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UNVEILING THE STRUCTURE OF THE PLANETARY NEBULA M 2-48

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The PN M 2-48 is formed by three main structures, namely, a bipolar central region (CR), a set of knots tracing a semicircular shell surrounding CR, and two symmetric bow-shocks. CR shows a kinematic structure corresponding to a bipolar shell, with an expansion velocity of $\simeq 50\,\mathrm{km\,s^{-1}}$. The semicircular shell appears to be expanding at $\simeq 20\,\mathrm{km\,s^{-1}}$, except in the regions aligned with the bow-shocks, which are interpreted as jet-shell interaction zones at $\simeq 100\,\mathrm{km\,s^{-1}}$. Finally, the bow-shocks have uncorrected velocities of $\simeq 80\,\mathrm{km\,s^{-1}}$. An inclination angle of 10° with respect to the plane of the sky is estimated using simple bow shock models.

High-dispersion (HD) spectroscopy was obtained in 1999, June 29 and 30, with the spectrometer MES (Meaburn et al. 1984) attached to the 2.1-m OAN telescope. A 90 Å bandwidth filter was used to isolate the 87th order, containing Hα and [N II] $\lambda\lambda$6548, 6584 lines.

In Figure 1, the slit positions A-F are shown against a contour map of a [N II] 6584 image. The 150 μm wide ($= 10\,\mathrm{km\,s^{-1}}$) slit was oriented East-West (A-D) and North-South (E-F). The exposure times were of 1800 s for each slit position. The spectra were wavelength calibrated to an accuracy of $\pm 1\,\mathrm{km\,s^{-1}}$.

An array of [N II] 6584 Å position-velocity (PV) maps, formed by the HD spectra (slits A-D), is shown in Figure 2. The complex kinematics of the main components of M 4-18 is evident, even revealing some features which were not detected previously.

The main results of our work are:

1. The bright central bipolar region presents a heliocentric expansion velocity of 50 kms^{-1}.
2. We propose that the knots around the bipolar core are forming two slow expanding arcs.
3. We confirm that the structure s1 is the interaction of an outflow with the east arc.

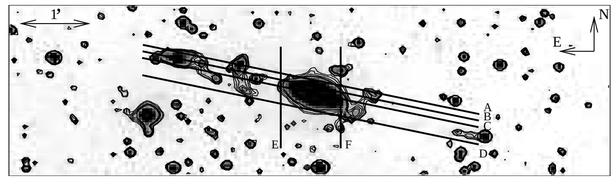

Fig. 1. The slit positions A-F are marked against a gray-scale representation and contours of the [N II] emission of M 2-48.

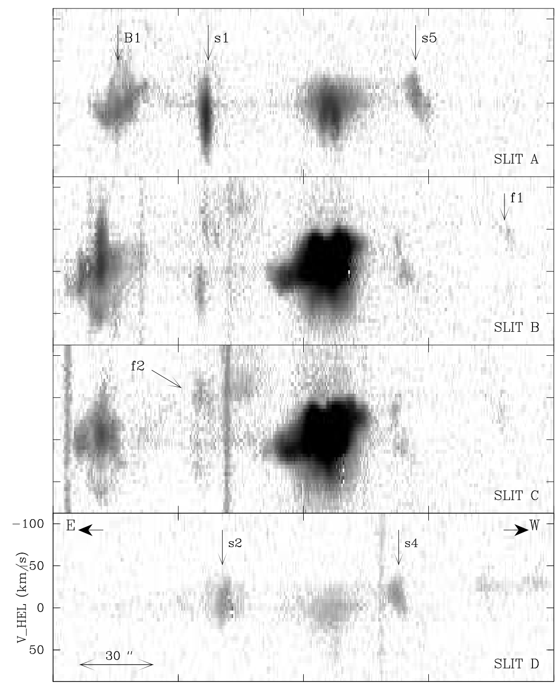

Fig. 2. Gray-scale representation of the PV arrays of [N II] 6584 Å along slits A-D. The different features are labeled following Vázquez et al. (2000).

4. We detect a bow-shock, B1, at $\approx 2'$ of the bipolar core. The symmetrical counterpart is only marginally detected.

REFERENCES

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