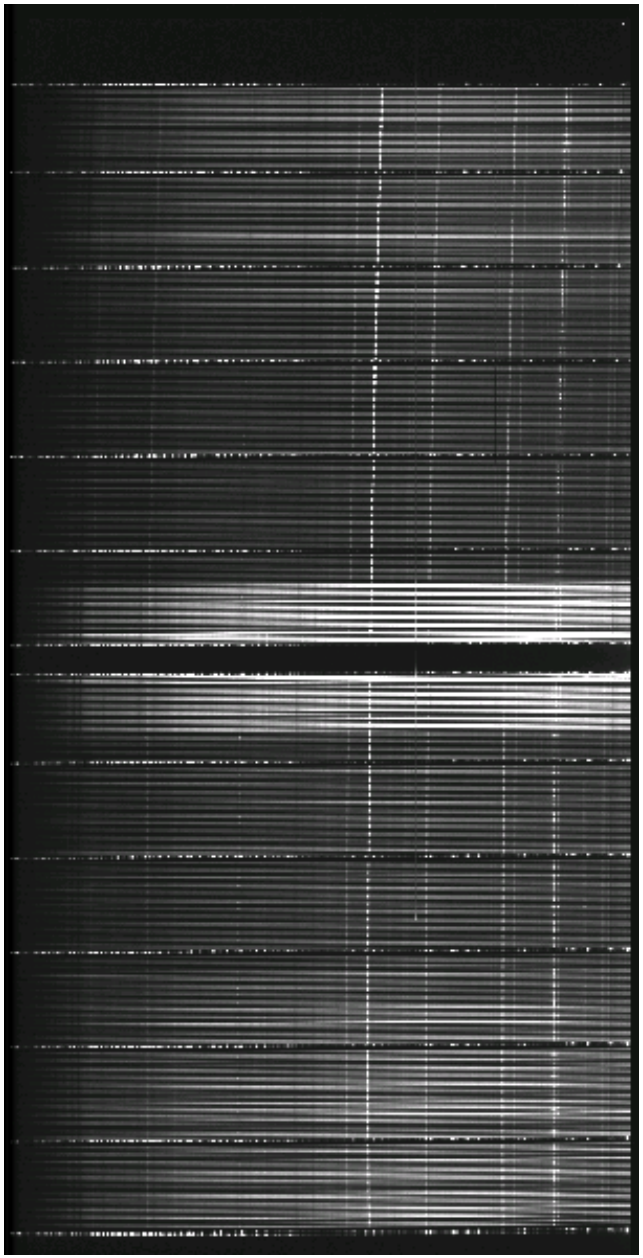
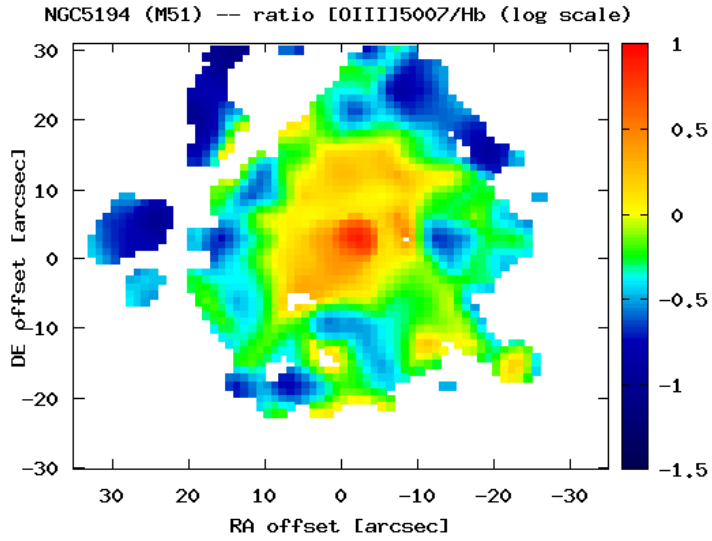
IFU spectroscopy of central parts of nearby Seyfert and normal galaxies

Tereza Bartáková, DTPA, Masaryk University, Brno
Supervisor: Bruno Jungwiert, AsI, Academy of Science, Prague

Ondřejov, 27th October 2009

overview

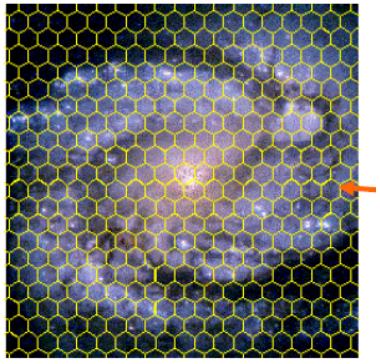


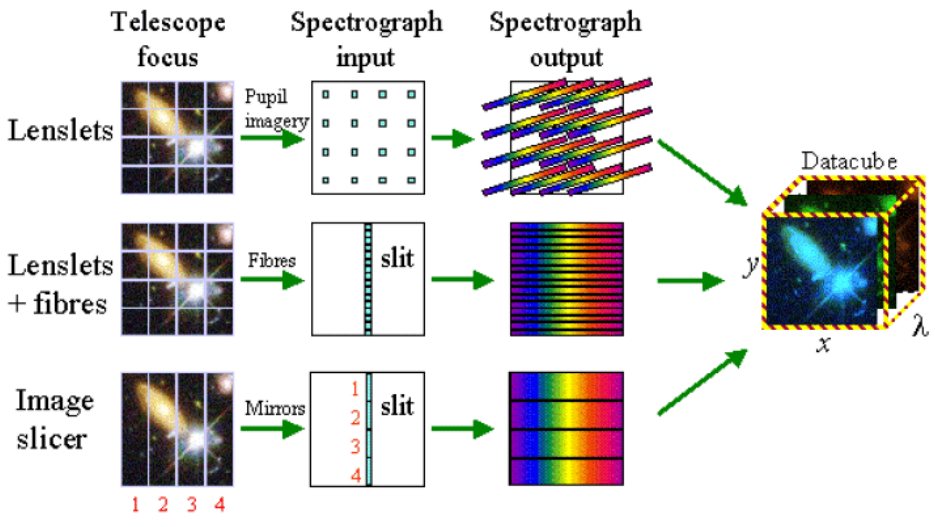


- IFS – fundamentals, data cubes, motivation
- observed sample, aims
- data processing
- very first results – 2D maps
- status

integral field spectrospcopy (IFS)

- method to obtain many spectra from the target field simultaneously
- FOV devided into spatial elements (spaxels)
- today's integral field units (IFUs) have hundreds to a few thousand spaxels and FOV from a few arcseconds to an arcminute





when slit is not enough?

- to avoid light losses
- to avoid precise slit positioning
- to avoid slit effect
- asymetric morphology and/or kinematics

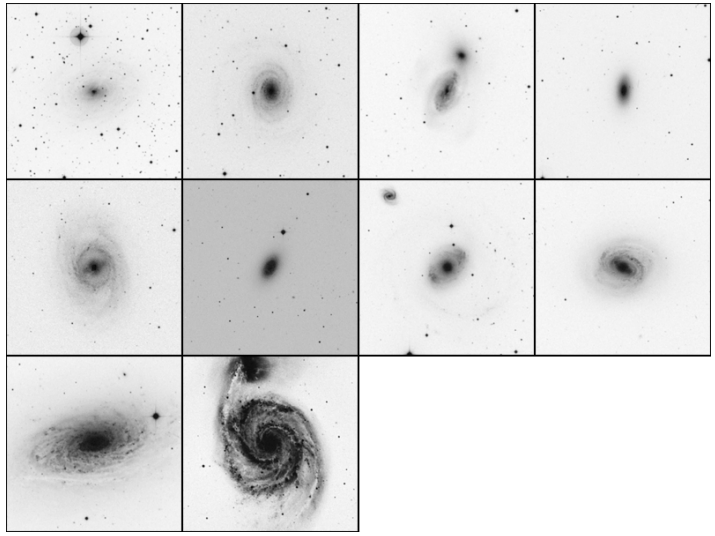
- all spectra observed under the same conditions

observed sample, aims

- PMAS-PPAK with FOV $\sim 1' \times 1'$ (currently the largest IFU)
- two setups: V300 (3650-6900 Å; FWHM $\sim$ 500 km/s) and R1200 (6200-6850 Å; FWHM $\sim$125 km/s)
- 5 pairs of AGN (Seyferts) and normal galaxies with the same Hubble type, similar inclination, distance and luminosity

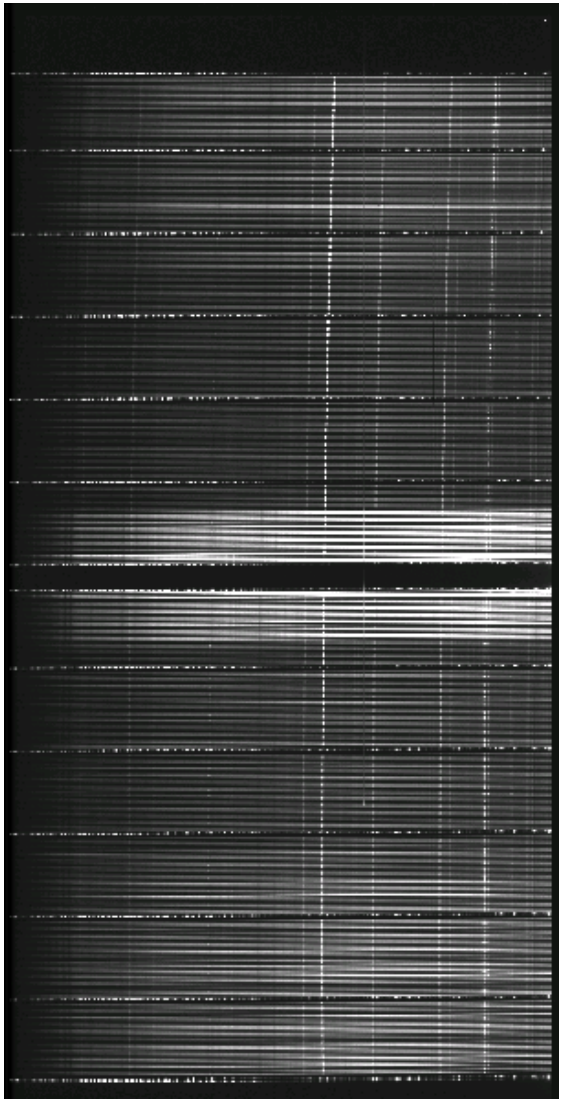
to obtain

- 2D kinematics of stars and ionized gas
- stellar populations, reddening, electron density, temperature, ionization sources of the gas
- properties of the central kpc of active and non-active galaxies

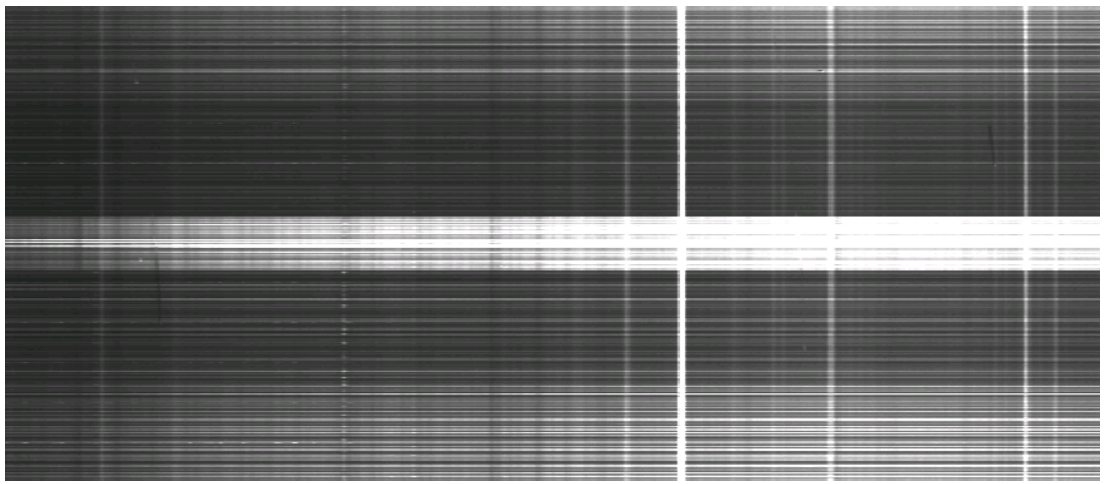


ic356, ngc2985, ngc3227, ngc3245,ngc3351, ngc4138, ngc4151, ngc 4579, ngc5055, ngc5194 (DSS images)

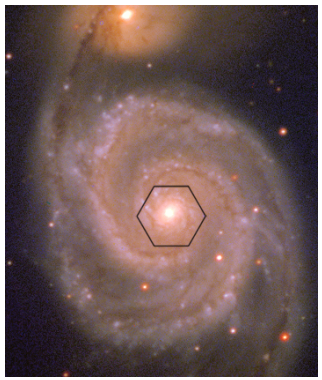
data – reduction



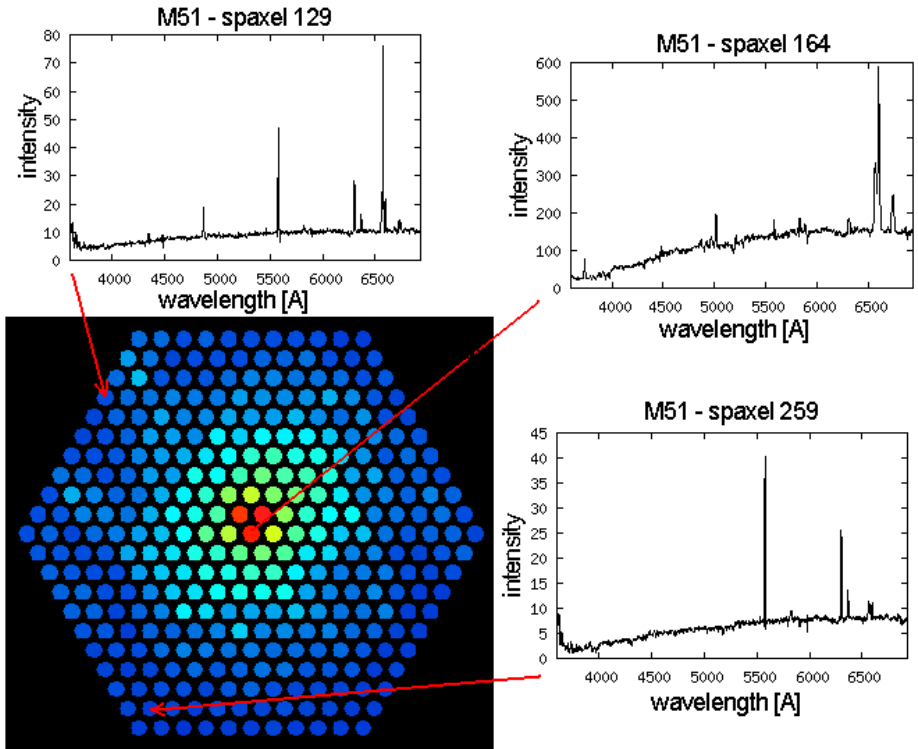
- tracing spectra on continuum image
- extraction of spectra
- distorsion and dispersion corrections
- wavelength calibration
- sky subtraction
- fiber to fiber correction (fiberflat)
- flux calibration (calibr. stars) into absolute units

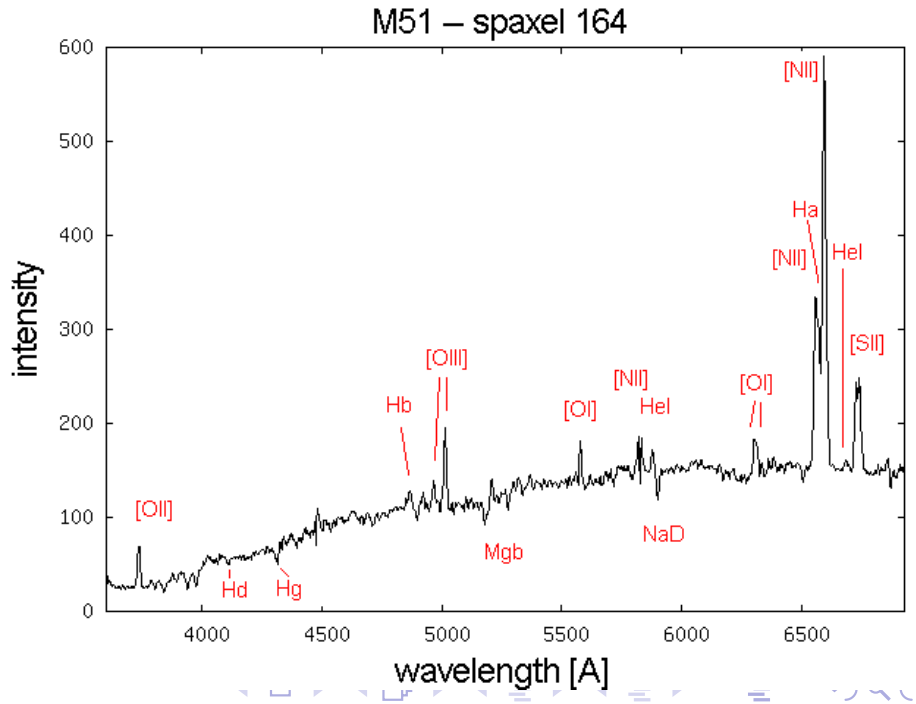


data – M51



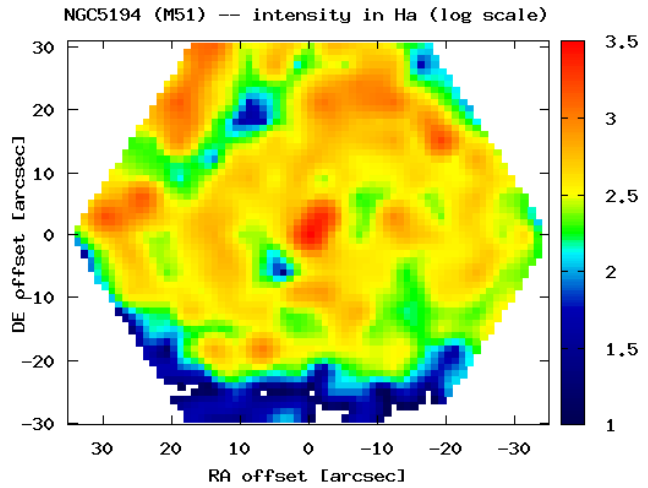
- 331 spectra of each galaxy
- emission line fluxes, velocities, FWHMs, ratios: [NII]6583/Hα, [OIII]5007/Hβ, [OI]6300/Hα, Hα/Hβ, [SII]6731/[SII]6717, ...
- fitting stellar population templates

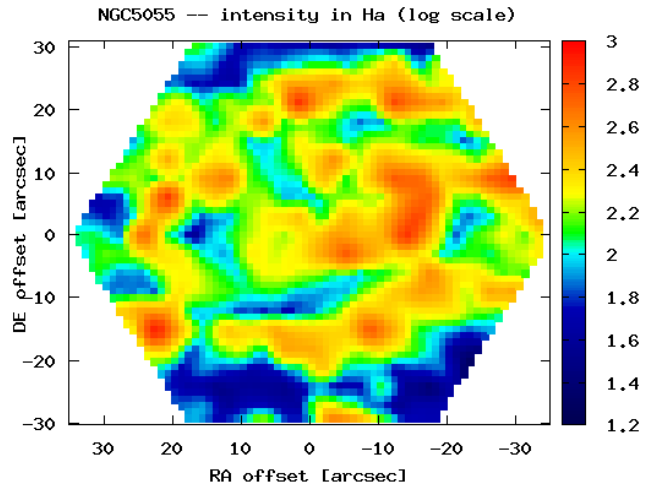




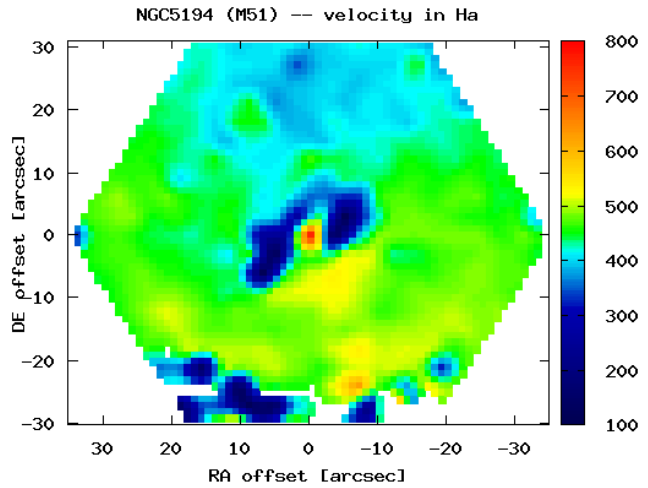
2D maps: M51 (AGN) vs. NGC5055 (normal g.)

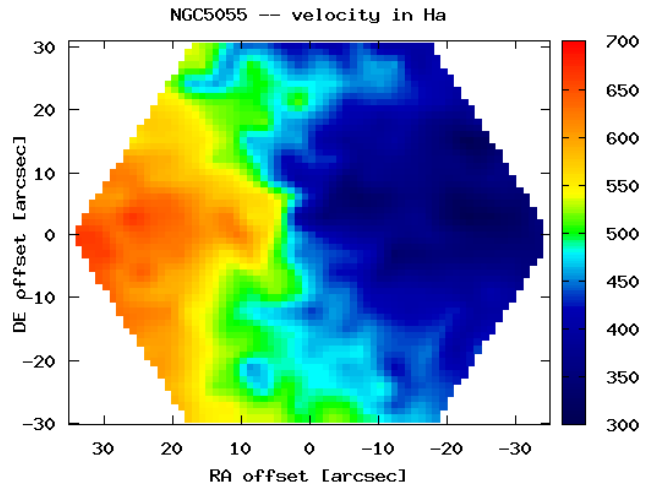
flux in Hα





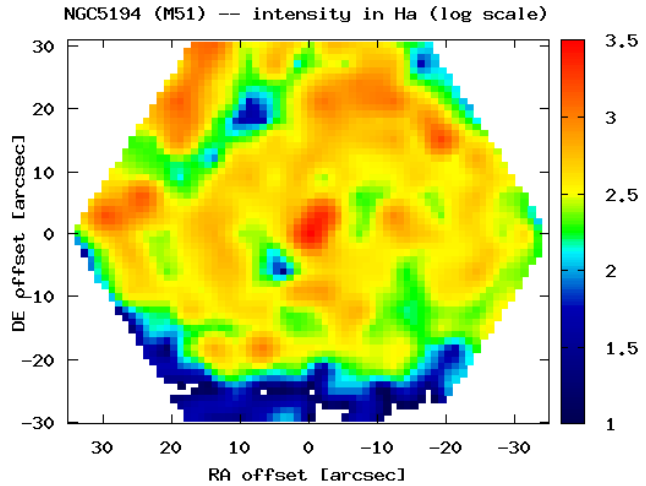
velocity in Hα

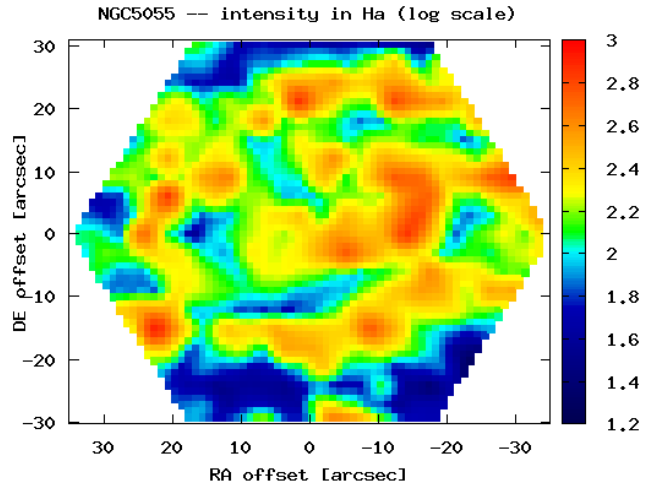




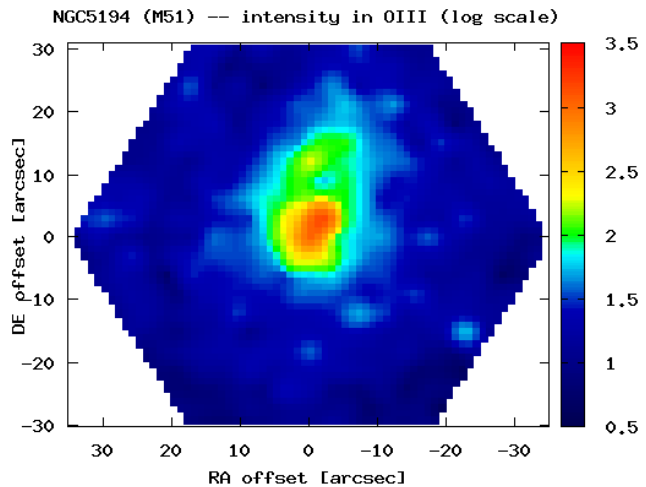
2D maps: M51 (AGN) vs. NGC5055 (normal g.)

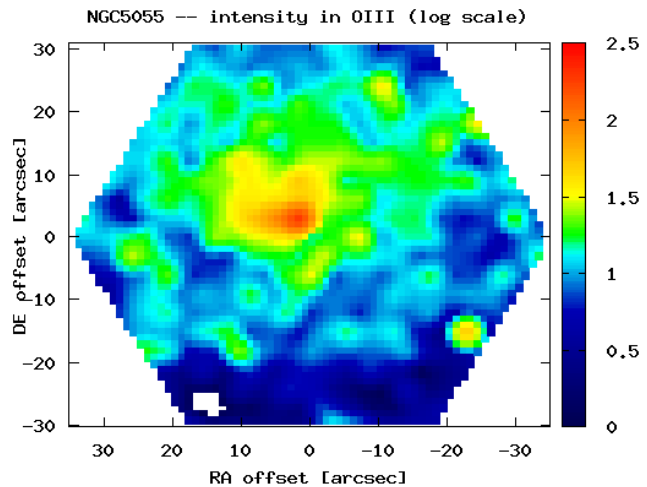
flux in Hα





flux in [OIII]



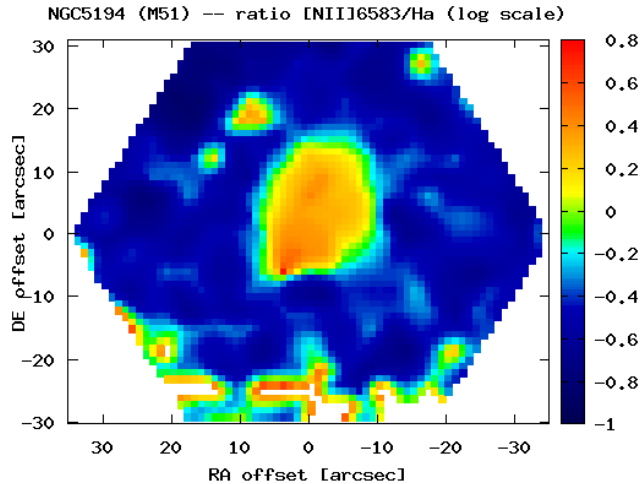


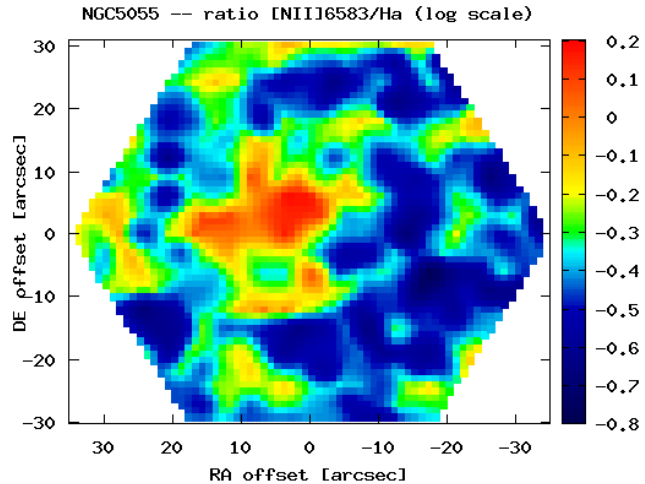
status

- 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
- modelling kinematics of ionized gas – planned

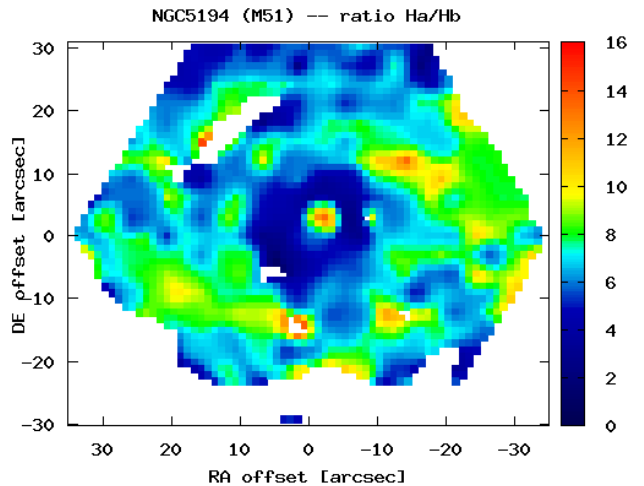
2D maps: M51 (AGN) vs. NGC5055 (normal g.)

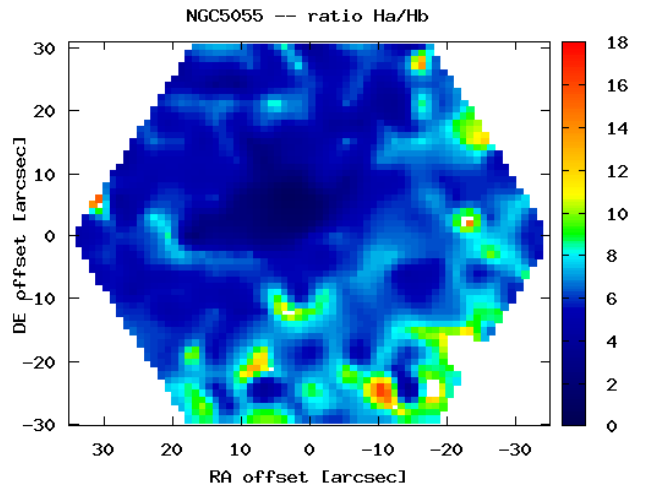
ratio [NII]6583 / Hα





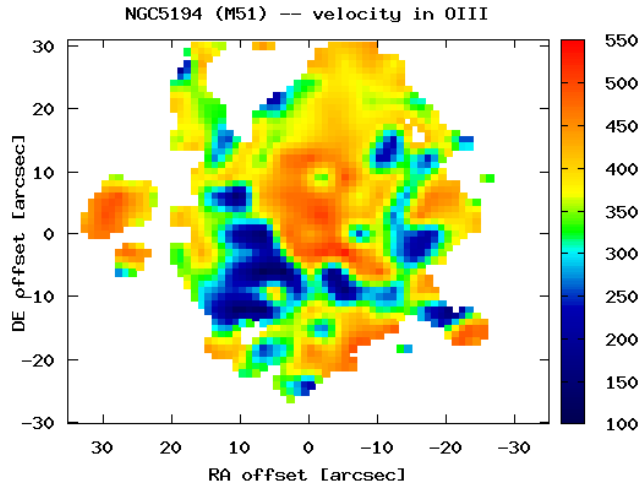
ratio Hα / Hβ

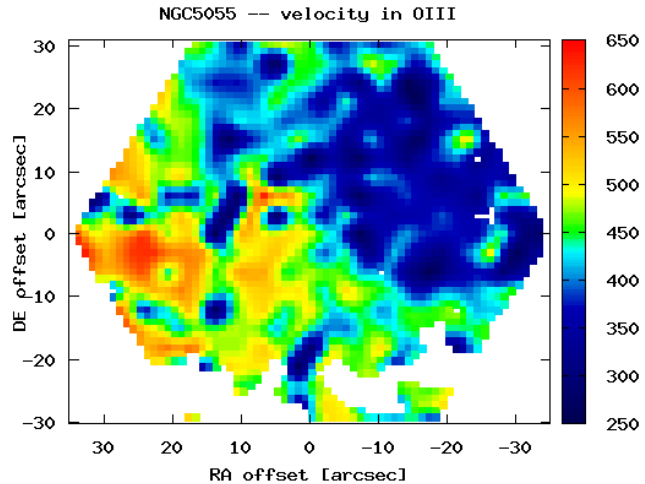




2D maps: M51 (AGN) vs. NGC5055 (normal g.)

velocity in [OIII]





ratio [OIII]5007 / Hβ