

# AGN feedback on the ISM of 3C 236

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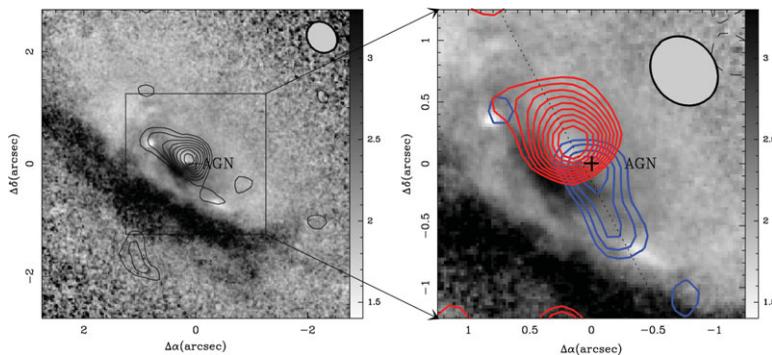
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**Abstract.** We have carried out 1mm/3mm continuum and  $^{12}\text{CO}(2-1)$  line high resolution observations to identify the footprints of AGN feedback on 3C 236. The CO emission comes from a spatially resolved disk characterized by a regular rotating pattern. Within the limits imposed by the sensitivity and velocity coverage of our data, we do not detect any outflow signatures in the cold molecular gas. Re-inspection of optical and IR spectra, shows the presence of a previously unknown ionized gas outflow. The star-formation efficiency in 3C 236, is consistent with the value measured in normal galaxies, which follow the canonical Kennicutt-Schmidt law. This result, confirmed to hold in other young radio sources examined in this work, is in stark contrast with the factor of 10–50 lower SFE that has been claimed to characterize evolved powerful radio galaxies. The recent reactivation of the AGN in 3C 236 is a likely explanation for the early evolutionary status of its molecular disk.

**Keywords.** galaxies: individual (3C 236) — galaxies: ISM — galaxies: kinematics and dynamics — galaxies: active — ISM: jets and outflows



**Figure 1.** **Left:** V–H color map (gray scale in STmag magnitude system) of 3C 236, with the integrated  $^{12}\text{CO}(2-1)$  emission overlaid. The contour levels are  $3\sigma$ , to  $6.5\sigma$  in steps of  $0.5\sigma$ , with  $\sigma=0.21 \text{ Jy km s}^{-1}$ . **Right:** Zoom into the central  $3''$ . Contours represent the  $^{12}\text{CO}(2-1)$  line maps integrated in two channels: *blue* ( $v_{\text{sys}}^{\text{CO}} - 330 \text{ km s}^{-1} < v < v_{\text{sys}}^{\text{CO}}$ ) and *red* ( $v_{\text{sys}}^{\text{CO}} < v < v_{\text{sys}}^{\text{CO}} + 485 \text{ km s}^{-1}$ ); color version of the figure is available online). The contour levels for the blue channel are  $0.39 \text{ Jy beam}^{-1}$  to  $0.91 \text{ Jy beam}^{-1}$  in steps of  $0.065 \text{ Jy km s}^{-1}$  ( $\sigma=0.12 \text{ Jy km s}^{-1}$ ). The contour levels for the red channel are  $0.39 \text{ Jy beam}^{-1}$  to  $0.59 \text{ Jy beam}^{-1}$  in steps of  $0.065 \text{ Jy km s}^{-1}$  ( $\sigma=0.14 \text{ Jy km s}^{-1}$ ). The dashed line shows the major axis of the molecular gas disk.

Full details about this work can be found in Labiano et al. *A&A*, in press.