

ABOUT THE SUSPECTED VERY YOUNG PN IRAS 17516-2525

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Infrared photometry suggests that IRAS 17516-2525 is in transition from the AGB to a young PN (Van der Veen et al. 1989a,b, Machado et al. 1989). IR spectra (van der Veen et al. 1989b, Käuffl et al. 1992) revealed that the object has an ionized core. Optical observations show a weak H_{α} emitting unresolved object (Käuffl et al. 1992) at the coordinates ($\alpha_{1950} : 17^h 51^m 37.8^s$, $\delta_{1950} : -25^{\circ} 25' 58''$) suggested by van der Veen et al. (1989a). The spectrum between 2.0 and $2.4\mu m$ shows e.g. Br_{γ} , $2.0875\mu m$ (unidentified) or the Na_I -doublet but no molecular Hydrogen (present in other compact PNs). The ratio of Pf_{β} to Br_{α} (hardly affected by extinction, insensitive to electron density and temperature) has been studied in IRAS 17516-2525 and Hen1044. For Hen1044 we find this ratio to be in accordance with theoretical calculations (Hummer and Storey, 1987). For IRAS 17516-2525, however, Pf_{β} is approximately twice as strong. Hence presumably Hen1044 is optically thin whereas IRAS 17516-2525 is optically thick at $\lambda \approx 4-5\mu m$. Line fluxes appear to be constant over a time scale of 4 years. If the visual extinction A_V in the object is $\geq 2^{mag}$ than the infrared luminosity equals the total luminosity (i.e. $L = 1400L_{\odot} * (\frac{distance}{kpc})^2$). A main-sequence object accidentally extinguished by an intervening cloud can be excluded because the observed line-width of Br_{α} ($\approx 40 \frac{km}{s}$, Van der Veen et al. 1989a) is too small as compared to that of O-stars ($\approx 1000 \frac{km}{s}$, Käuffl, 1992). Assuming an expansion-velocity of $\approx 20 \frac{km}{s}$ the stellar appearance constrains dynamic age and size ($age \leq 360y * \frac{distance}{kpc}$, $size \leq 1500AU * \frac{distance}{kpc}$). A pre-main sequence object can also be excluded. The max. luminosity ($L_{PMS} \leq 5000L_{\odot}$) then requires the object to be closer than 2 kpc where it should be resolvable. In conclusion the observational evidence strongly suggests that IRAS 17516-2525 represents the searched 'missing link' between AGB stars and young compact Planetary Nebulae.

References

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