## A multiwavelength study of a young, Z-shaped, FR I radio galaxy NGC3801

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Abstract. We present preliminary results from a multi-wavelength study of a merger candidate, NGC3801, hosting a young FR I radio galaxy, with a Z-shaped structure. Analysing archival data from the VLA, we find two HI emission blobs on either side of the host galaxy, suggesting a 30 kpc sized rotating gas disk aligned with stellar rotation, but rotating significantly faster than the stars. Broad, faint, blue-shifted absorption wing and an HI absorption clump associated with the shocked shell around the eastern lobe are also seen, possibly due to an jet-driven outflow. While 8.0  $\mu$ m dust and PAH emission, from *Spitzer* and near and far UV emission from *GALEX* is seen on a large scale in an Sshape, partially coinciding with the HI emission blobs, it reveals a ~2 kpc radius ring-like, dusty, starforming structure in the nuclear region, orthogonal to the radio jet axis. Its similarities with Kinematically Decoupled Core galaxies and other evidences have been argued for a merger origin of this young, bent jet radio galaxy.

## 1. NGC3801

NGC3801 is a nearby E/S0 galaxy at a distance of  $\sim$ 47.9 Mpc, with the body of the galaxy being crossed by two main dust features (Heckman et al. 1986; Verdoes Kleijn et al. 1999). A warped dust lane lies along the optical minor axis while patchy dust filaments are seen on the eastern and western halves of the galaxy. At brightness levels  $\mu_V \sim 23-24$  mag arcsec<sup>-2</sup>, the galaxy shows a hysteresis loop like structure while at even fainter levels, a boxy isophotal structure is seen (Heckman et al. 1986). It hosts a small radio galaxy with an angular size of  $\sim 50$  arcsec (11 kpc), whose jet axis is almost orthogonal to the rotation axis of the stellar component or orthogonal to the minor-axis dust lane (Heckman et al. 1985). Millimetre-wave observations have helped identify a radio core and clumps of CO(1-0) emission suggesting a r~2 kpc circum-nuclear rotating gas disk orthogonal to stellar rotation and perpendicular to the radio jet (Das et al. 2005). *Chandra* observations reveal shock-heated shells of hot gas surrounding the radio lobes (Croston, Kraft, & Hardcastle 2007). HI observations with the Arecibo telescope show gas in both emission and absorption, but higher resolution observations are required to determine its distribution and kinematics (Heckman et al. 1983). We present the first ever imaging study in HI, dust, UV and  $Pa\alpha$  emission.

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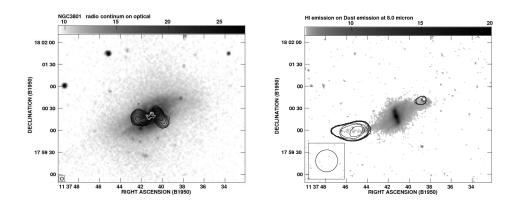


Figure 1. Left: 1.4 GHz radio continuum contours superimposed on the optical image. Right: Total intensity HI emission contours superimposed on dust emission.

## 2. Results and Discussion

Figure 1 shows the radio continuum image superimposed on an optical DSS blueband image in the left panel and the total intensity HI image superimposed on the 8.0  $\mu m$  dust/PAH emission image from the *Spitzer* on the right panel. The dust emission shows a prominent linear feature nearly orthogonal to the jet in the central region (r~2 kpc). We found that both the 8.0  $\mu$ m dust/PAH emission and UV emission from GALEX show similar  $\sim 30$  kpc wide S-shaped structure, representing young massive star formation in it. Our HI-emission study with the VLA shows emission blobs on the eastern (mostly red-shifted) and western (blue-shifted) sides, roughly coinciding with the tails of the S-shaped structure (Figure 1, right panel). These HI results suggest a rotating gas disk ( $V_{circ} \sim 280$ km  $s^{-1}$ ), with velocities nearly twice than that of the stars (cf. Heckman et al. 1985). In addition, broad, faint, blue-shifted absorption wing and an HI absorption clump associated with the shocked shell around the eastern lobe are seen, possibly due to jet-driven outflow. Due to its similarity with kinematically decoupled cores and other properties, we propose that a merger between a gasrich spiral galaxy and an elliptical galaxy has triggered its AGN activity and has shaped its stellar, gaseous and radio-jet structures. Detailed stellar population synthesis studies to understand its time evolution are in progress.

## References

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