# Integral field spectroscopy of nearby Seyfert and normal galaxies

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### 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



## 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
- $H\alpha/H\beta$  (extinction), metalicity, density
- [NII]/H $\alpha$ , [OIII]/H $\beta$ , [SII]+[SII]/H $\alpha$  (ion trace

(ionisation source tracers)

## analysis -- NGC 4138

300

200

100

-100

-200

-300

150

100

50

-100

-150

-200

5.5

4.5

3.5

30

30

20

10

Stellar velocities [-300/300] (v\_sys=888km/s) [km/s]

30

20

[arcsec]

0 DffSet 10

-20

-30

-30

-20

-10

RA offset [arcsec]

Ж





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 5055 - normal galaxy

#### NGC 5194 (M51) - Seyfert 2

-30 -20

30

20

Can

Ш

-10

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et

出



[NII] / Hα









0.4

0.2

-0.2

-0.4

-0.6

#### spatially resolved BPT diagrams

NGC 5194 (M51) - Seyfert 2

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



#### 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

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#### 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



## analysis -- stellar populations influence

#### without stellar population subtraction



Intensity in Hb (log scale) [e-16erg/s/cm2/arcsec2]



Intensity in OIII (log scale) [e-16erg/s/cm2/arcsec2]







Velocity in OIII |-150/150| (v\_sys=504km/s) [km/s]



#### with stellar population subtraction



Intensity in Hb (log scale) [e-16erg/s/cm2/arcsec2]



Intensity in [OIII] (log scale) [e-16erg/s/cm2/arcsec2]







Velocity in Hb |-150/150| (v\_sys=504km/s) [km/s]



Velocity in [OIII] |-150/150| (v\_sys=504km/s) [km/s]

