Galaxy Evolution and Feedback across Different Environments
Proceedings IAU Symposium No. 359, 2020
T. Storchi-Bergmann, W. Forman, R. Overzier & R. Riffel, eds.
doi:10.1017/S1743921320002379

The gas distribution and kinematics in the central region of the Seyfert 2 galaxy NGC 1125

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Abstract. We present Gemini Near-Infrared Integral-Field Spectrograph (NIFS) observations of the inner 660×660 pc^2 of the Seyfert 2 galaxy NGC 1125, which reveals that the emission-line profiles present two kinematic components: a narrow one ($\sigma < 150$ km s^{-1}) due to emission of the gas in the disk and a broad component ($\sigma > 150$ km s^{-1}) produced by a bipolar outflow, perpendicular to the galaxy's disk.

Keywords. galaxies: Seyfert, galaxies: kinematics and dynamics, galaxies: individual (NGC 1125)

It is now widely accepted that feeding and feedback processes of active galactic nuclei (AGN) play an important role in the evolution of galaxies (Harrison *et al.* 2018; Storchi-Bergmann & Schnorr-Müller 2019). Mapping the multiphase gas kinematics and distribution allow us to map and quantify the feeding and feedback processes of AGN. Recent studies, using near-IR integral field spectroscopy, have shown that the H_2 and ionised gas have distinct flux distributions and kinematics, with the former usually tracing gas in orbit in the disk of the galaxy and the latter tracing AGN winds usually extending to high latitudes relative to the galaxy disk (Riffel *et al.* 2015; Schönell *et al.* 2019).

We use J and K band integral field spectroscopy of the inner the 660×660 pc^2 of the Seyfert 2 galaxy NGC 1125 obtained with the Gemini NIFS instrument at a spatial resolution of ∼25 pc to map the emission-line flux distributions and kinematics of both molecular and ionized gas. We use the the python library IFSCUBE (Ruschel-Dutra 2020)to fit the emission line profiles of both ionized and molecular gas by two Gaussian functions. Figure 1 shows an example of the fitting of the [Fe II]$\lambda1.2570\,\mu$m and Paβ emission line profiles observed at the nucleus of the galaxy.

Figure 2 shows the flux, centroid velocity and σ maps for the Paβ narrow ($\sigma <$ 150 kms^{-1}) and broad ($\sigma > 150$ km s^{-1}) components. Similar maps are obtained for other near-infrared emission lines. For the narrow component, the flux distributions for all emission lines are more elongated along the major axis of the galaxy and the corresponding velocity fields show a similar rotation pattern as that of the stars. Thus, we interpret this component as being produced by emission from gas in the disk. On the other hand, most of the emission from the broad component is most extended perpendicular to the major axis of the galaxy, the velocity gradient is perpendicular to that of

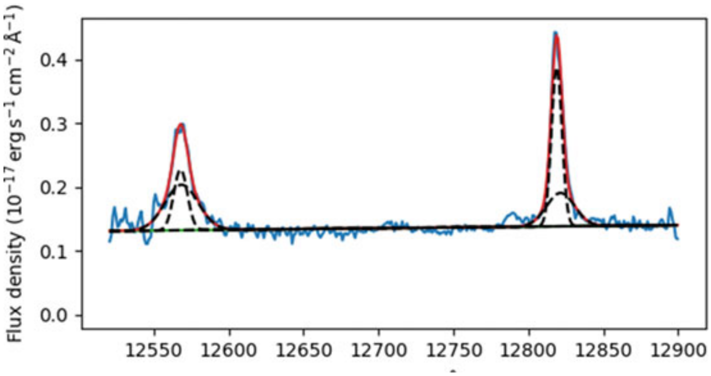

Figure 1. Example of fits of the [Fe II]$\lambda 1.2570\,\mu$m and Paβ emission-line profiles by two Gaussian components (black solid + black dashed lines). The observations are shown in blue and the fit of the gaussian is shown as the red solid line. The narrow component is attributed to emisson from the disk and the broad component from an outflow.

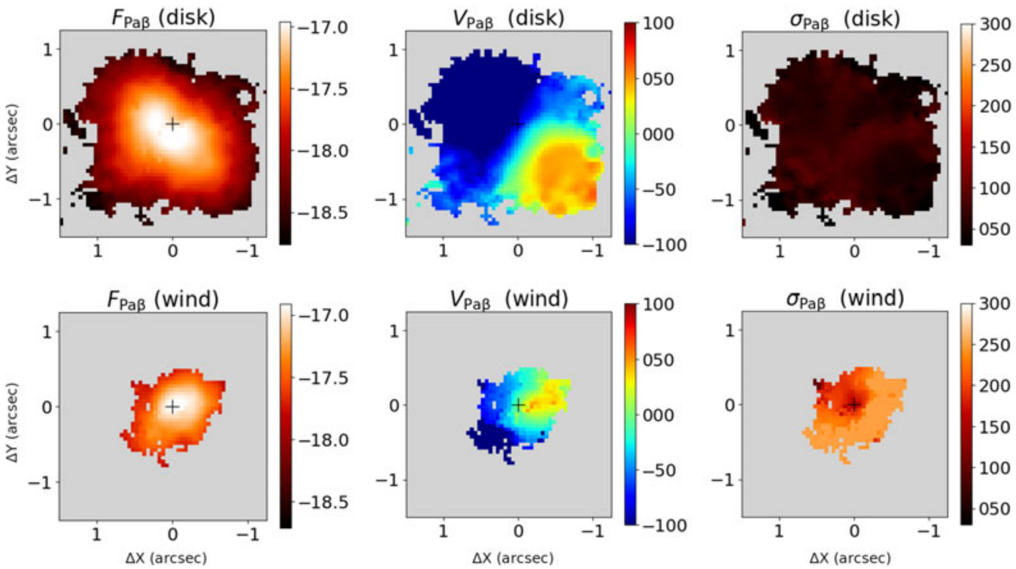

Figure 2. Flux (left), centroid velocity (middle) and velocity dispersion (right) maps for the disk (top) and wind (bottom) components of the Paβ emission line. The color bars show the fluxes in logarithmic scale of erg s^{-1} cm^{-2} spaxel^{-1} and the velocities (relative to the systemic velocity of the galaxy) and velocity dispersions (σ) in km s^{-1}.

the stars, and the velocity dispersion is higher than that observed for the stars and for the disk component. We interpret the observed broad component as a bipolar outflow.

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https://doi.org/10.1017/S1743921320002379 Published online by Cambridge University Press