OBSERVATIONS OF THE 3.3μm EMISSION FEATURE IN PLANETARY NEBULAE

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Absolute fluxes of the 3.3μm features were measured for 12 planetary nebulae. Both narrow-band photometry and low resolution spectrophotometry were used. Photometry was performed with narrow bandpass filters centered at 3.28μm and 3.72μm($\lambda/\Delta\lambda$ = 14). Using a CVF spectrophotometer, the 3.1μm - 3.8μm spectra of four nebulae (IC 418, IC 2149, NGC 6543, NGC 6572) were obtained. The values of the fluxes measured with the two different methods agree well.

The 3.3μm feature appears in the spectrum of each nebula. In addition, the spectral scans show the 3.4μm feature to be present in IC 2149, to be weak or probably absent in NGC 6572 and to be absent in IC 418 and NGC 6543.

The intensities of the 3.3μm feature of the planetary nebulae in our sample are correlated with the total infrared emission (taken from Mosley, H. 1980, Ap. J. 238, 892 and Cohen, M. and Barlow, M.J. 1980, Ap. J. 238, 585). This implies that the 3.3μm emission is associated with the major dust component. No correlations between this feature and other parameters of either the nebula or the central star were found.

LOW TEMPERATURE DIELECTRONIC RECOMBINATION COEFFICIENTS FOR IONS OF C, N AND O

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Dielectronic recombination coefficients have been calculated for some ions of C, N and O by Storey (1981, Mon. Not. R. astr. Soc., 195, 27P). Using the same approach, we have extended those calculations to all other ions of C, N and O for which a dielectronic contribution to the

total recombination coefficient might be expected at nebular temperatures. Recombination coefficients have been calculated in the temperature range from 5000 K up to the temperature at which the Burgess general formula becomes valid. The total dielectronic recombination coefficients are fitted to a simple function of the electron temperature.

RECOMBINATION SPECTRA OF PLANETARY NEBULAE

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The lines of the transitions between the subordinate levels of the CIII, NIII etc. ions are observed in the spectra of planetary nebulae (PN) (1). Their theoretical intensities may be found by solving the stationarity equations and accounting for both the recombination and cascade radiative transitions. It is possible to calculate the recombination spectra in various approaches: the single- or multi-configuration approximations (SCA and MCA) making use of both the superposition of configurations (SC) or the multiconfigurational Hartree-Fock-Jucys equations (2), taking into consideration the contribution of the dielectronic recombination to the intensities of the recombination lines. The energy spectra, the transition probabilities etc., as a rule ought to be calculated in the intermediate coupling scheme (2). Both analytical or numerical (e.g. Hartree-Fock) wave functions may be adopted.

In the framework of the above-mentioned approximations we have calculated the probabilities of many transitions in the ions CIII, NIII, OIII etc. In Table 1 some transition probabilities (in 10^8 s^{-1}) are presented as examples.

The transition probabilities found were used for calculations of the intensities of the recombination lines of the ions under consideration. It turned out that the accounting for the correlation effects improves essentially the coincidence of the theoretical lines and those observed in the spectra of PN. Taking into account the two-electron transitions we can explain the appearance and calculate the intensities of the lines caused by the transitions from doubly excited configurations in CIII and NIII.

https://doi.org/10.1017/S0074180900094146 Published online by Cambridge University Press