

Narrow-band Imaging of NGC 7026

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NGC 7026 is one of the most remarkable bipolar planetary nebulae in the northern sky. There is an increasing interest in sources of this kind, as they indicate that anisotropic outflow phenomena play a significant role in the final evolutionary stages of massive stars. To investigate the spatial distribution of the excitation conditions in this nebula, and to get information about the structure of the progenitor's red giant wind, we started a multi-wavelength survey taking high spatial resolution line images in the visible, near and mid-infrared range using the Calar Alto and UKIRT telescopes. The instruments used are the STScI optical coronagraph (Paresce & Burrows, ESO Messenger 47, 1987), the MAGIC IR camera (Herbst *et al.*, SPIE Proc.N.1946, p.605, 1993), and the new MPIA thermal IR imager MAX. We present here some preliminary results, which allows us to estimate the main physical parameters of the central star, to find evidence for significant shock emission at the polar regions of the nebula, and to reveal an unexpected deficit of H₂ emission.

- The extinction appears to be fairly uniform around $A_v = 2.5$, reaching a maximum value $\cong 3.3$ at the two bright lobes' position. Because of this uniformity, the observed morphology is unaffected by the circumstellar emission.
- The central star dereddened continuum flux at 5480 Å, obtained through a black-body extrapolation from the HST image, is: $F_{5480} = 3.98 \cdot 10^{-15} \text{ erg s}^{-1} \text{ cm}^{-2} \text{ Å}^{-1}$. The corresponding apparent magnitude is 16.95, i.e. $\simeq 1.0 - 2.8$ magnitudes fainter than that reported by other authors. Zanstra method gives for the central star $T = 176,000 \text{ K}$; assuming a distance of 2180 pc, we found $R = 0.086 R_\odot$ and $L = 6,300 L_\odot$. Locating the star on the Wood & Faulkner (1986, ApJ 307,659) evolutionary tracks, we obtain for the stellar mass $M \simeq 0.65 - 0.72 M_\odot$.
- Images taken in various optical and near-IR recombination lines reveal the complex excitation status of this source. Several filaments are protruding from the equatorial regions to the poles. The occurrence of high excitation conditions in the polar regions, well beyond the nebular core, indicates the presence of shock interaction spatially resolved in our images.
- An image taken at UKIRT with MAX in the N band filter shows that the dust distribution is restricted to the equatorial region; the total flux measured in the band is 2.2 Jy, in excellent agreement with the IRAS data.
- We find no evidence for H₂ emission above $3 \cdot 10^{-16} \text{ erg cm}^{-2} \text{ s}^{-1} \text{ sq. arcs}^{-1}$. This is unusual, since the presence of H₂ emission is normally associated with bipolar nebulae. Possibly, in this nebula the dust spatial distribution and opacity to the ionizing radiation don't provide a convenient environment for the H₂ catalysis and survival.