A SINGLE STAR MODEL FOR V 1016 CYGNI

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We present a model of the emission object V1016 Cygni consistent with the current optical, infrared and radio observations. V1016 Cygni is 4.2 ± 1.0 kpc from the sun. It was originally an M star which ejected $\sim 0.017\ M_\odot$ at 35 kms^{-1} over a period of ∿600 years producing a neutral nebula with an r^{-2} density distribution. This process ceased in 1961.3 ± 3.0 when the nebula detached from a remnant hot core ($T \gtrsim 80{,}000K$, $R \lesssim 1.5\ R_\odot$). By 1964 .1 ± 0.3 the nebula was ionized by the UV radiation from the core, producing the observed emission line spectrum. The infrared energy excess comes from two dust components of ∿1000°K and ∿250°K, which absorb UV photons from the star. The dust is concentrated into clumps which 1) provide high density areas on their inner side, allowing strong [OIII] λ4363 to remain; 2) shield the regions on their outer side permitting low excitation lines to be present; 3) explain the observed emission line structure. A stellar wind of 105 km/s helps to keep the centre of the ejected nebula hollow. We suggest V1016 Cygni is an example of a low mass planetary nebula in the formation stage.

OPTICAL HISTORIES OF SOME POSSIBLE EMBRYONIC PLANETARY NEBULAE

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From the list of stellar emission-line objects which exhibit radio spectra characteristic of uniform radial mass outflow, we have selected those objects which might be considered possible embryonic planetary nebulae. Our criterion was to choose those mass outflow objects with exciting stars of the types characteristic of central stars of non-stellar (i.e., normal) planetary nebulae. These objects are Hb 12, Hen 1044, HD 167362, and possible M2-9, Vy 2-2, and H1-23.

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