Integral field spectroscopy of nearby Seyfert and normal galaxies

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16th November 2010, Ondřejov

last year status

- data reduction – **done**
- emission line fitting – **in progress**
- 2D maps of fluxes, mean line-of-sight velocities, FWHMs, extinctions and finding ionization sources – **in progress**
- diagnostic diagrams – **in progress**
- stellar templates fitting to get age, metalicity, kinematics – **in progress**
- modeling kinematics of ionized gas – **planned**

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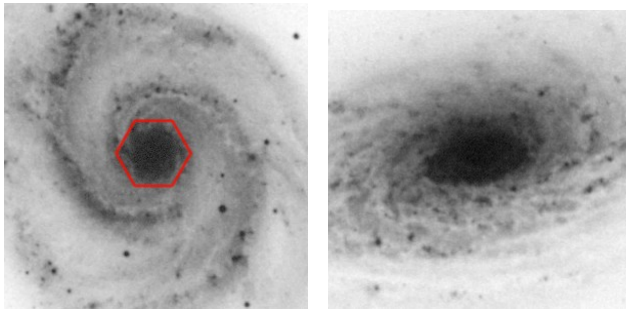
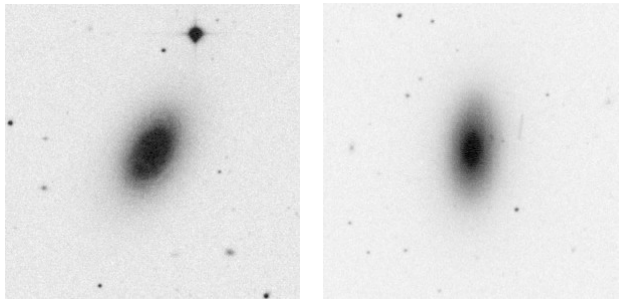
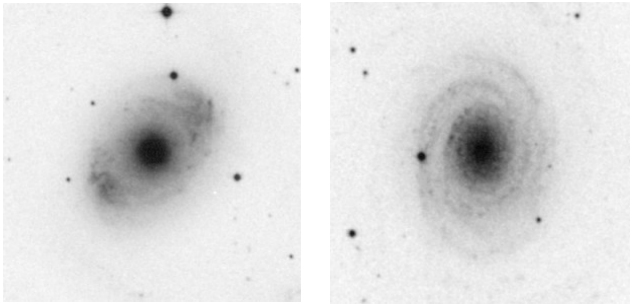
Seyfert & normal



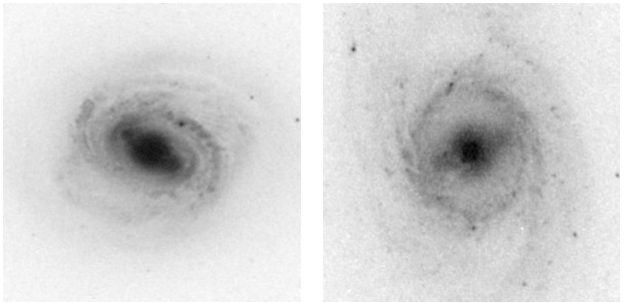
NGC 5194 (M51) & NGC 5055



NGC 4138 & NGC 3245



NGC 4151 & NGC 2985

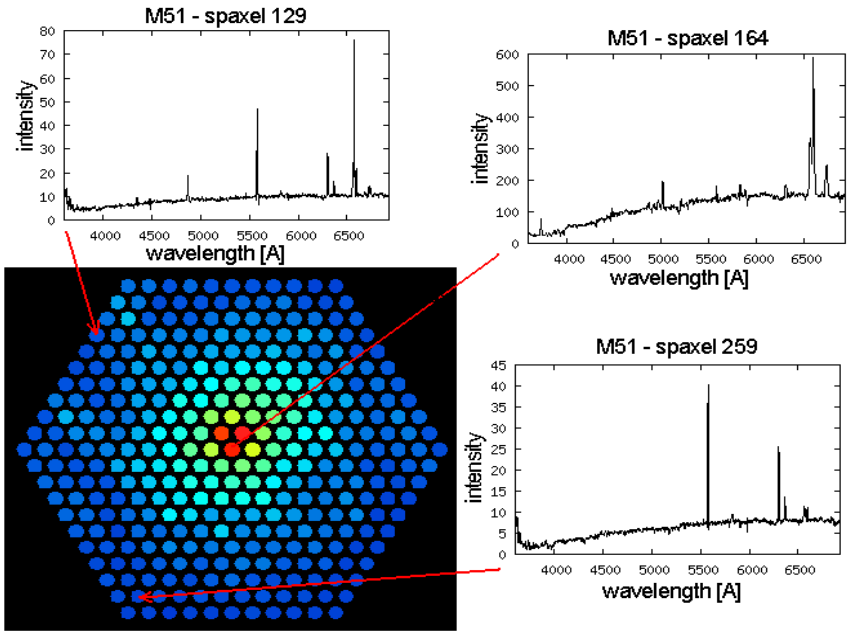


NGC 4579 & NGC 3351

our project

← DSS images **(5' x 5')** of 4 pairs of Seyfert & normal galaxies matched in Hubble type, luminosity, inclination and distance

- PMAS-PPAK IFU
- $0.001 < z < 0.005$
- 3600Å - 7000Å, FWHM ~ 8Å (600km/s)



our project – motivation

- our project is aimed to study differences in properties in central kpc(s) of nearby Seyfert and normal galaxies
  - stellar population, SFR, extinction, electron density, temperature, metalicity, gas ionization/excitation state
  - stellar and gaseous kinematics
- signatures of past inflow, radial gradients of stellar age, metallicity and velocity dispersion
- establishing the connection between 100 pc and 1 kpc
- AGN fuelling and growth of the central supermassive black holes

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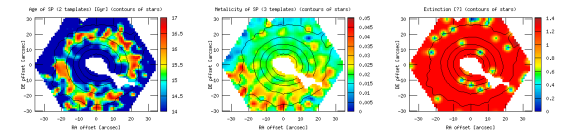
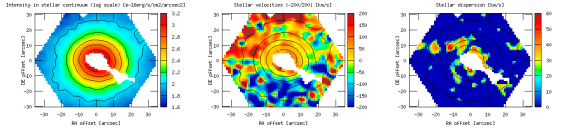
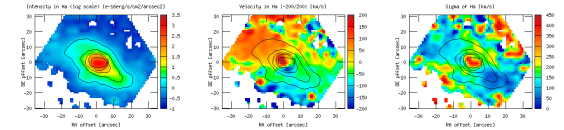


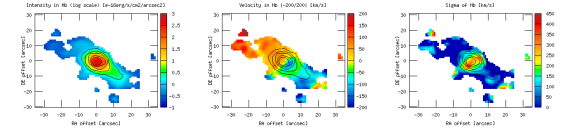
- stars: age, metalicity, extinction



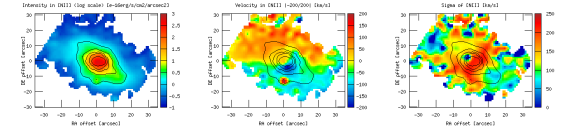
- stars: flux, LOS velocity, dispersion



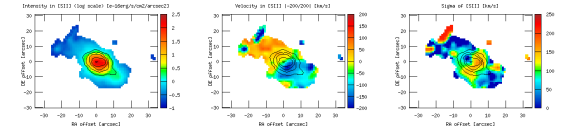
- Hα: flux, LOS velocity, dispersion



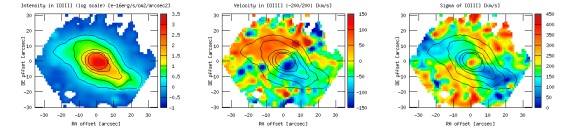
- Hβ: flux, LOS velocity, dispersion



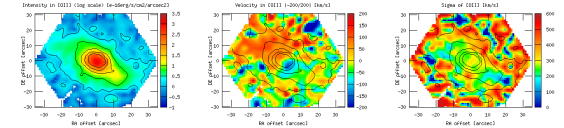
- [NII]6548Å: flux, LOS velocity, dispersion



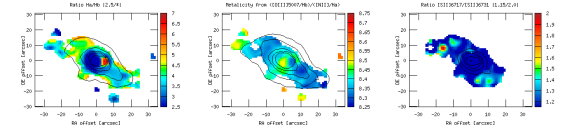
- [SII]6731Å: flux, LOS velocity, dispersion



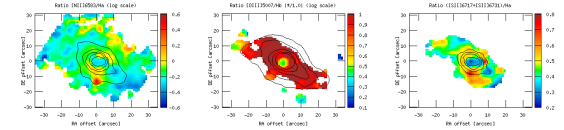
- [OIII]5007Å: flux, LOS velocity, dispersion



- [OII]3727Å: flux, LOS velocity, dispersion

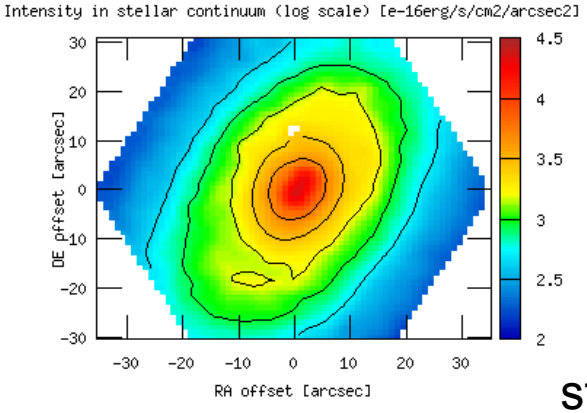


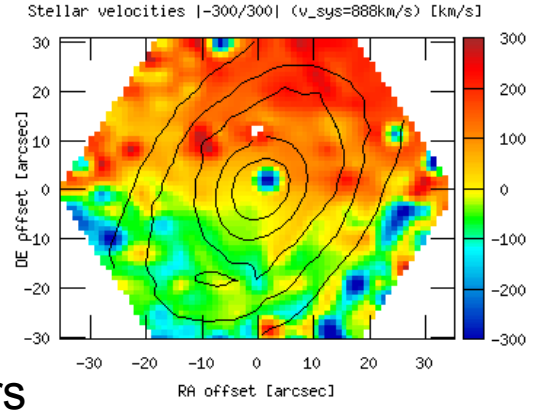
- Hα/Hβ (extinction), metalicity, density



- [NII]/Hα, [OIII]/Hβ, [SII]+[SII]/Hα (ionisation source tracers)

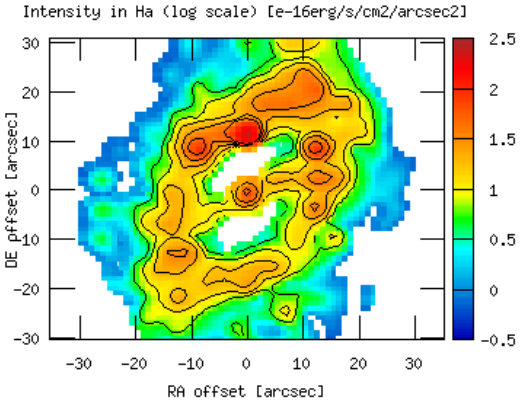
analysis -- NGC 4138

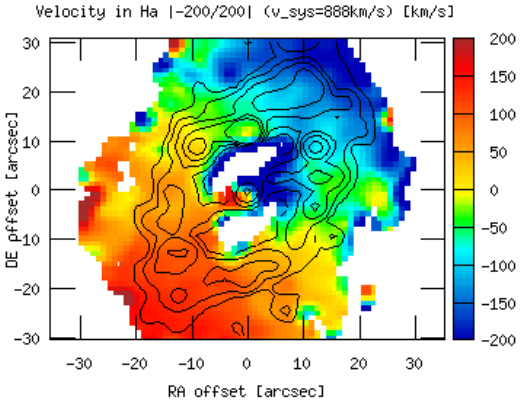




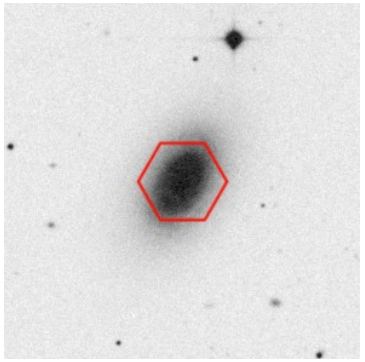
stars

Hα

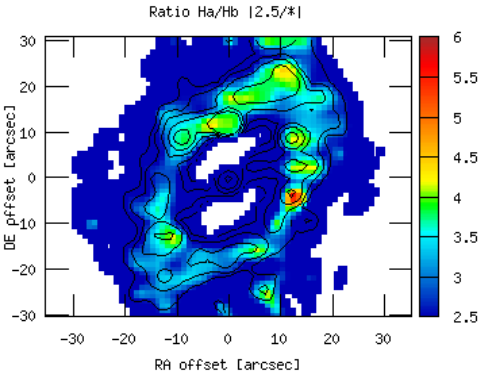




DSS image 5' x 5'



Hα / Hβ



- Seyfert 1.9, SA(r)0+
  1" ~ 80 pc
- two counterrotating stellar disks and gaseous disk

  (Jore et al., 1996)
- Hα ring, no bar

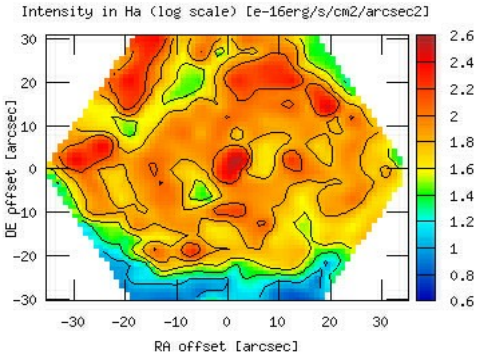
  (Pogge & Eskridge, 1987)
- chemically distinct core

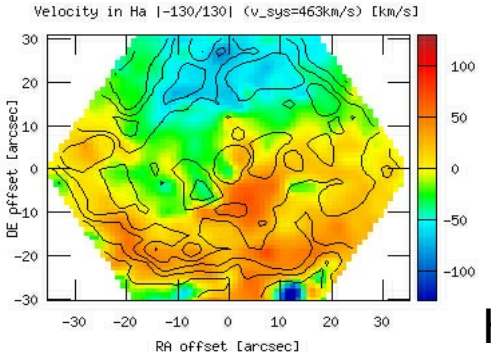
  (Afanasiev & Silchenko, 2002)
- merger, destroyed bar, both?

analysis -- active vs normal galaxies

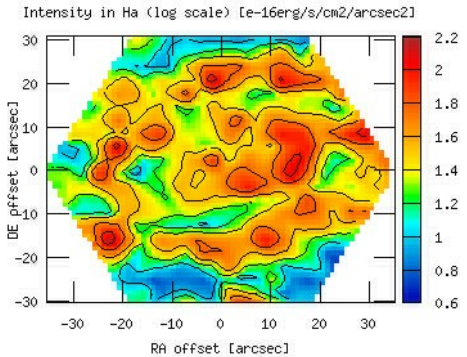
NGC 5194 (M51) - Seyfert 2

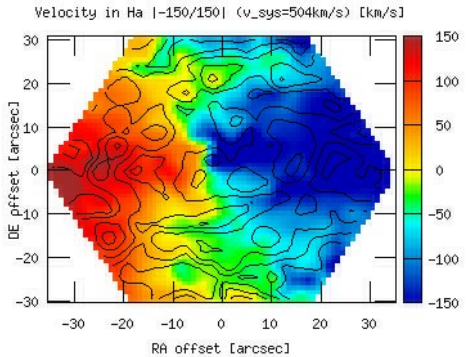
NGC 5055 - normal galaxy

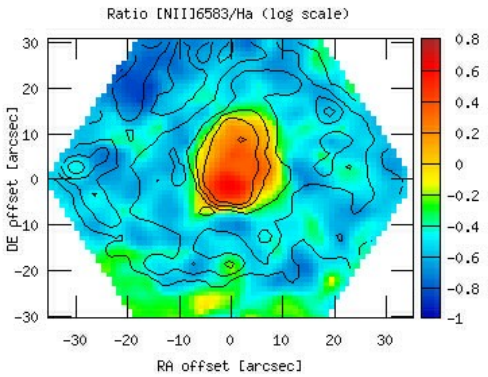




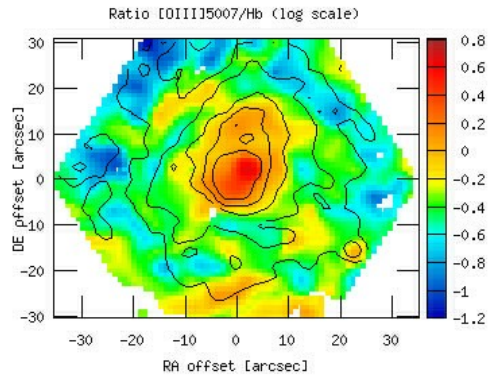
Hα



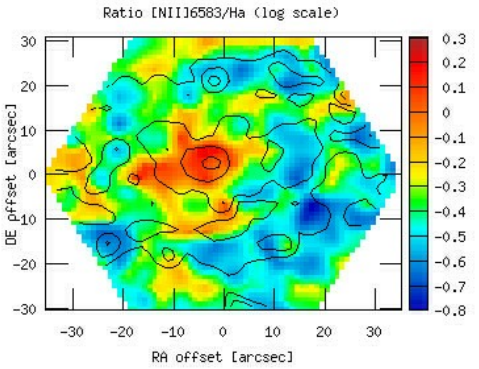




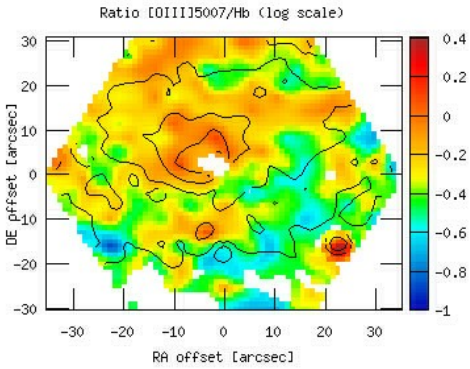
[NII] / Hα



[OIII] / Hβ



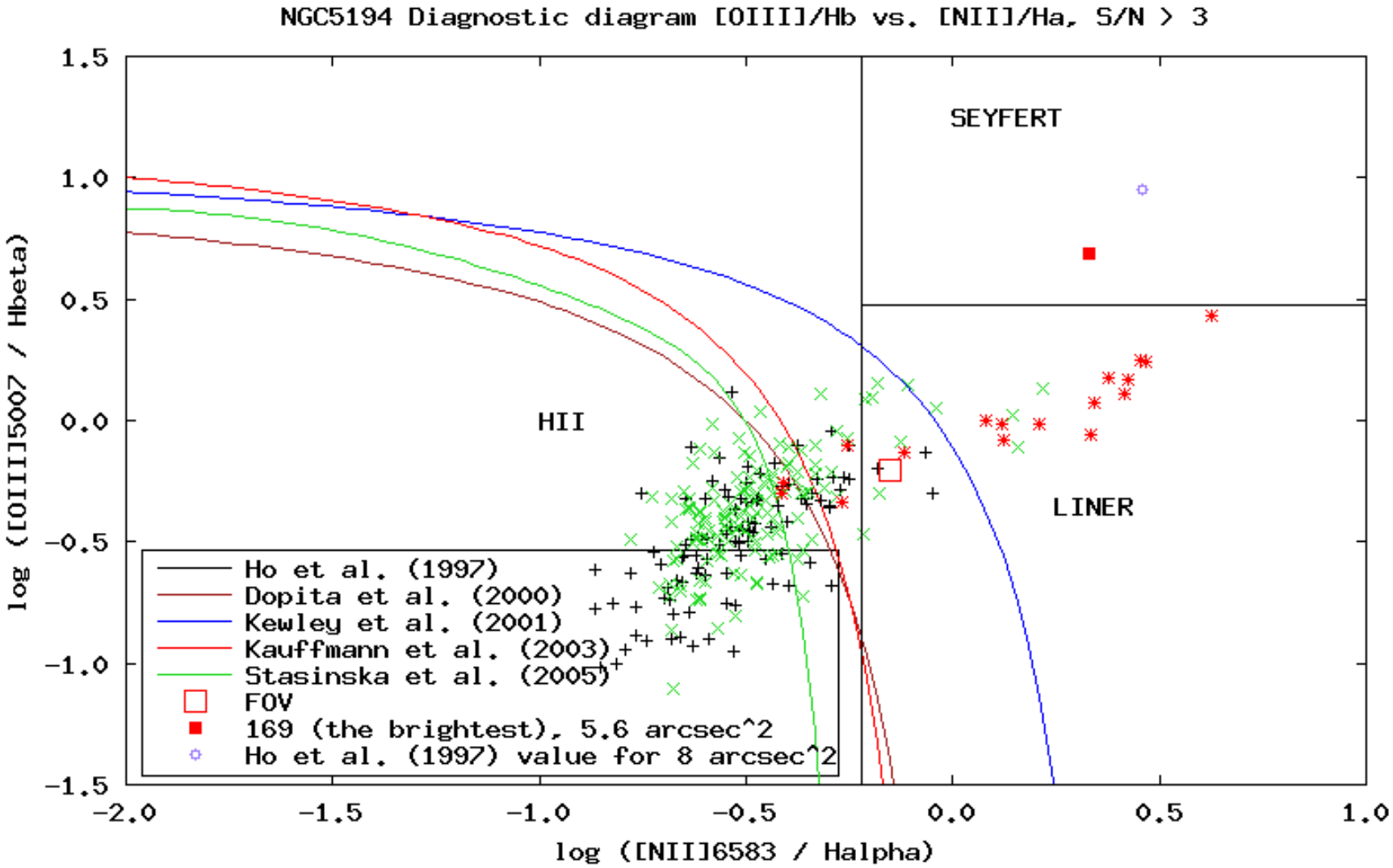
[NII] / Hα



[OIII] / Hβ

spatially resolved BPT diagrams

NGC 5194 (M51) - Seyfert 2

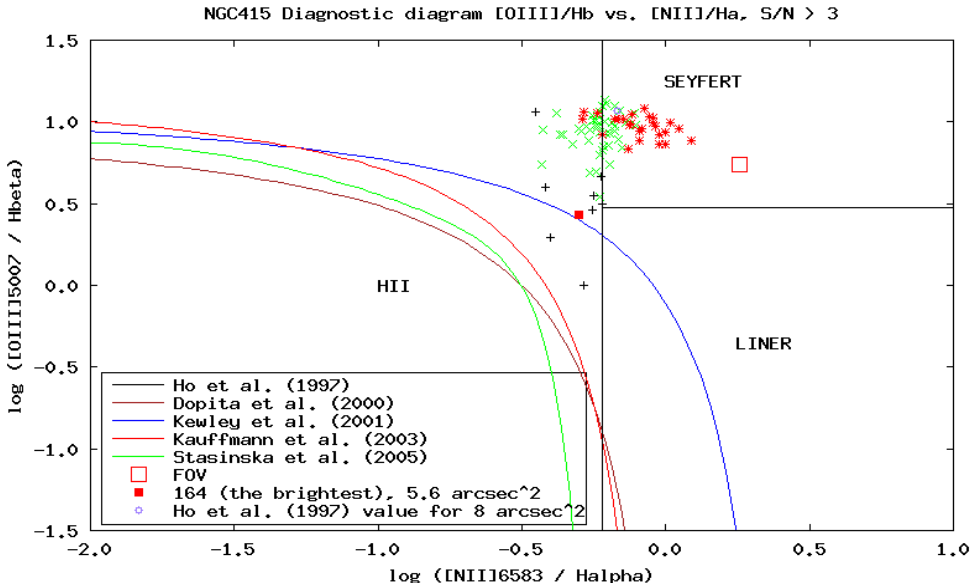


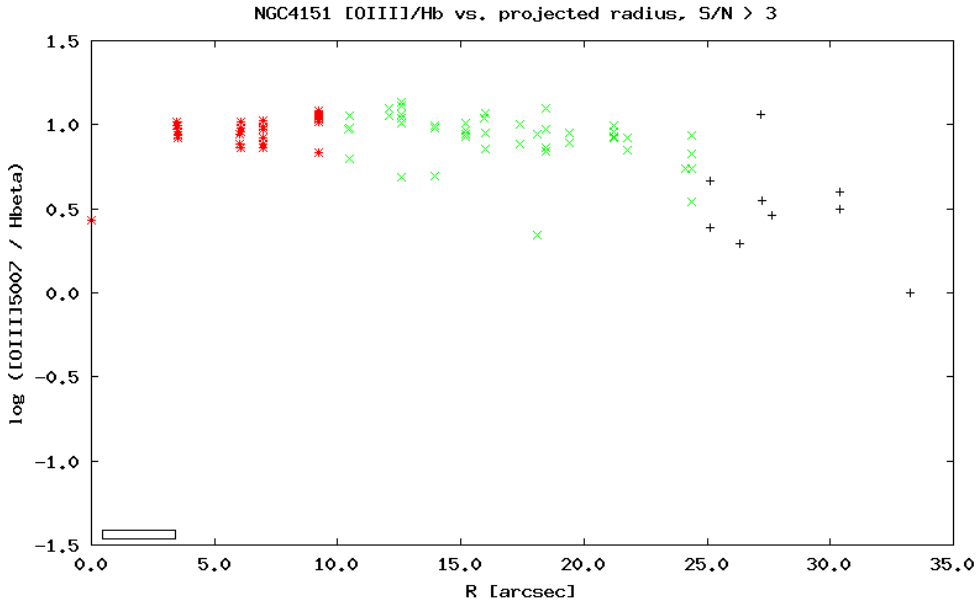
red points: spaxels with r ≤ 10", ***green points:*** spaxels with 10" < r ≤ 25",
black points: spaxels with r > 25"

spatially resolved BPT diagrams

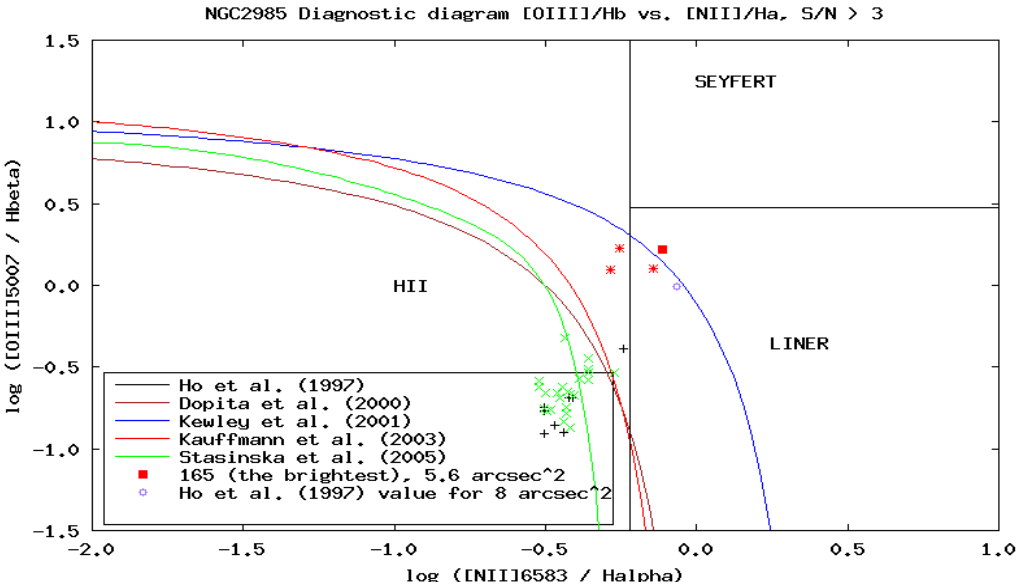
active vs. non-active galaxy

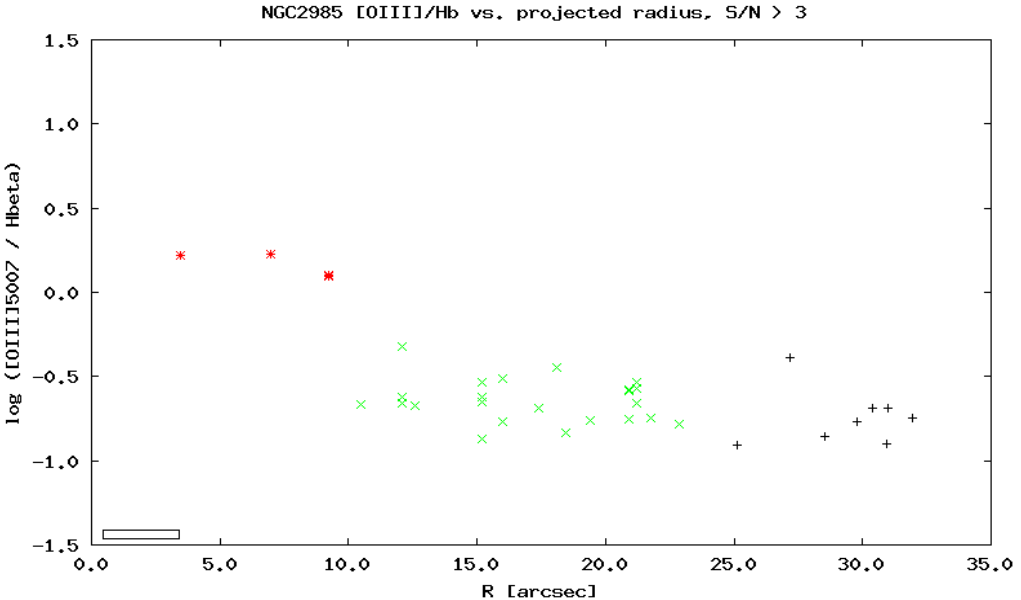
NGC 4151 - Seyfert





NGC 2985 - normal galaxy

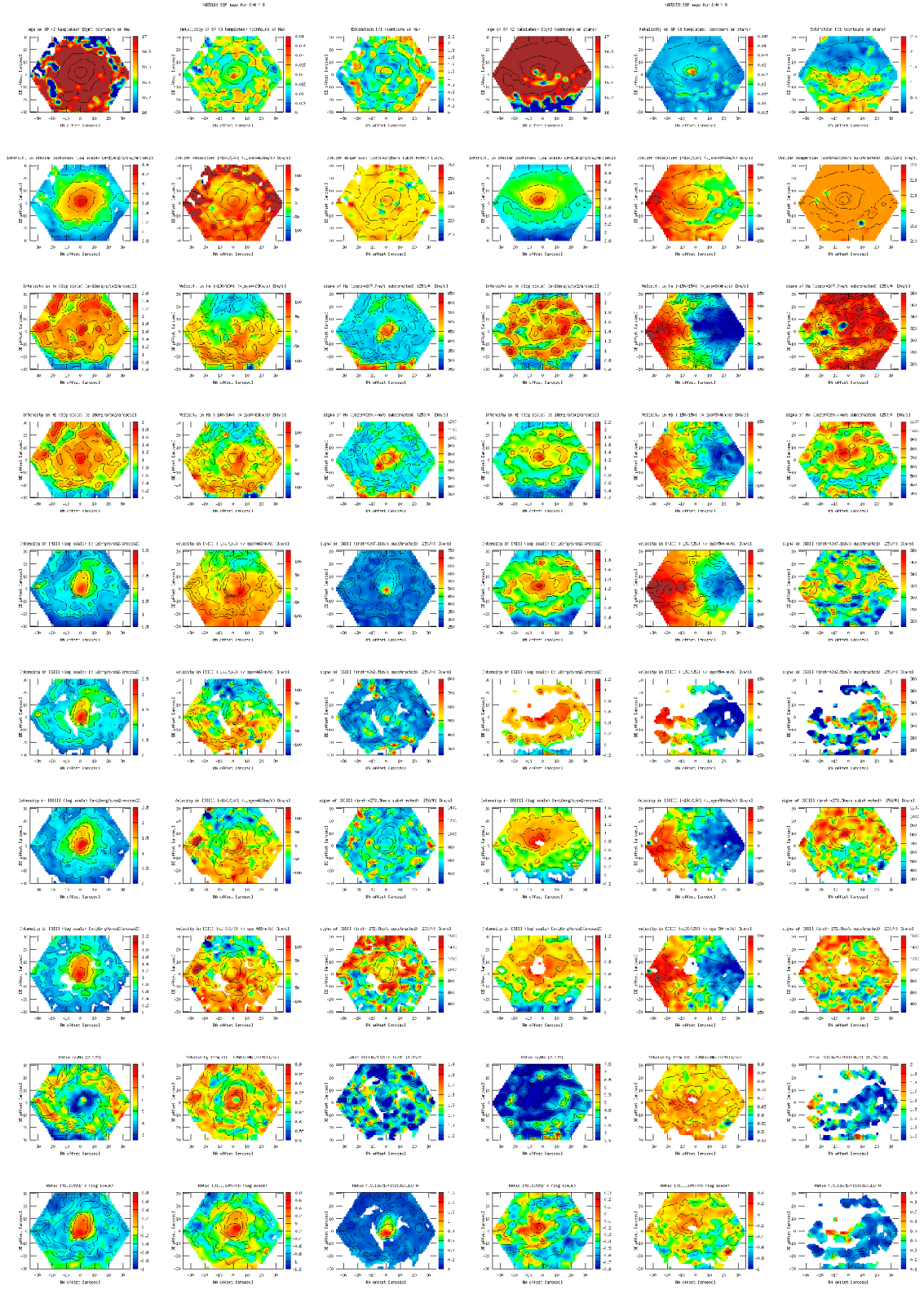




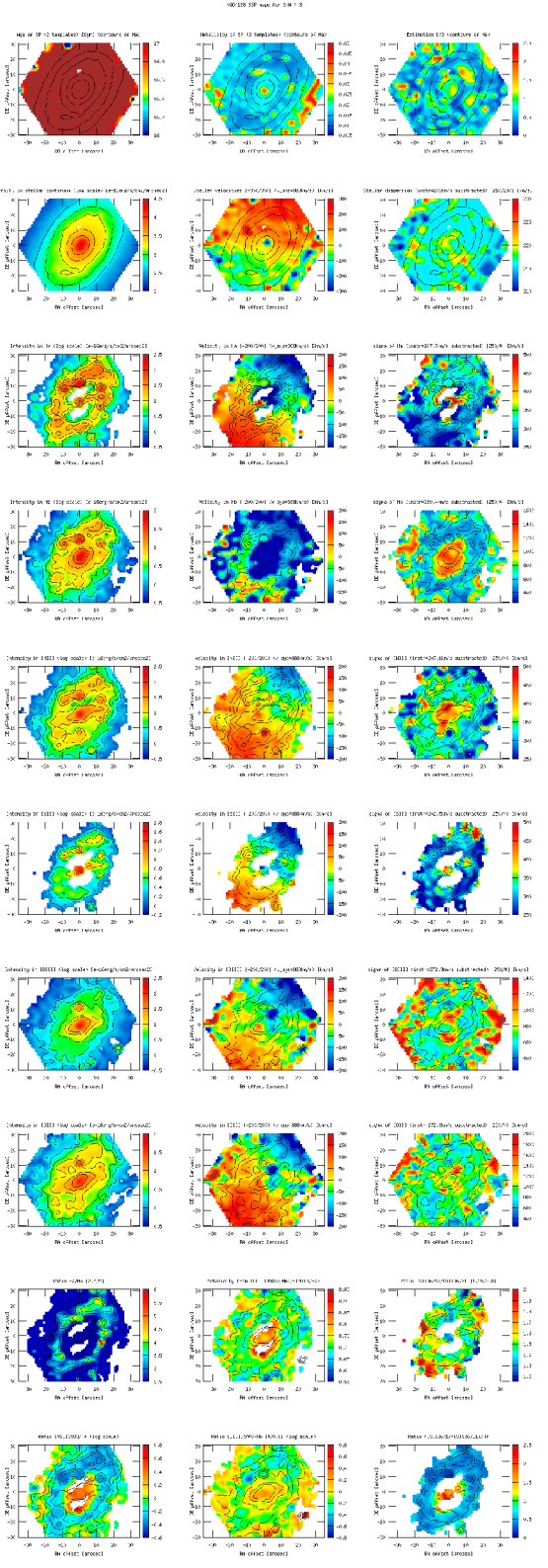
summary

- we analysed 3D spectroscopic data of 4 pairs of galaxies
- we obtained stellar and gaseous properties and kinematics
- we look for differences in the central regions of the galaxies

- we are going to publish 2D maps of fluxes and line ratios and diagnostic diagrams (as soon as possible :))
- we are going to further analysis of kinematical fields -- quantitative study of deviations from regular kinematics and modeling the kinematic field in particular cases



Thank
You
for
Your
Attention

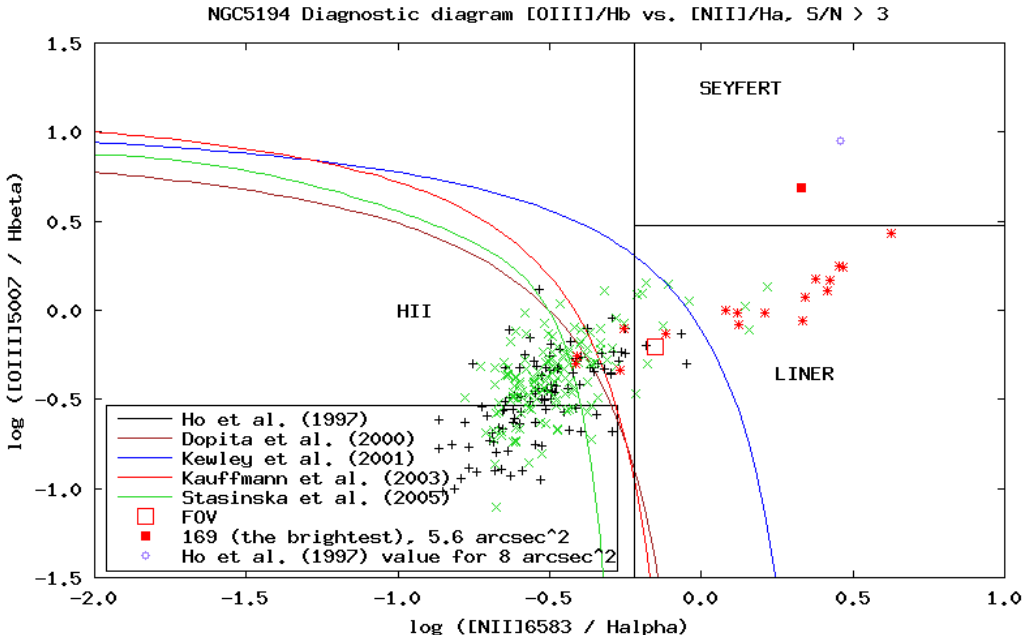


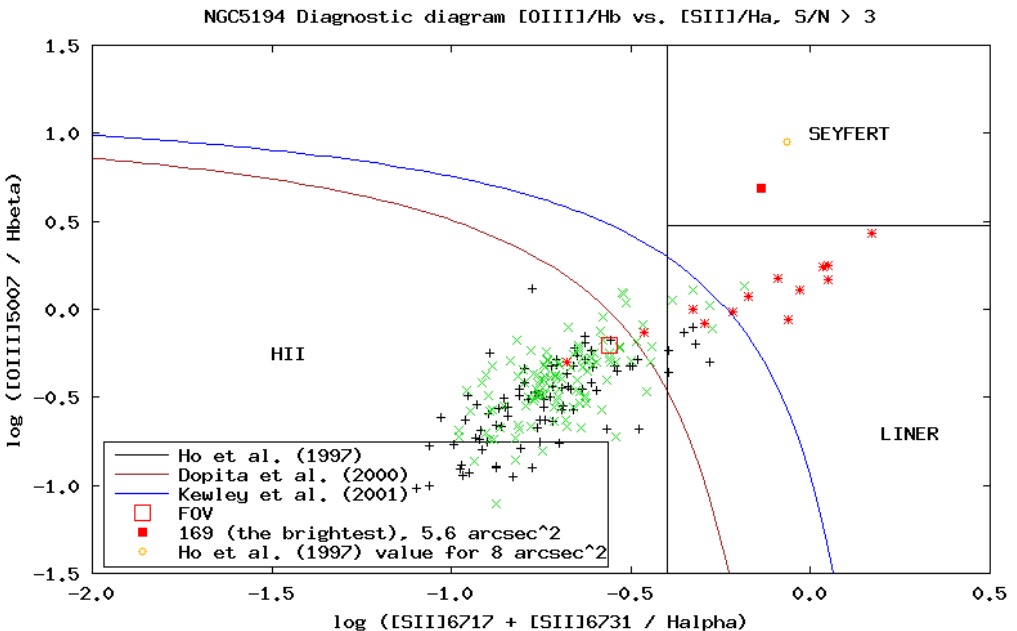
references

- Afanasiev & Silchenko (2002), ApJ 124, 706
- Bennert et al. (2006), A&A 446, 919
- Bruzual & Charlot (2003), MNRAS 379, 1000
- Jore et al. (1996), AJ 112, 438
- Pogge & Eskridge (1987), AJ 92, 291

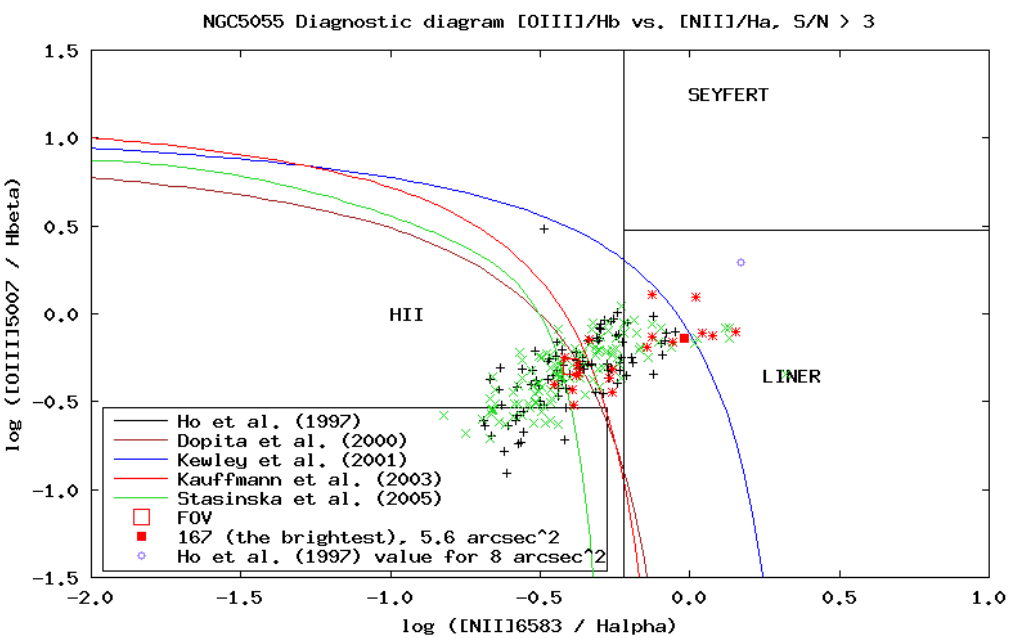
spatially resolved BPT diagrams

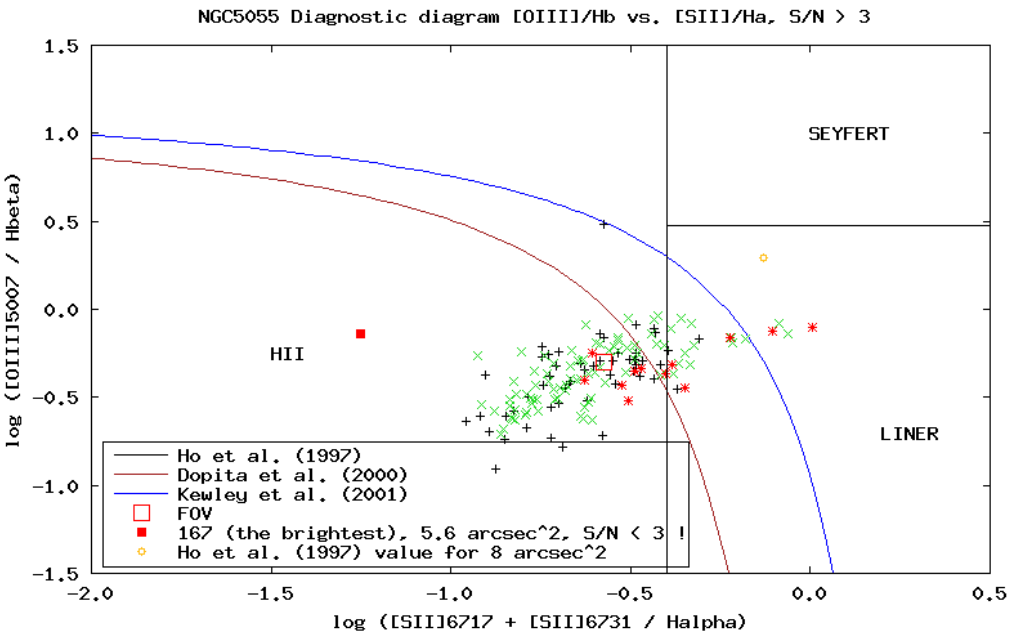
NGC 5194 (M51) - Seyfert 2





NGC 5055 - normal galaxy





analysis -- stellar populations influence

without stellar population subtraction

with stellar population subtraction

NGC 5055