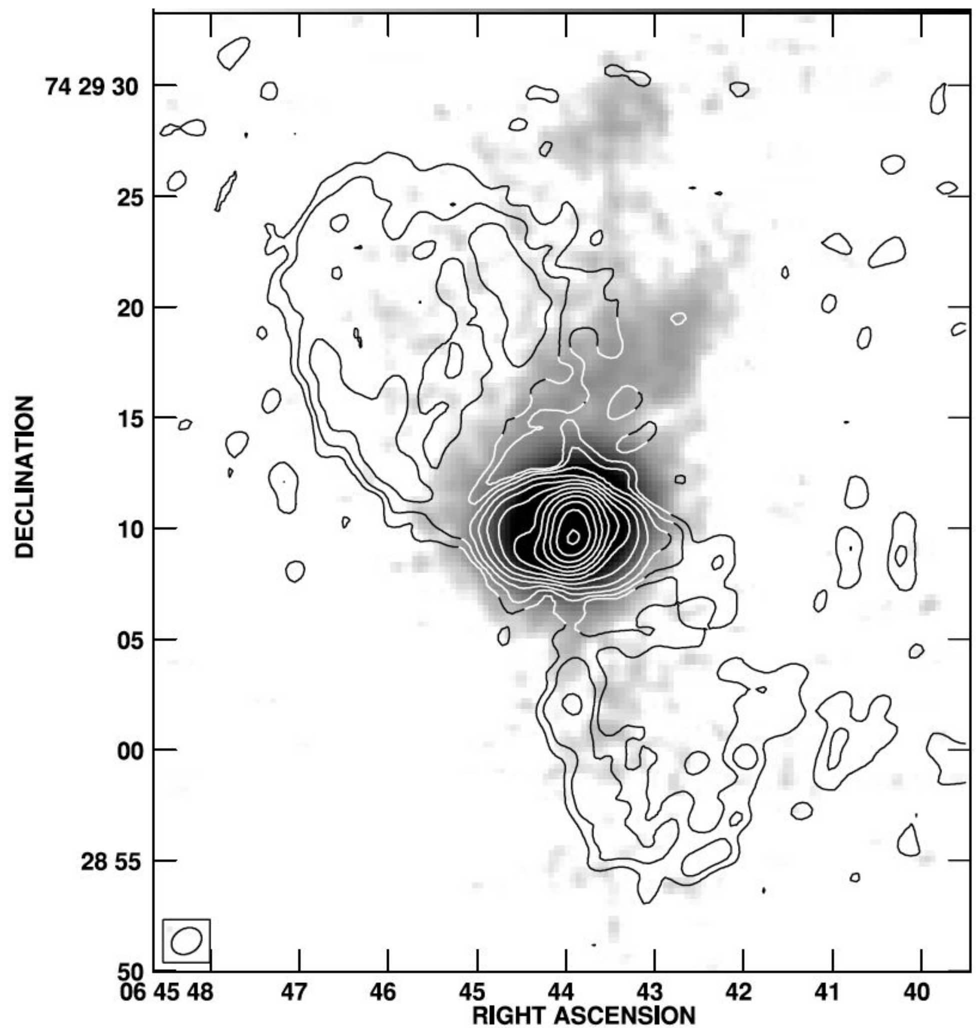
arXiv:1809.05950

Meaburn+ 89:
Extended Emission-Line Region
r~22 kpc (R_25=9.3 kpc)

Kukula+ 96; Kharb+ 06, 14:
- precessing radio jet (<1 kpc)
- non-thermal bubbles (r=1.5 and 7.5 kpc)

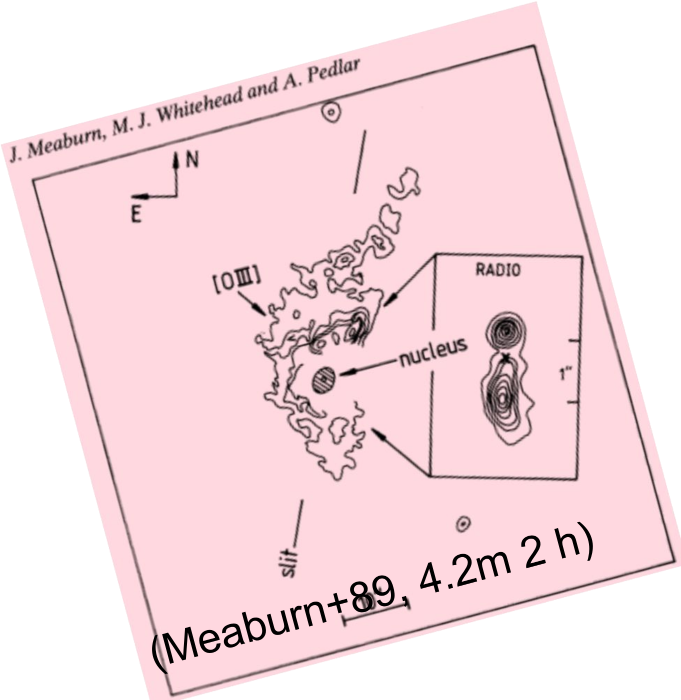


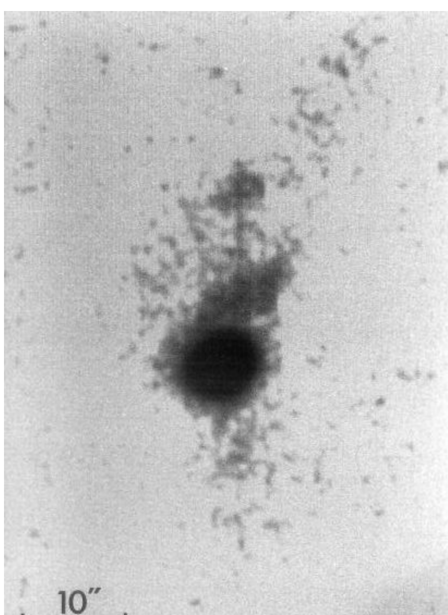




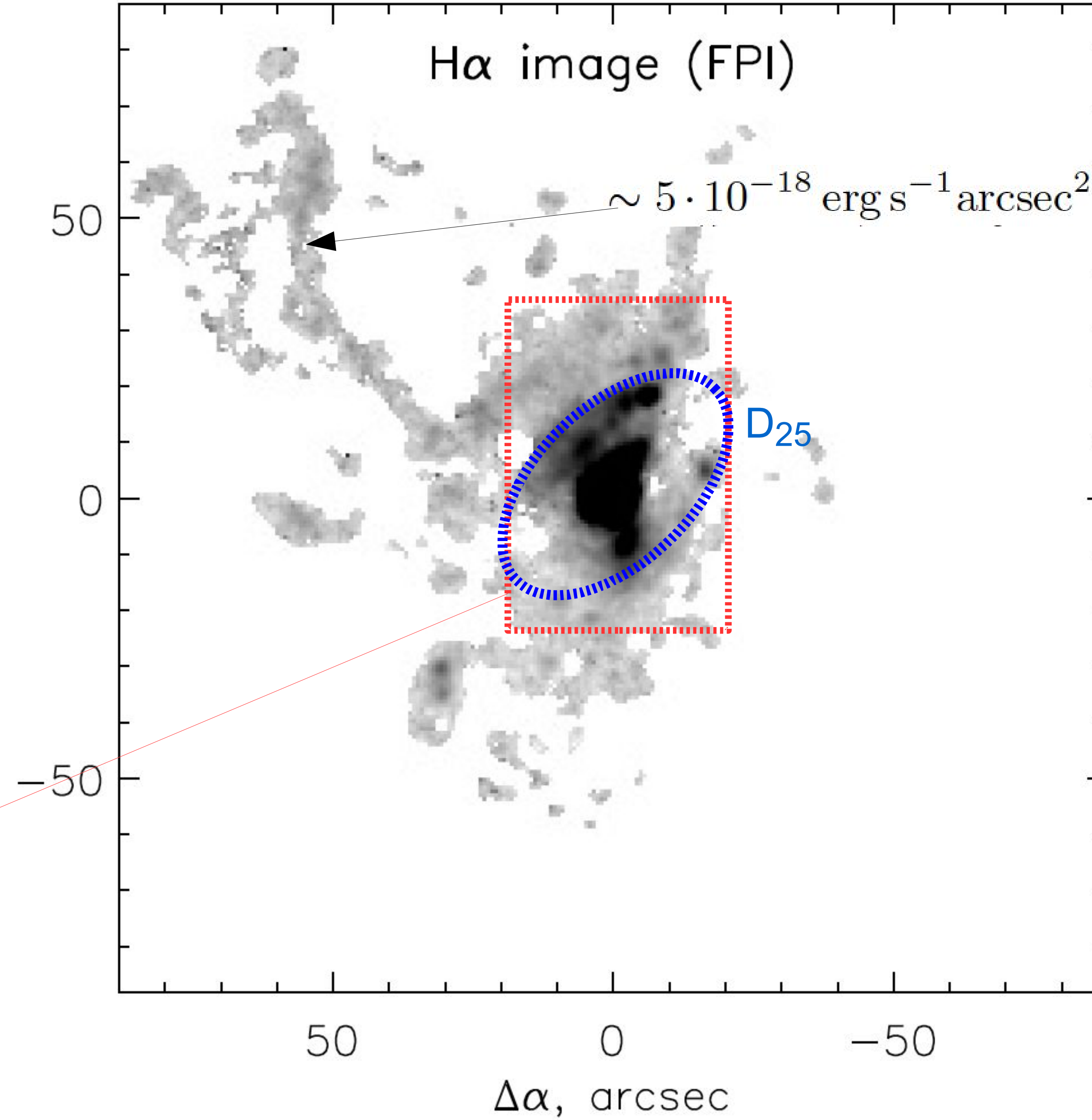
AGN-type ionization of the EELR with
a complicated kinematics:
- jet-clouds interaction?
- kinematically decoupled systems
- inclined/counter-rotated gas?
(Meaburn+ 89, Afanasiev & Silchenko, 90)

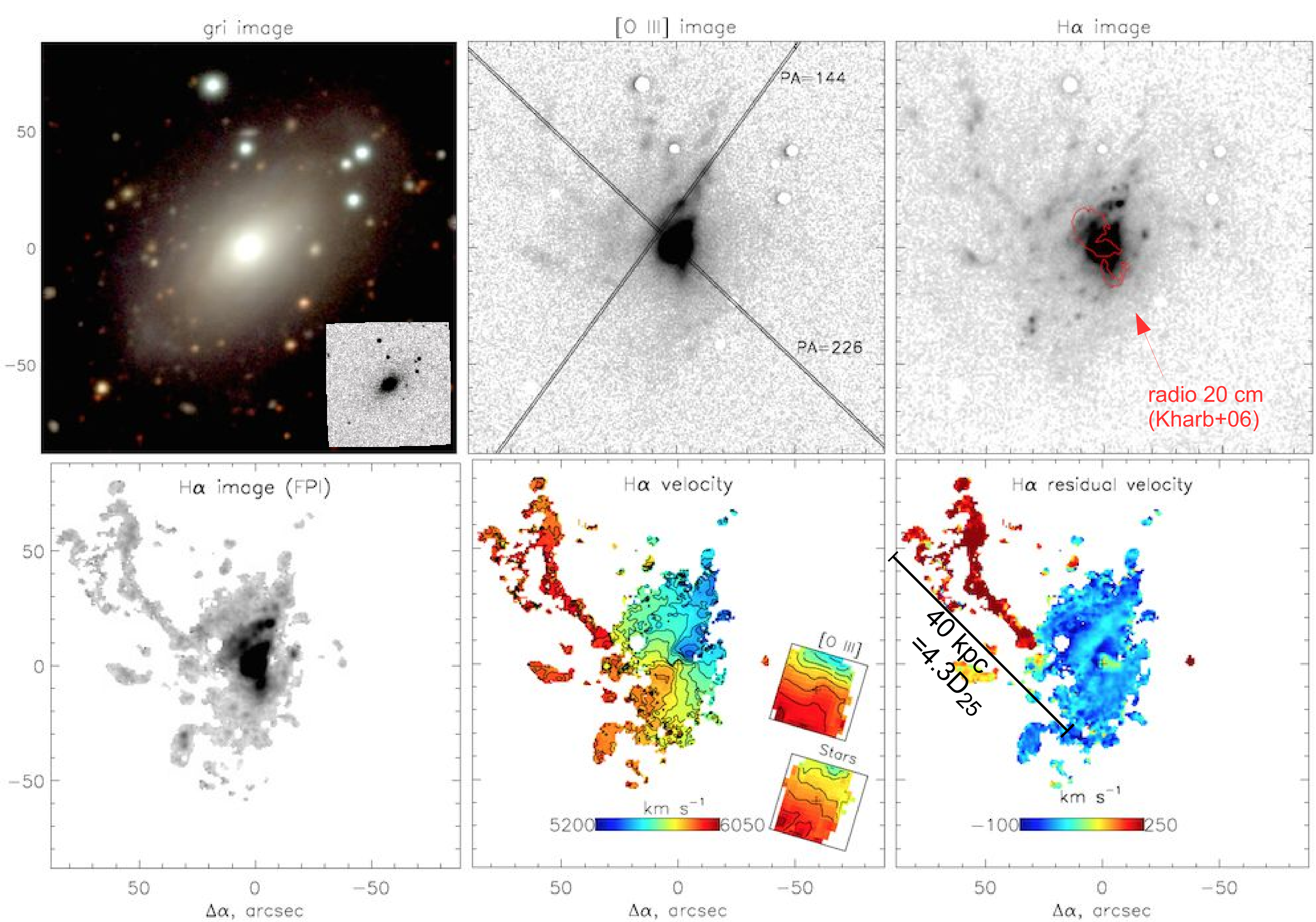
EELR: [OIII] (α) данные



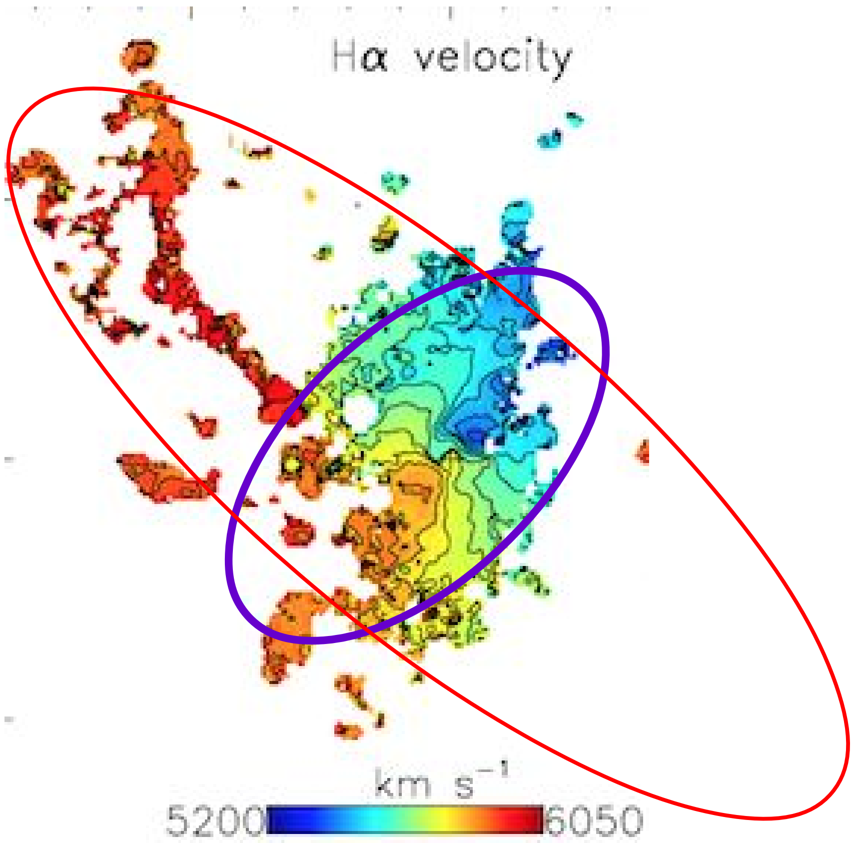


(Kukula+96, 2.1m 7.5 h)

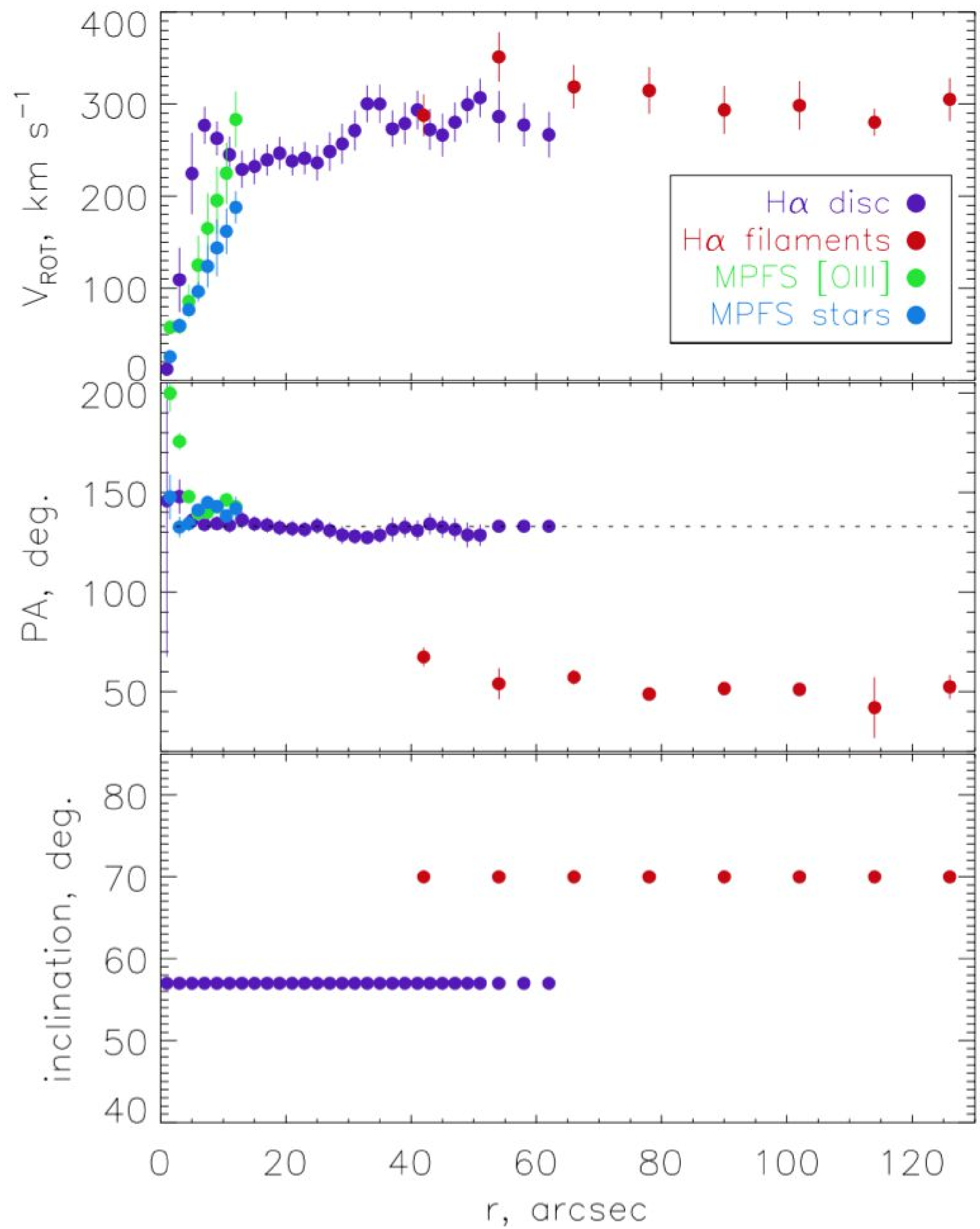


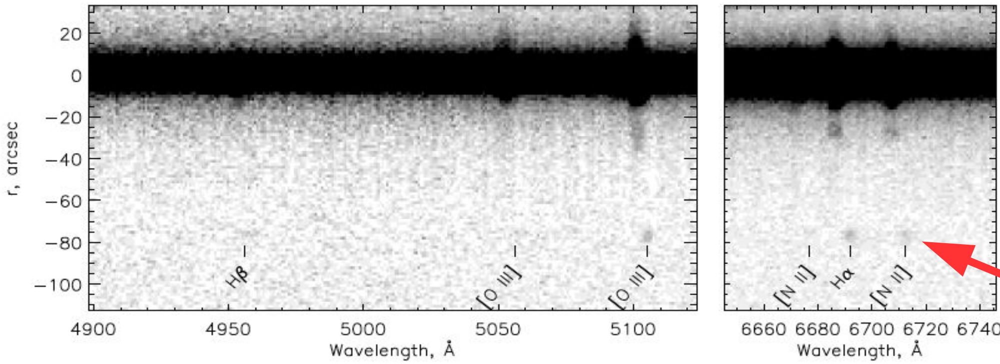


SCORPIO/SCORPIO-2: IFP,LS,DI + MPFS



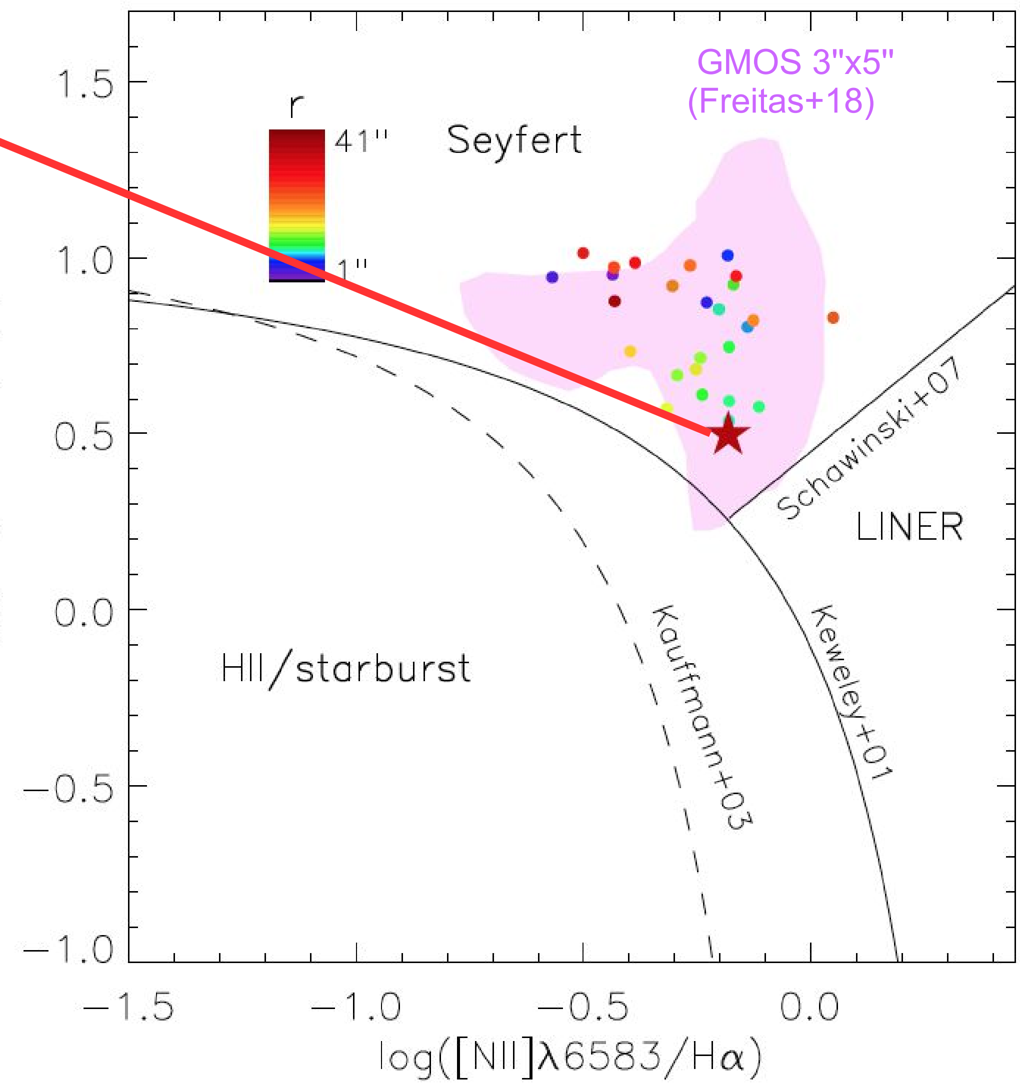
Если принять те же
Vsys и Vrot





Оценка ионизационного баланса
(по методу Keel +17):
Q_{ion} - emission rate of ionizing photons required to produce the observed Hα sur. brightness

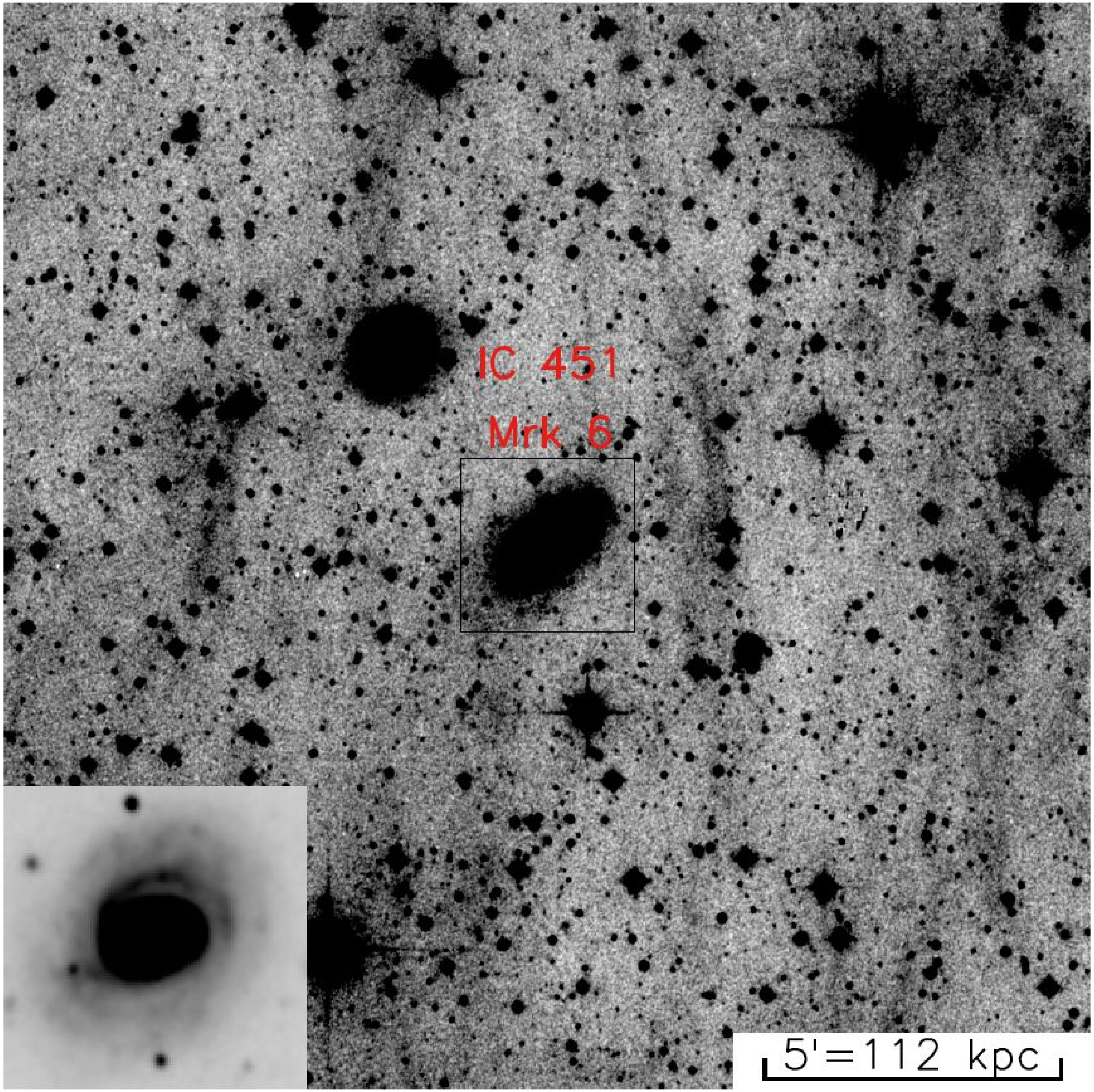
$Q_{ion}/Q_{nuc}=4\pi r^2 F/F_{nuc}<1\text{-}3$
т.е. излучения ядра хватает для иониации филаментов



Аргументы **против** AGN ветра или джета:

- Газ динамически холодный: σ<30-50 км/с;
- Сам радиоджет значительно меньше;
- Нет контр-джета/конуса

1- (



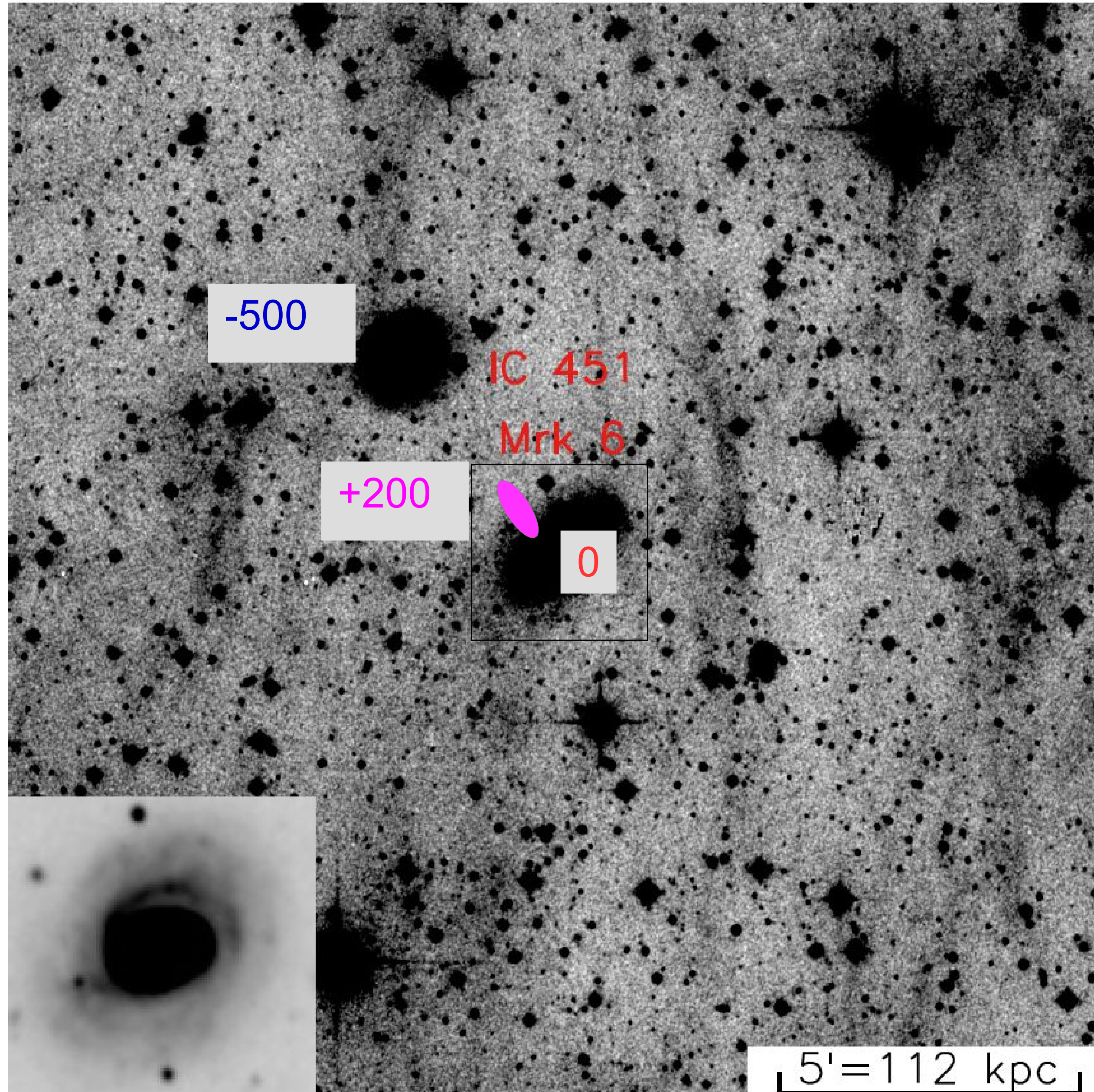
m(g)~28^{m}/arcsec^{2} Dodonov +17

1- (

Systemic velocities

Mrk 6 : 5640 км/с
Филамент: 5800-6000 км/с
IC 1451: 5123 км/с

Такое распределение скоростей - аргумент против приливного захвата или ram-pressure (протяженного мягкого рентгена тоже нет)



$m(g)\sim28^m/arcsec^2$

Dodonov +17

Происхождение газа не ясно, ждем HI ...

BTFI2: a simple, light and compact Fabry-Perot instrument for the SOAR telescope

Bruno C. Quint[a], Brian Chinn[b], Claudia Mendes de Oliveira[c], Philippe Amram[d], Denis Andrade[c], William Schoenell[c,e], and Daniel Moser Faes[c] arXiv:1808.07939

4-m +SOAR Adaptive Module (SAM)
Seeing<0.5" at Halpha

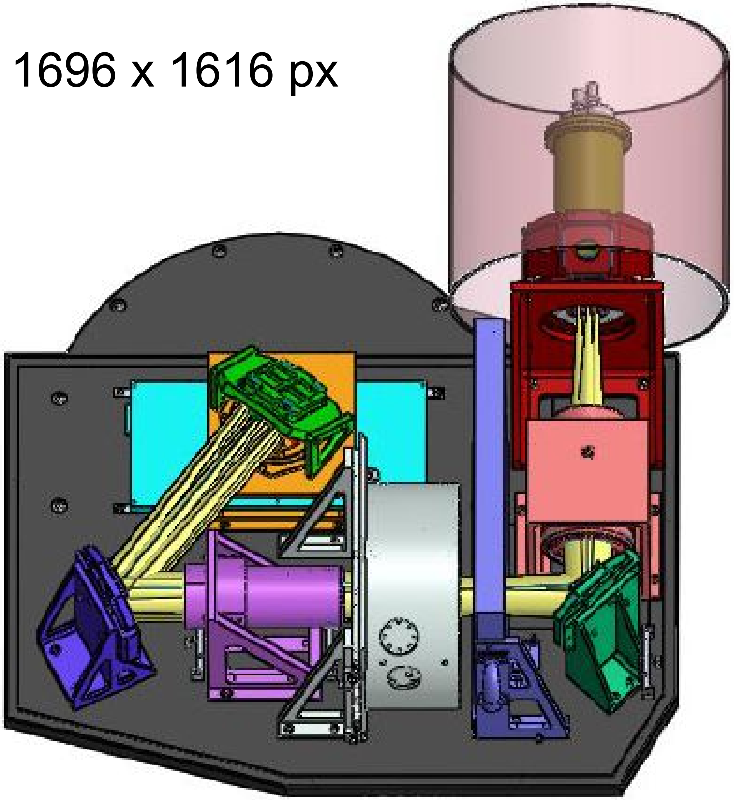
Интересное техническое описание того, как делают новый прибор используя оптику старого:
- Brazilian Tunable Filter Imager (BTFI) – оказался тяжелым для работы в порту с АО, а новопридуманный фильтр на двух VPHG остался на уровне лабораторных тестов
- SAM-FP – предшественник с АО (были публикации!), но с обычной ПЗС

Сейчас же планируется быстрая EMCCD e2v CCD207 1696 x 1616 px
Редуктор F/16.5 → F/7.1, px=0.12", FOV 3x3 arcmin

В остальном – SCORPIO, даже фильтров 6

Nominal Parameters for the two Queensgate ET-70 Fabry-Perot

Gap Size	44μm	200μm
Interference order for Hα	134	609
Resolution for Hα	4000	11200
Free-Spectral-Range	48.95Å	10.77Å
Free-Spectral-Range [km/s]	2230 km/s	490 km/s
Finesse	32	18



A Comparison of Stellar and Gas-Phase Chemical Abundances in Dusty Early-Type Galaxies

arXiv:1809.05114

Emily Griffith, Paul Martini, Charlie Conroy, 12 pages, 9 figures, 3 tables

The source of cold ISM in ETG:

- accretion of lower mass, gas-rich dwarfs **(другая аккреция не обсуждается!)**
- internal production from stellar mass loss and/or cooling from the hot ISM

"… selected three dusty ETGs for follow up spectroscopy:
NGC 2768, NGC 3245, NGC 4694"

MODS1/LBT 3200-10000 A
Reduction: modsIDL pipeline (free download)

3.1 Stellar Population Modeling

After reducing the data, we model our spectra with alf, an "absorption line fitting" program (Conroy & van Dokkum 2012; Conroy et al. 2018), based on the MIST iscochrones (Choi et al. 2016), and optical and NIR empirical stellar libraries (Sánchez-Blázquez et al. 2006; Villaume et al. 2017).

3.3 Gas-Phase Abundances

We do not detect the auroral lines necessary for the direct method. Instead, we employ lines commonly used in strong line methods, [O II]λ3727, H$\beta\lambda$4861, [O III]λ5007, H$\alpha\lambda$6563, and [N II]λ6583, with the following diagnostic emission line ratios:

$$N2 = [\mathrm{N\,II}]\lambda6583/\mathrm{H}\alpha$$

$$O3N2 = [\mathrm{O\,III}]\lambda5007/\mathrm{H}\beta/[\mathrm{N\,II}]\lambda6583/\mathrm{H}\alpha$$

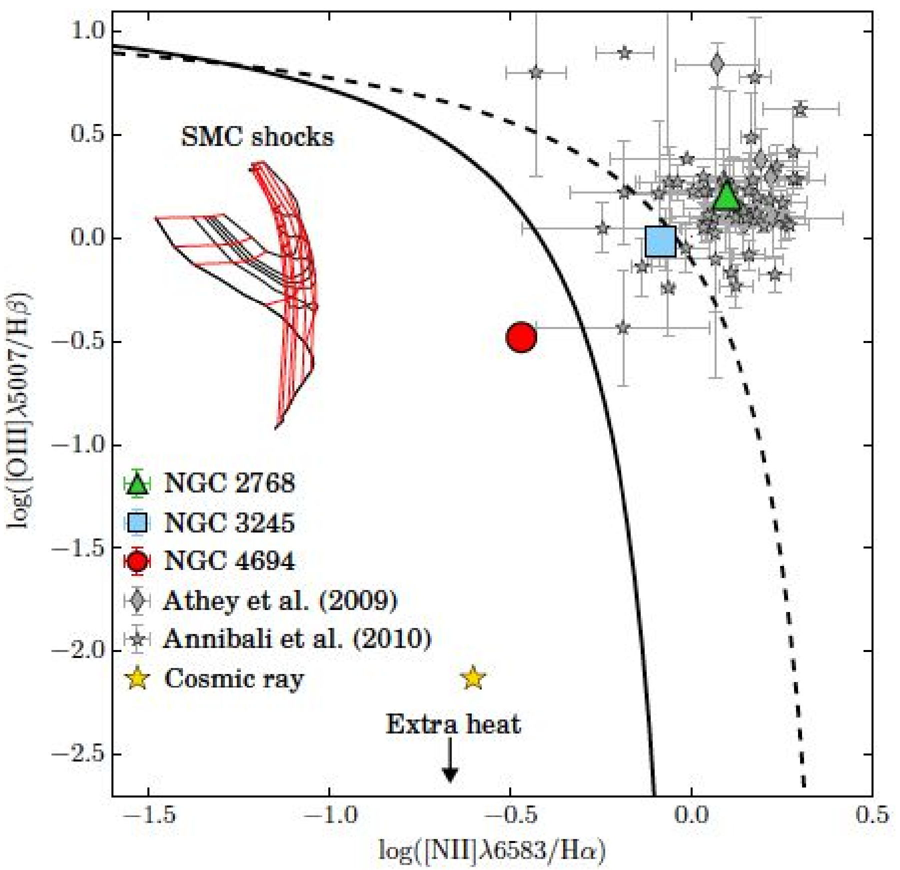
$$N2O2 = [\mathrm{N\,II}]\lambda6583/[\mathrm{O\,II}]\lambda3727$$

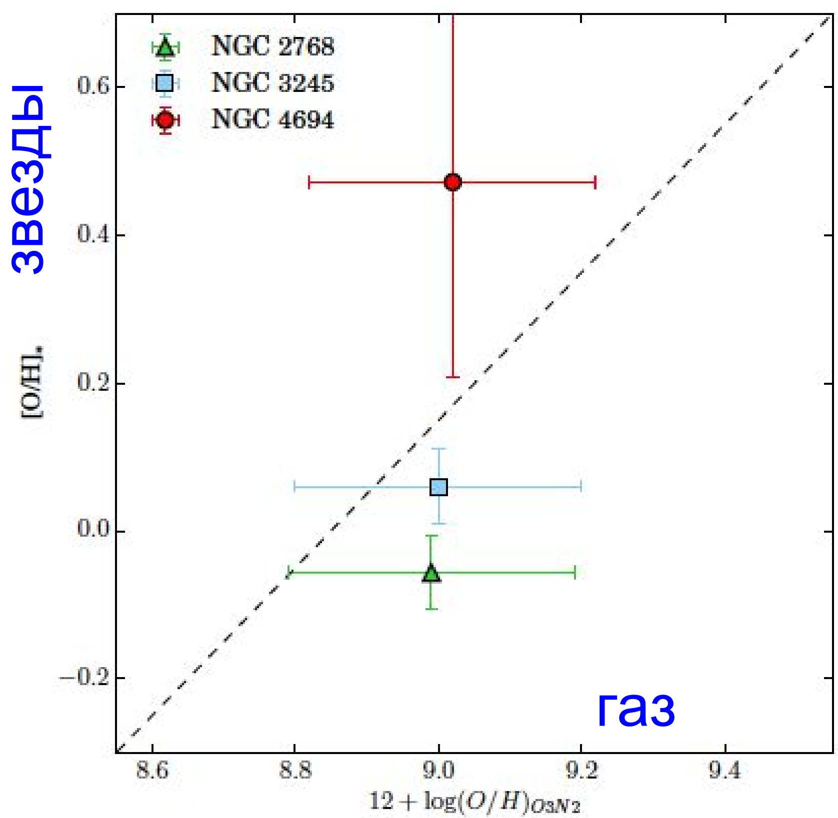
direct method. Instead, we employ lines commonly used

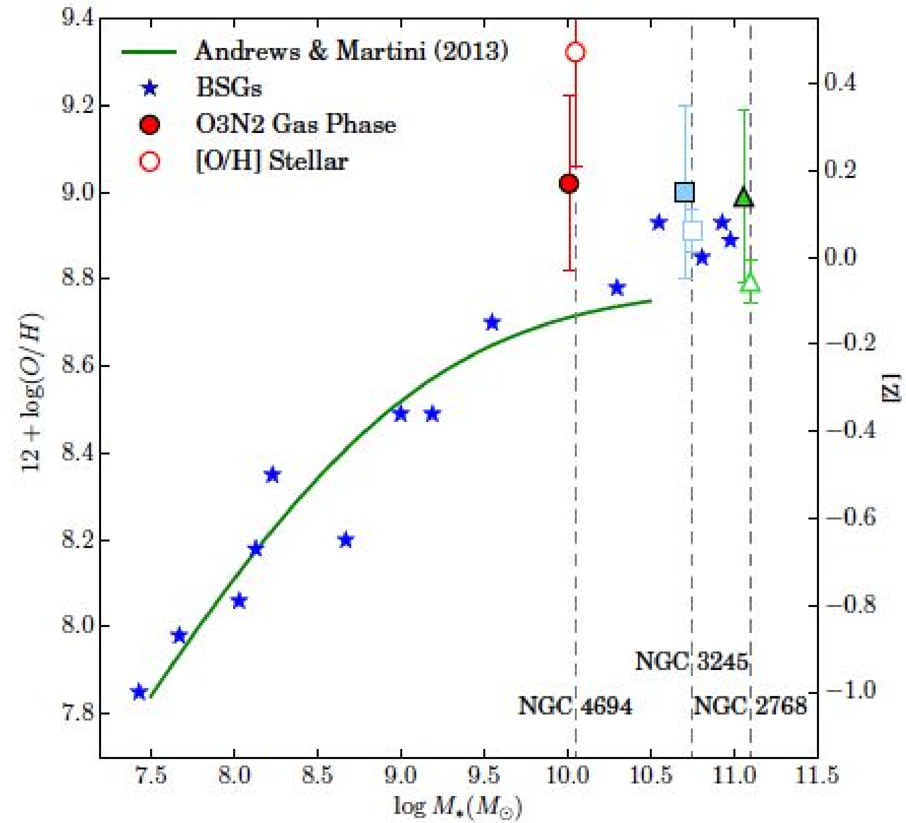
Анализ – по полному спектру галактик :(

arXiv:1809.05114

In addition to spectra of the entire galaxy (extraction width 24"), we extract multiple smaller, one-dimensional spectra from each galaxy: one on the nucleus and two to four off-nuclear positions of width 4". We apply the analysis described in Section 3.1 and 3.3 to each. Figure 3 shows the [O III]λ5007/Hβ and [N II]λ6583/Hα ratio along the spatial dimension (lighter, smaller markers), as well as the values of the entire slit (darker, larger markers). Hβ was not detected in some off-nuclear spectra. We find that off-nuclear line flux measurements concur with nuclear and full galaxy line fluxes. The remainder of our analysis employs just the full galaxy spectra.







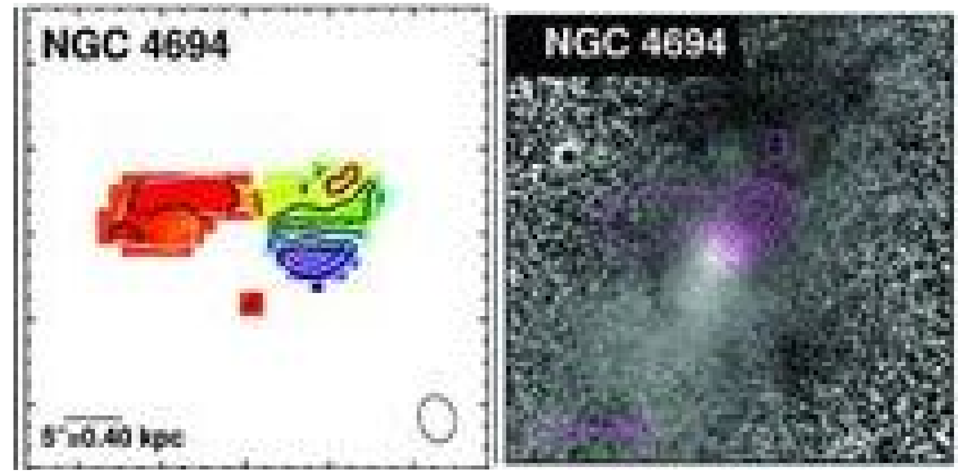
… Наши данные указывают (strongly support) на внутренний источник от старого звездного населения и/или охлаждения ISM, нежели на внешнюю аккрецию...

While there is some circumstantial evidence of minor mergers in these two cases, we do not measure the lower metallicity gas that would be indicative of external accretion. More generally, the minor merger hypothesis requires a very high merger rate. Based on equations by Stewart et al.

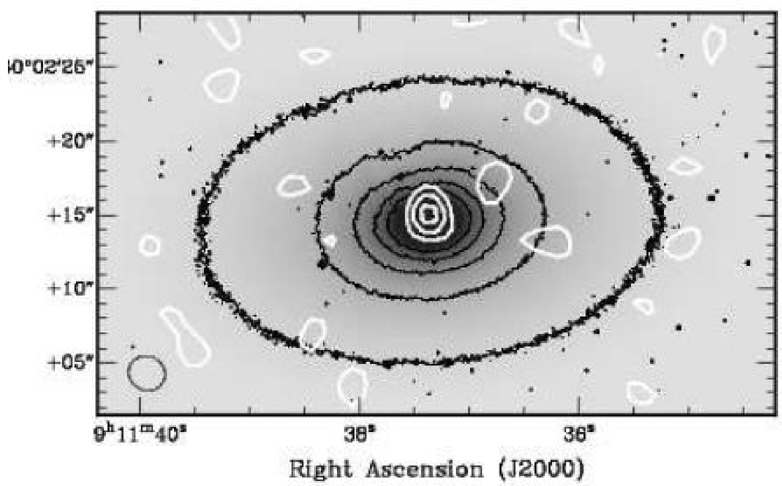
:)

NGC 2768 – полярный диск в CO!
A UGC 4808 – возможный донор
(Crocker +08)

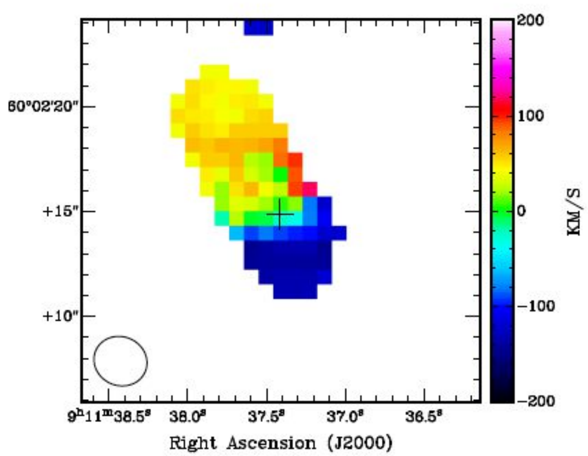
NGC 4694 – interacting system
(Duc, 2007 Alatalo et al. 2013)

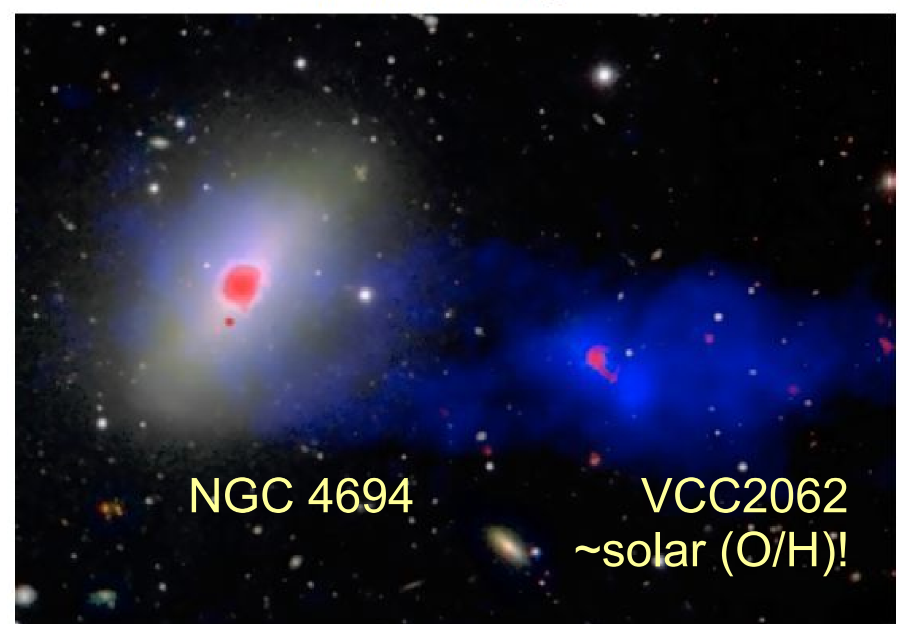


P.-A. Duc et al.: An old TDG in the Virgo cluster 189



The molecular polar disc in NGC 2768





Семинар VOLGA 24/09/2018, Моисеев