Supporting Online Material for

A Symmetric Bipolar Nebula Around MWC 922

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1 Supporting On-line Material
A symmetric bipolar nebula around MWC 922

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1 Observations and Image Processing

High angular resolution observations of MWC 922 were made using the PALAO adaptive optics system [s1] and PHARO infrared camera [s2] on the Mt. Palomar 200” telescope. An image recovered by mosaicing together a number of separate exposures taken through an H-band filter (bandpass 1.487 – 1.783 μm) with a total integration time of 15 minutes is given in Figure 1. This summation of shorter exposures leads to an extremely high dynamic range in the final image, making it difficult to render the full spectacle of detail that ranges from the bright core to faint structures in the outer nebula over a surface brightness range in excess of 2000:1. In order to enhance the visualization of features from the bright core to the faint extended nebula, Figure 1 panel (b) displays the H-band image after Laplacian filtering [s3] (a kernel size 20 pixels which was found to smooth out image granularity while avoiding unacceptable loss of information) which accentuates regions of rapidly-varying source structure.

With the underlying skeleton of the nebula laid bare, the fitting of structures to this image generated the model depicted in Figure 1 panel (c). Image artifacts, depicted in blue as horizontal and vertical straight edges, are due to small mismatches in gain and flat-fielding, and charge persistence effects in the detector. Five neighboring faint stars have been plotted in green, illustrating the AO-corrected point-spread function with the characteristic box-pattern (or waffle) due to singular modes of the AO reconstructor [s4]. Faint diffraction rays can also be seen. Remaining image structures, illustrated in red in the model, are from the Red Square nebula. Separate images were taken after rotation of the telescope cassegrain ring, which rotates the AO system and instrument with respect to the sky. Detector and optical artifacts
generally remain fixed, but real features must move by the given angle [s5]. These tests confirmed that none of the real structures reported here is an artifact.

References


