PMAS-PPAK integral-field spectroscopy of nearby Seyfert and normal spiral galaxies

Comparative study of nearby Seyfert and normal galaxies

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our project vs CALIFA

- PMAS-PPAK IFU
- $0.001 < z < 0.005$
- 8 galaxies, Seyfert vs normal spirals
- 3600Å - 7000Å, R ~ 500
- 6200Å - 6900Å, R ~ 2360
- data obtained in 2005

- PMAS-PPAK IFU
- $0.005 < z < 0.03$
- 600 galaxies
- 4300Å - 7000Å, R ~ 850
- 3700Å - 5000Å, R ~ 1650
- data being obtained (2010 - 2012)

Our project is aimed to study differences in properties of ionized gas, gas & stellar kinematics and stellar population in central regions of nearby Seyfert and normal spiral galaxies.

The sample of 8 galaxies - meant as a pilot study.

Seyfert & normal

NGC 5194 (M51) & NGC 5055

NGC 4138 & NGC 3245
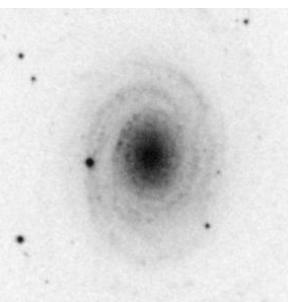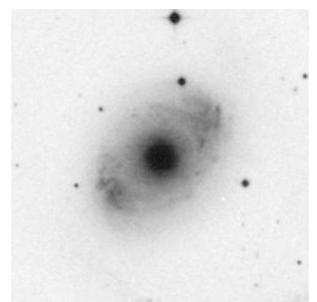
NGC 4151 & NGC 2985

NGC 4579 & NGC 3351

our project

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

- data reduction processed with R3D

- analysis processing with FIT3D

 stellar population modelling using the synthetic library of Bruzual & Charlot (2003)

 emission lines fitted by simple Gaussian functions
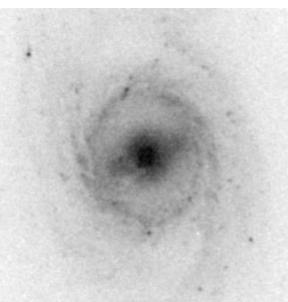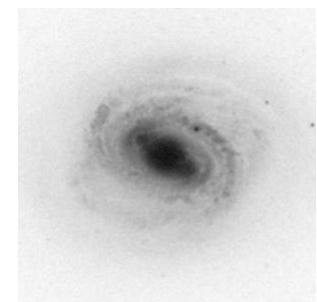
analysis -- NGC 4138
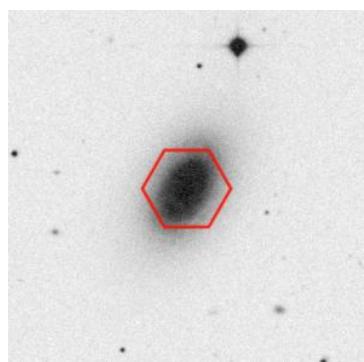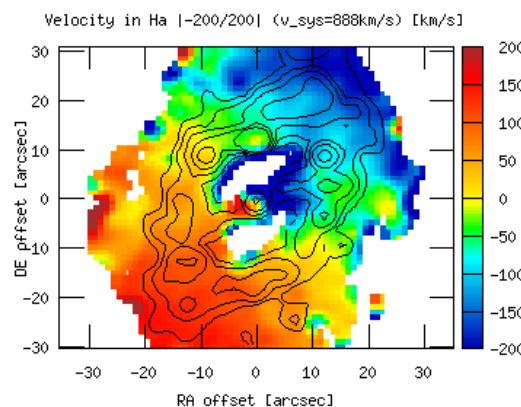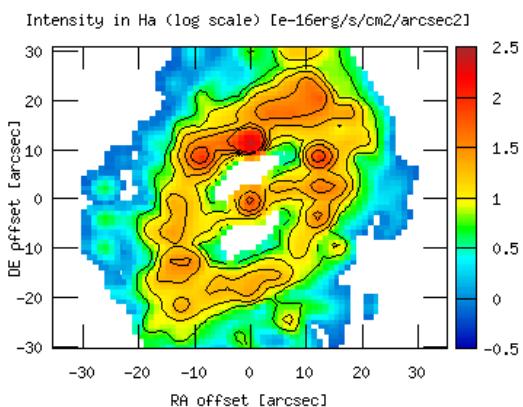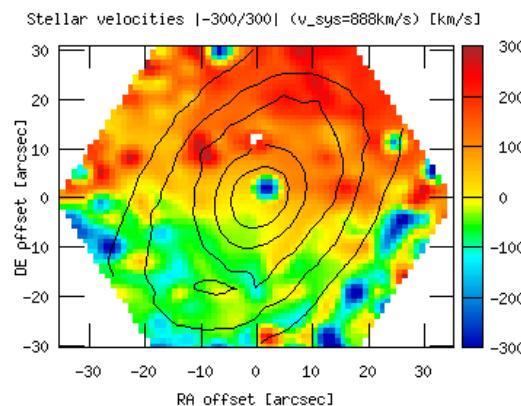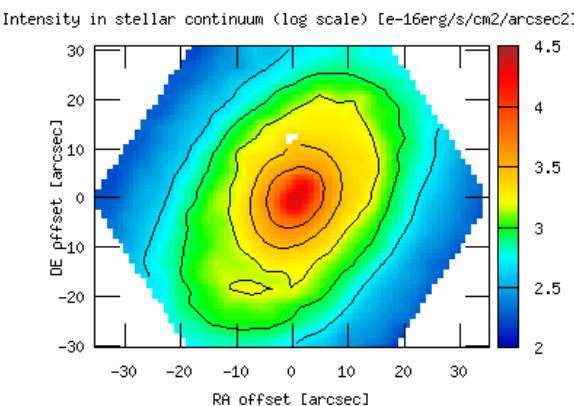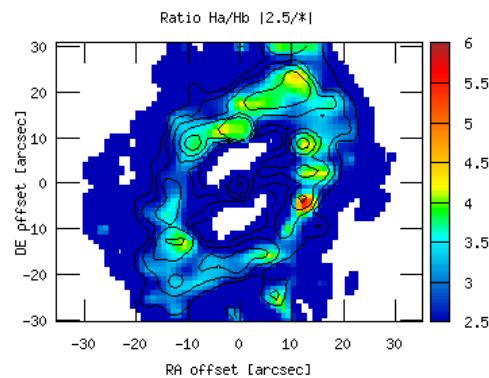

- Seyfert 1.9, SA(r)0+ 1" ~ 80 pc

- 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 -- stellar populations influence

without stellar population subtraction
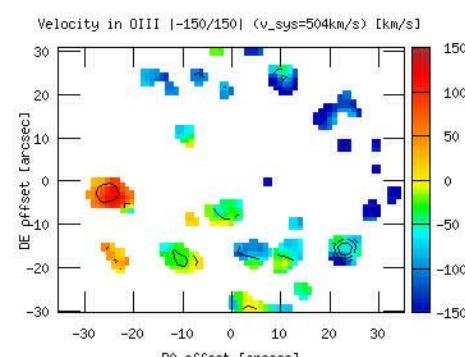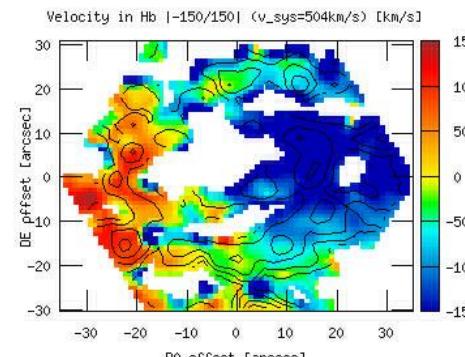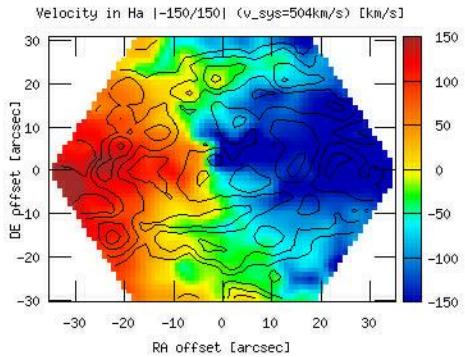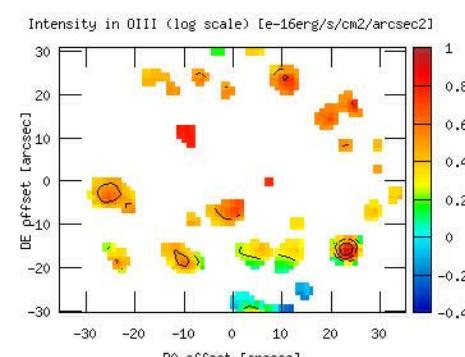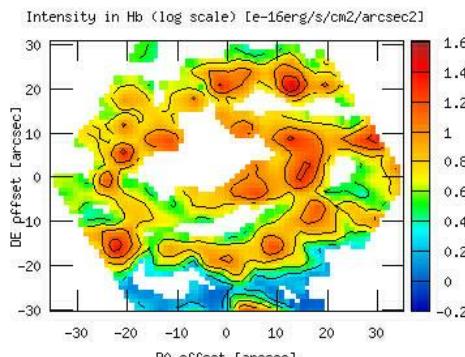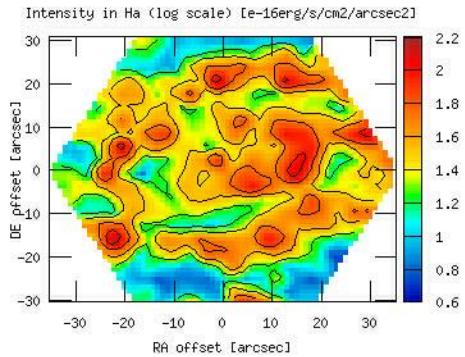
with stellar population subtraction

NGC 5055

Hα

Hβ
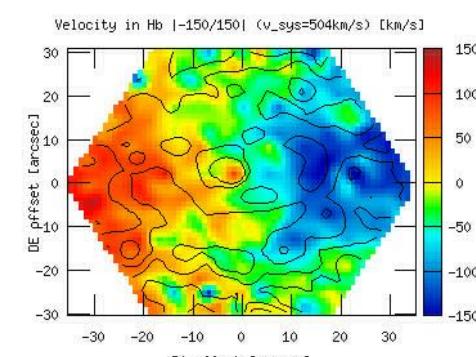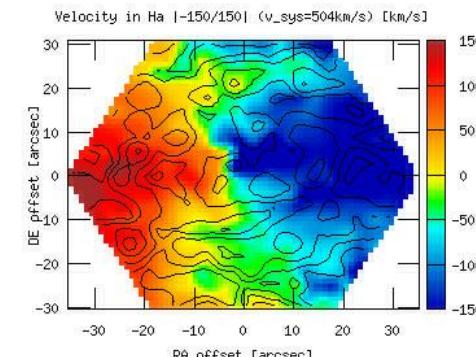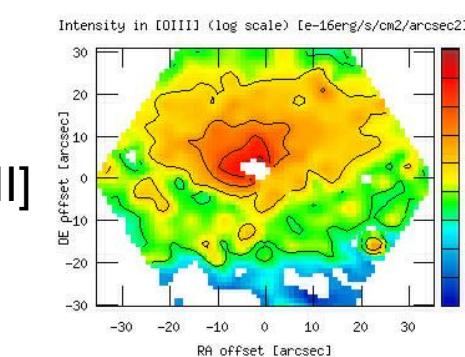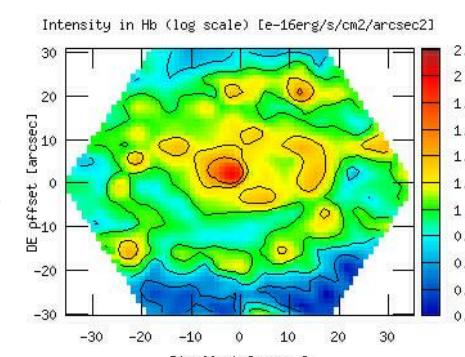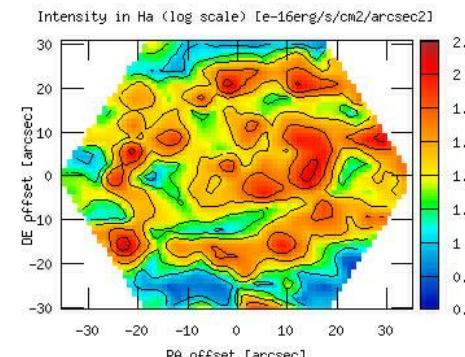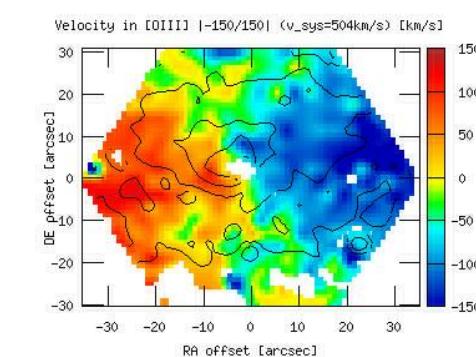
[OIII]

analysis -- active vs normal galaxies

NGC 5194 (M51) - Seyfert 2
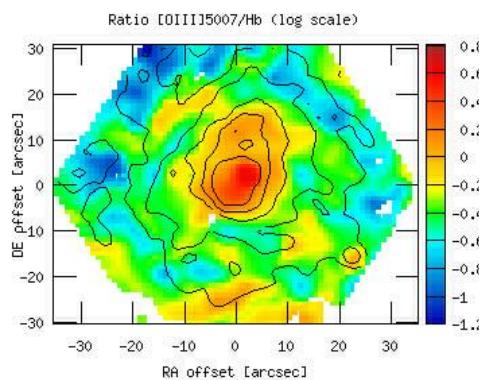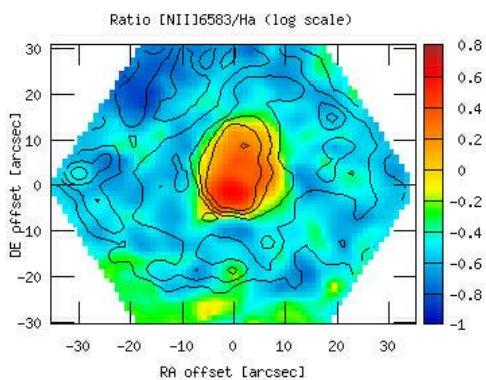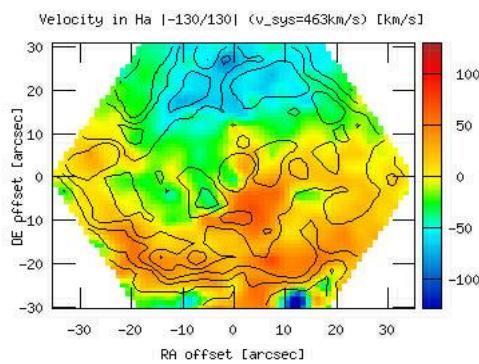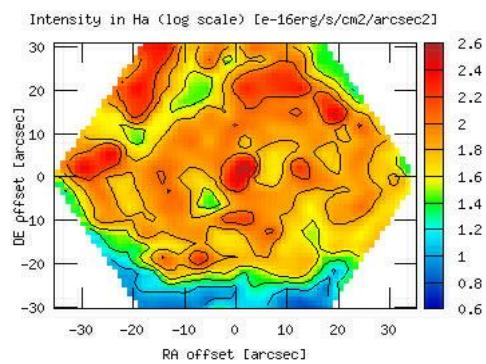
NGC 5055 - normal galaxy

Hα

[NII] / Hα

[OIII] / Hβ

[NII] / Hα

[OIII] / Hβ

spatially resolved BPT diagrams

NGC 5194 (M51) - Seyfert

NGC5194 Diagnostic diagram [OIII]/Hb vs. [NII]/Ha, S/N > 3

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

spatially resolved BPT diagrams

NGC 5194 (M51) - Seyfert

NGC 5055 - normal

spatially resolved BPT diagrams

Comparison of NGC5194 & NGC5055 in diagnostic diagram [OIII]/Hb vs. [NII]/Ha, S/N>3
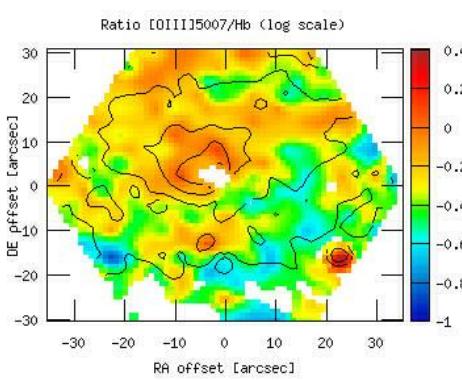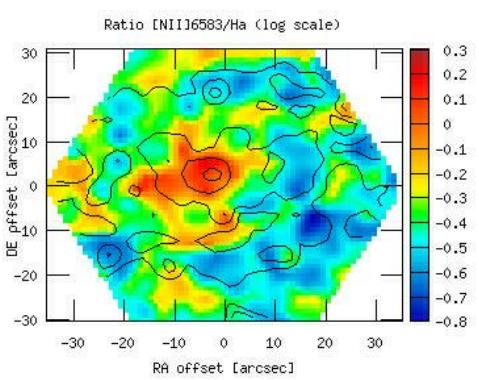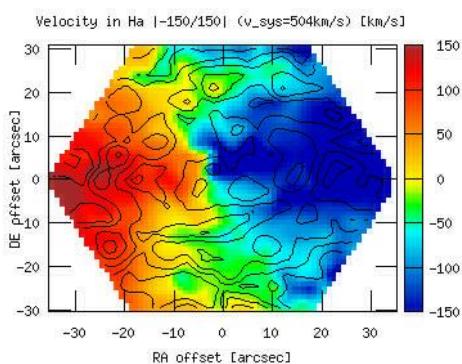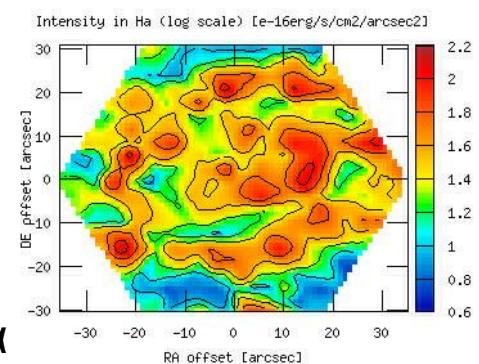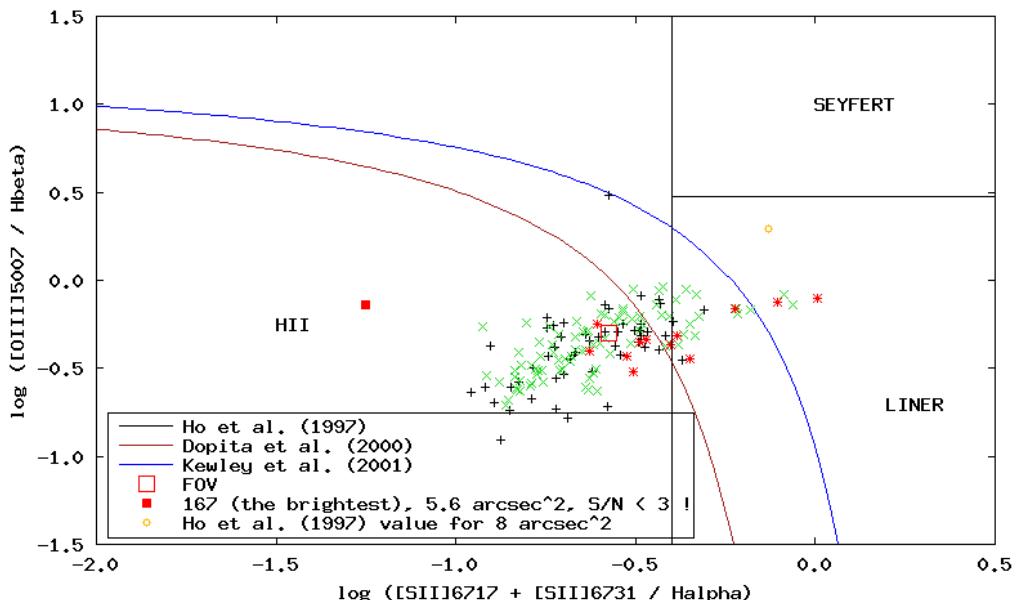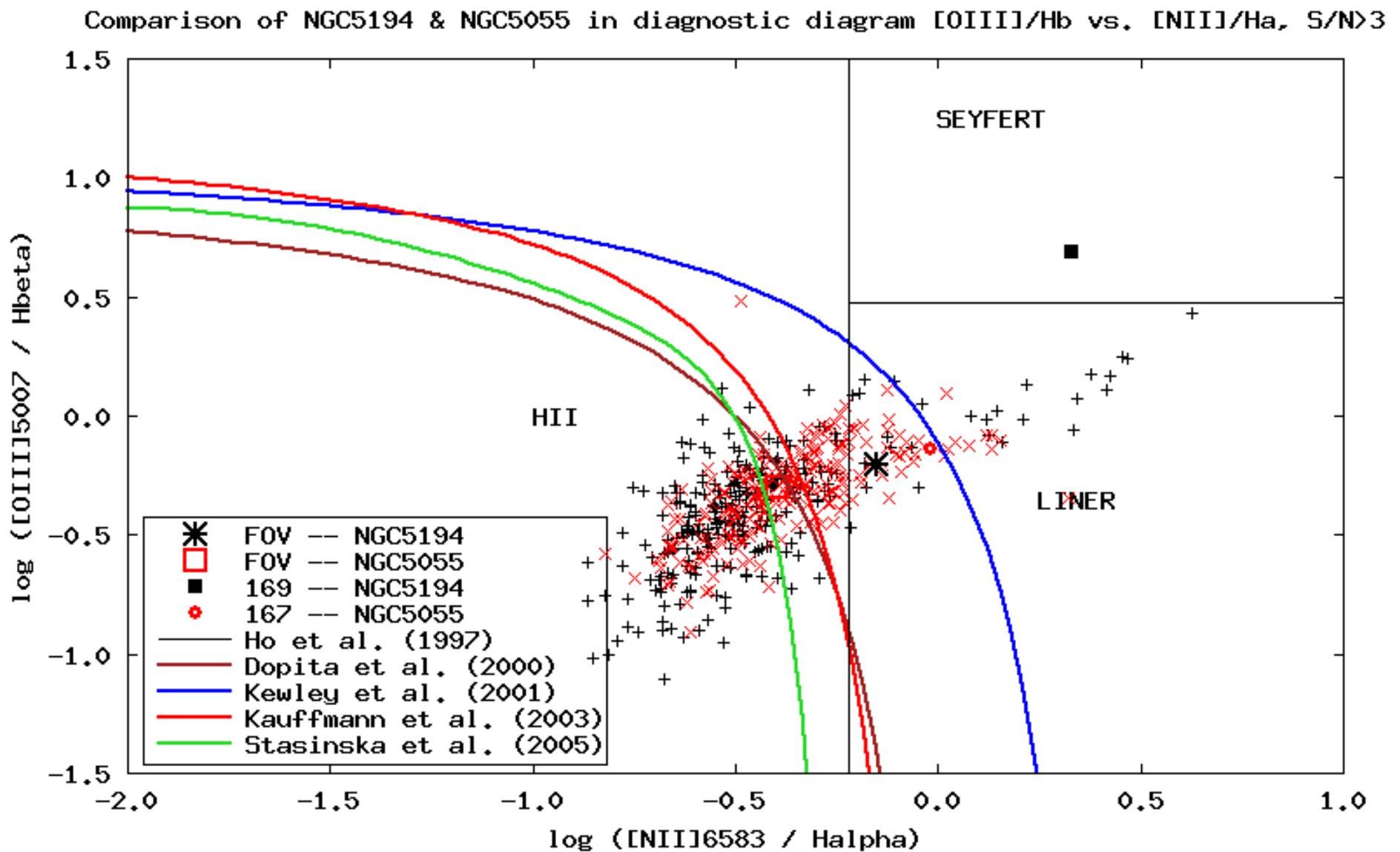
black points: NGC 5194 (M51) - Seyfert, *red points:* NGC 5055 - normal galaxy

size of NLR in CALIFA survey

- Schmitt et al. (2003)
- NLR size:
- 300 pc - 3.4 kpc
- for CALIFA with
- $0.005 < z < 0.03$:
- NLR ~ 0.5" to 35" in diameter
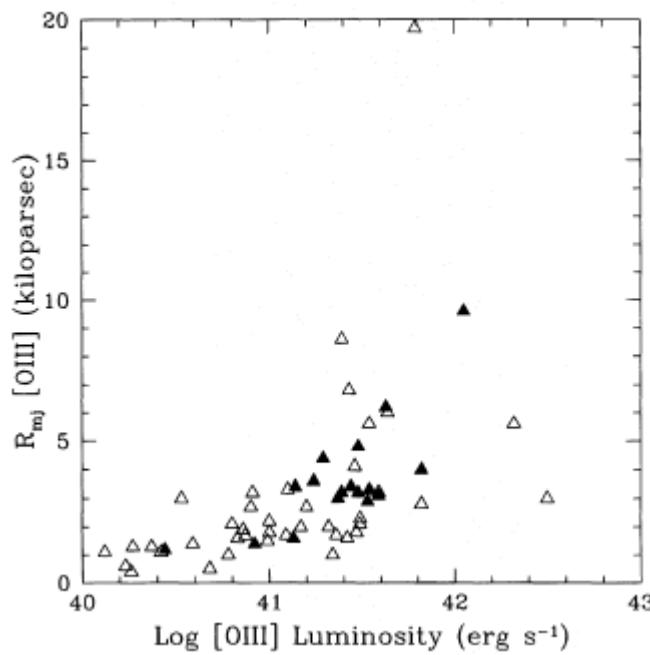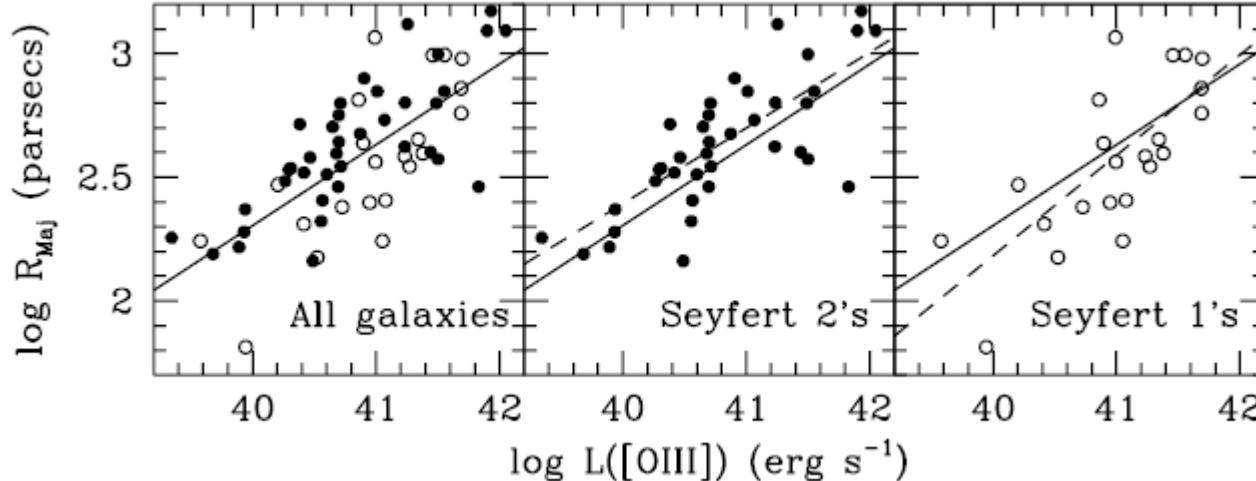
- Mulchaey et al. (1996)
- NLR size:
- 300 pc - 14 kpc
- NLR ~ 0.5" to 68" in diameter

$(H_0 = 71 \text{ km/s/Mpc})$

summary

- several aspects of PPAK data analysis were presented

  - study of complex structure of NGC 4138

  - role of stellar model subtraction

 - active vs non-active galaxy

- multiple stellar kinematic components fitting is needed to disentangle complex dynamical structures

NGC 4138 - stellar mean LOS velocity

Stellar velocities |−300/300| (v_sys=888km/s) [km/s]
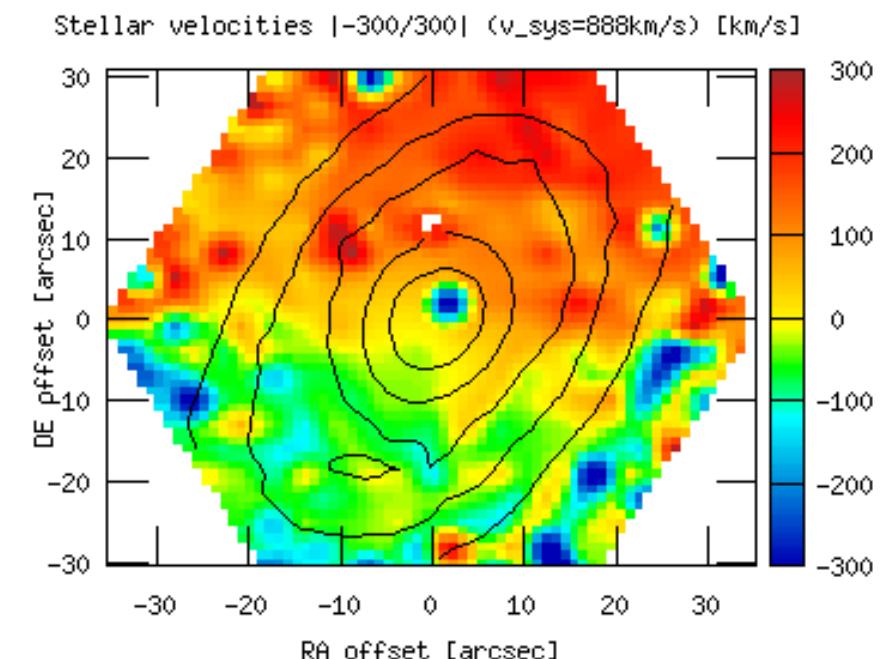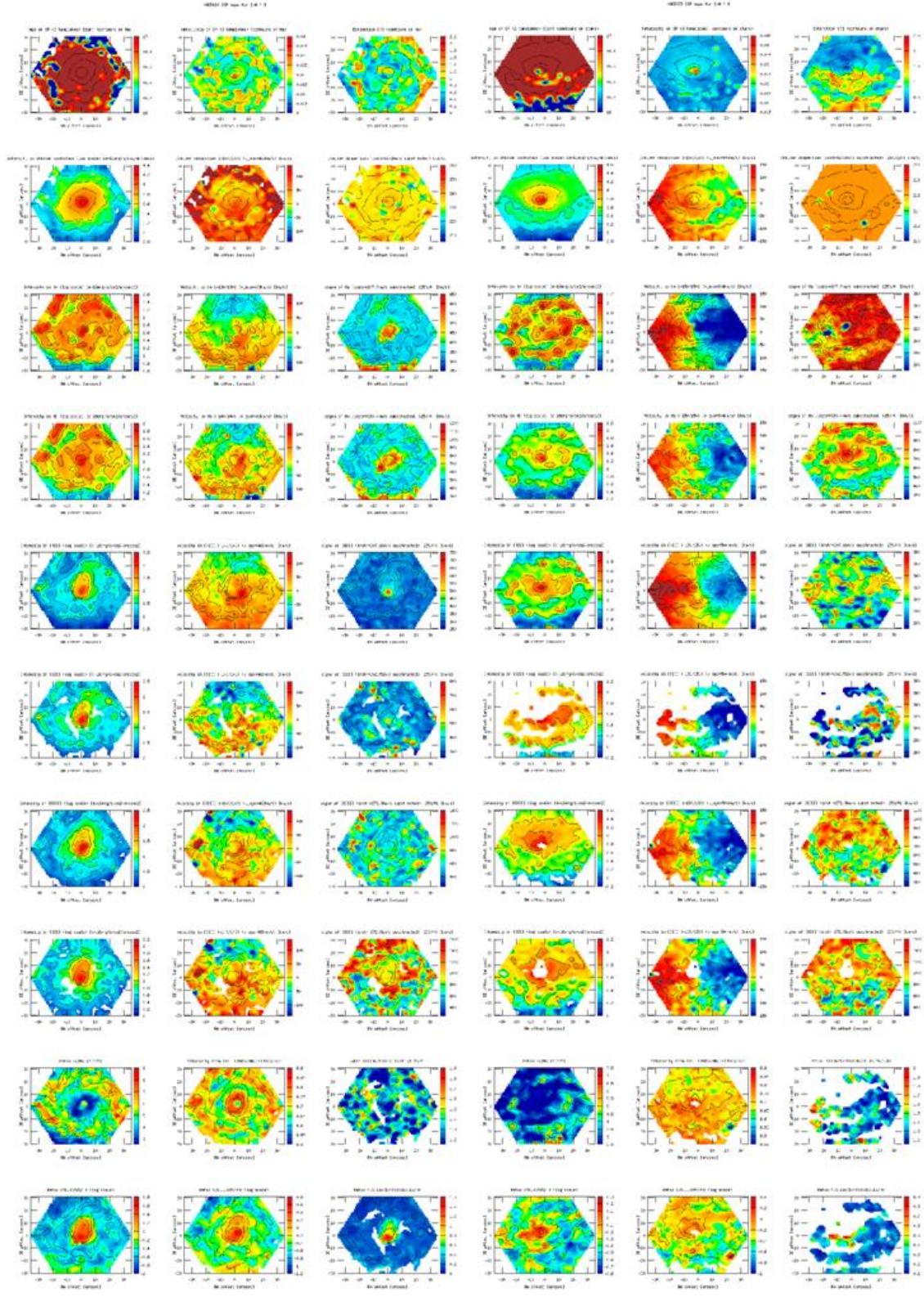
Thank
You
for
Your
Attention

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

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- Schmitt et al. (2003), ApJ 597, 768