

## CHANGES IN EMISSION LINE INTENSITIES OF HBV475

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Some of the results in the spectroscopic observation of HBV475 are presented.

Relative emission line intensities to  $H\beta$  are obtained by quantitative analysis (Tamura, 1977, submitted to Astrophysical Letters). The most conspicuous character of these spectra are (i) appearance of emission lines of  $Fe^{+6}$  and  $Ca^{+4}$ , (ii) strengthening of  $HeII\ \lambda 4685$  in comparison with Andrillat (1973, Mem.Soc.R.Sciences Liège, VI., 5, 371).  $I([FeVII]\ \lambda 6087)/I([FeVII]\ \lambda 5159)$  suggests that the electron density in the  $Fe^{+6}$  zone is  $10^6$  to  $10^7\text{cm}^{-3}$  if an electron temperature  $T_e = 20,000^\circ\text{K}$  is assumed. The electron temperature of the  $O^{+2}$  zone is about  $6,000^\circ\text{K}$  from the intensity ratio of  $O^{+2}$  if we assume the electron density is greater than  $10^6\text{cm}^{-3}$  from the absence of [OII] doublet.  $I(N1+N2)/I(H\beta)$  and  $I(HeII\ \lambda 4685)/I(H\beta)$  show different excitation classes, namely, 3 and 8.

It may be considered that (a) the temperature of an exciting star of nebular matter is progressively increasing, (b) an ionization stratification is established by  $Fe^{+6}$ ,  $He^{+2}$ , and  $O^{+2}$ . One can recognize the existence of mass motion from emission line profiles of [FeVII] in a relatively high dispersion spectrum (Tamura, in preparation).

In conclusion, HBV475 gives us a scene of planetary nebula formation since rapid change of the exciting star and mass ejection from it are suggested even now by spectral variations.

## DENSITY DISTRIBUTION AND CHEMICAL ABUNDANCES IN NGC 7027

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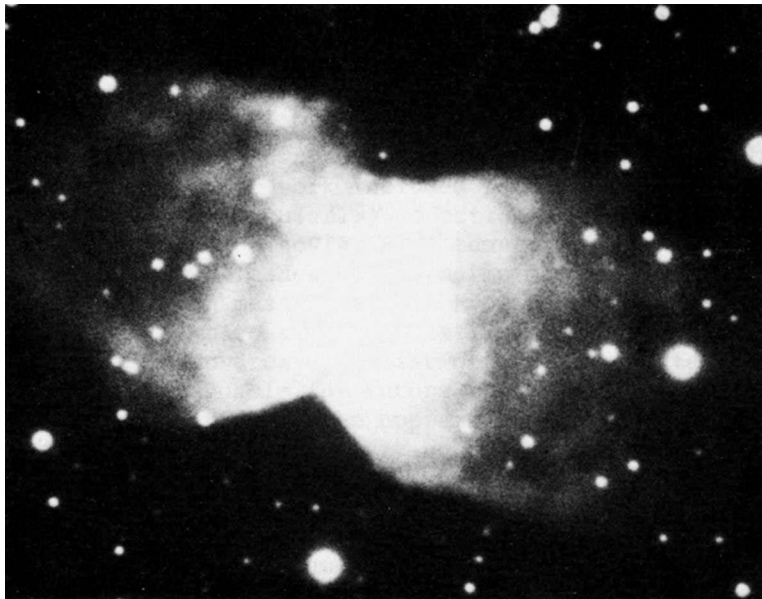
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The data available on permitted and forbidden line intensities of the planetary nebula NGC 7027 have been analyzed in terms of non-constant density models. The significance of the derived density distribution is discussed. Some implications to the determination of the chemical abundances are also discussed.



NGC 7008



NGC 2346