

High Resolution Observations of BD +30 3639 – A Young PN

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Sub-arcsecond resolution radio and optical images of the young planetary nebula BD +30 3639 look superficially very similar, showing a pronounced box-shaped bright nebular shell. However, a detailed comparison at high spatial resolution reveals several regions where the optical emission is obscured by localised dusty regions. The highest resolution radio image to date of this PN, a 6 cm map obtained by combining MERLIN and VLA observations (Bryce et al, 1996) has been compared to the highest resolution optical $H\beta$ image from the Hubble Space Telescope (obtained by J.P. Harrington and collaborators) to reveal the differences in emission which are probably due in the main to dust obscuration at optical wavelengths (Bryce et al, 1996 & Arnaud, Borkowski & Harrington, 1996). New 6 km s^{-1} resolution, spatially resolved spectra of optical emission lines, obtained using the Utrecht echelle spectrometer on the 4.2 m William Herschel Telescope, show that this nebula is bright in the low ionisation emission lines of [N II] 6548 + 6584 Å and also appears to be more spatially extended than in the fainter, high ionisation [O III] 5007 Å emission. The velocity ellipse observed from a long slit oriented north-south was found to be tilted, indicating an inclined, elliptical morphology rather than a simple, radially expanding spherical shell and the gaps in the velocity ellipse observed with an east-west slit suggest that the true shape is probably an open ring-like structure rather than a closed shell. A deep exposure of the [N II] 6584 Å emission line appears to show a collimated, accelerating flow in an eastward direction away from the central star and extending well beyond the main bright nebular ring. It was also observed in the Hydrogen and [N II] 6548 Å emission lines. The H_2 1–0 S(1) image of BD +30 3639 by Graham et al (1993) also shows a feature to the east of the main nebular ring. This may well be related to faint halo structures detected by Harrington and collaborators from their HST images (private communication).

REFERENCES

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