

The Jets of NGC 6543

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Abstract. High spectral resolution observations of the high speed jets of NGC 6543 are presented. When deprojected, these give velocities of $V_{north} = -82.0 \text{ km s}^{-1}$ and $V_{south} = 63.8 \text{ km s}^{-1}$.

1. Observations and results

The Planetary Nebula NGC 6543 has several long narrow jet-like features visible in [NII] which are thought to be evidence of precessing jets (Harrington & Borkowski 1994). The two brightest jets were observed with the Manchester echelle spectrometer (Meaburn et al. 1984) combined with the f/7.9 2.1m San Pedro Martir telescope on 17/18 May 2001. The spatial resolution was $0.35 \text{ arcsec pixel}^{-1}$ on the SITE 3 1024×1024 ($24 \times 24 \mu\text{m}^2$) pixel CCD detector. A slit width of $70 \mu\text{m}$ (0.87 arcsec) was used, giving a velocity resolution of 4.5 km s^{-1} . The slit positions are shown in Fig. 1. Observaton times were 1800 seconds for both slit positions.

Fig. 2(a) shows the [NII] 6584 Å nebular emission line for slit position 1. The jet is visible at around $V_{HEL} = -100 \text{ km s}^{-1}$, giving a radial velocity with respect to the systemic, $V_r = -41.0 \text{ km s}^{-1}$. Slit postion 2 (Fig. 2(b)) shows the jet along with a feature at a smaller red shift, probably emission from the polar cap. The jet has $V_r = 31.9 \text{ km s}^{-1}$. If the observed ellipse A (Fig. 1) is actually a circular ring, an inclination of its axis to the plane of the sky of $\sim 30^\circ$ is implied. Therefore the deprojected jet speed is $V_r / \sin 30^\circ = 2V_r$, giving $V_{north} = -82.0 \text{ km s}^{-1}$ and $V_{south} = 63.8 \text{ km s}^{-1}$ in the north and south jets respectively. An interesting feature in Fig. 3 is the faint blue shifted component which is possibly a remnant from a time when the southern precessing jet was angled towards us as opposed to away from us as it is now.

References

Meaburn, J. et al. 1984, MNRAS, 210, 463

Harrington, J. P. & Borkowski, K. J. 1994, BAAS, 26, 1469

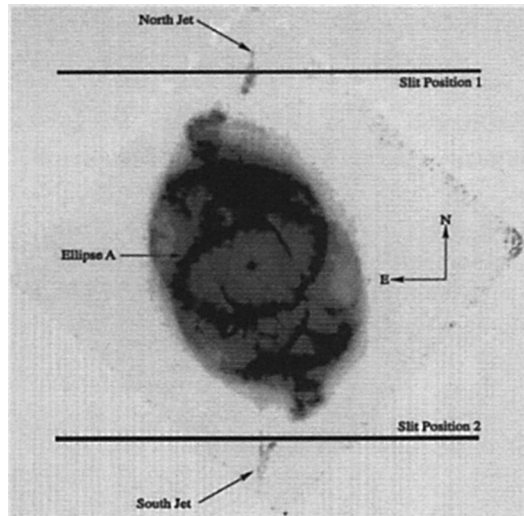


Figure 1. The 36x36 arcsecond WFPC2 image (ref. GO 5403, PI: J.P. Harrington) showing slit positions 1 and 2.

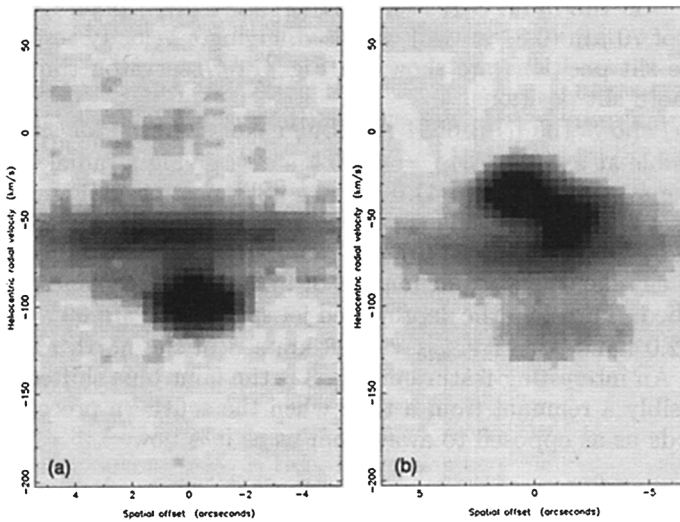


Figure 2. $[\text{NII}]$ 6584 Å emission lines from slit position 1 (a) and slit position 2 (b). East is a positive spatial offset.