

Posters

(in alphabetical order)

Symbiotic Stars and Planetary Nebulae in the $\lambda 5007/H\beta$ vs. $\lambda 4363/H\gamma$ Diagnostic Diagram

N. O. Baella¹

¹Observatorio Nacional, MCT
Rua Gen. Jose Cristino 77, Rio de Janeiro, 20921-400, Brazil
email: baella@on.br

Abstract. In this work the location of a sample of 174 flux measurements (planetary nebulae, S, D, D'-type Symbiotic Star (SS) and six peculiar objects) on the $\lambda 5007/H\beta$ vs. $\lambda 4363/H\gamma$ diagnostic diagram are compared, in order to investigate possible differences in electron density and temperature among them. Helium abundances, electron density and temperature were obtained for five D'-type SS and HD149427 (PC 11). In order to calculate them, expressions normally used for objects with low density were modified, in such a way that they can be used in objects with higher densities.

Keywords. binaries: symbiotic, novae, cataclysmic variables, planetary nebulae: general

Several efforts have been made to separate PN from SS on the basis of observations in the visual region of the spectrum only. For example, a BPT Diagram (Baldwin, Phillips & Terlevich 1981) separate emission-line objects according to their excitation mechanism. In Fig. 1, we have drawn three lines which separate tentatively three regions, which contain PN, S-type and D+D' symbiotic stars. But the separation between D and D'-Type symbiotics is not so clear. The region of PN have two regions: High-Excitation PN (PN Region-1, $\lambda 5007/H\beta > 1$) and Low-Excitation PN (PN Region-2, $\lambda 5007/H\beta < 1$). SS and PN are objects which differ greatly in their electron density. Then, the behavior of the intensities of the [OIII] lines at $\lambda 5007$ and $\lambda 4363$ should allow one to separate them. Several authors have mentioned the possibility of the existence of an evolutionary relation between PN and SS, but there is no general agreement concerning this possibility. Fig. 1 shows the S-type SS region, indicating two possible S-Type SS. There are a new sub-class of S-Type symbiotic stars: S₁ and S₂?

Symbiotic Nova 'Walk': Symbiotic Nova V1016 Cyg is classified as a D-type SS, considered to belong to a sub-class of SS which have been called protoplanetary nebulae. An outburst was observed in 1965. This may be seen in Fig. 2. In that year, V1016 Cyg reached the position of closest proximity to symbiotic-limit. Also, V1016 Cyg move in a particular region of the graph: the right side of symbiotic-limit line. Then, is there a possible relation between outburst and symbiotic-limit position? The theoretical limit for high temperature (Fig. 2) is in good agreement with the simbiotic-limit observed in the diagrams. V1016 Cyg seems to have returned to its initial conditions after 22 yr.

This work was based on the paper 'A Diagnostic Diagram for Planetary Nebulae and Symbiotic Stars' by Gutierrez-Moreno, A., Moreno, H. & Cortes, G. (1995).

References

- Baldwin, J. A., Phillips, M. M., & Terlevich, R. 1981, *PASP*, 93, 5
Gutierrez-Moreno, A., Moreno, H., & Cortes, G. 1995, *PASP*, 107, 462

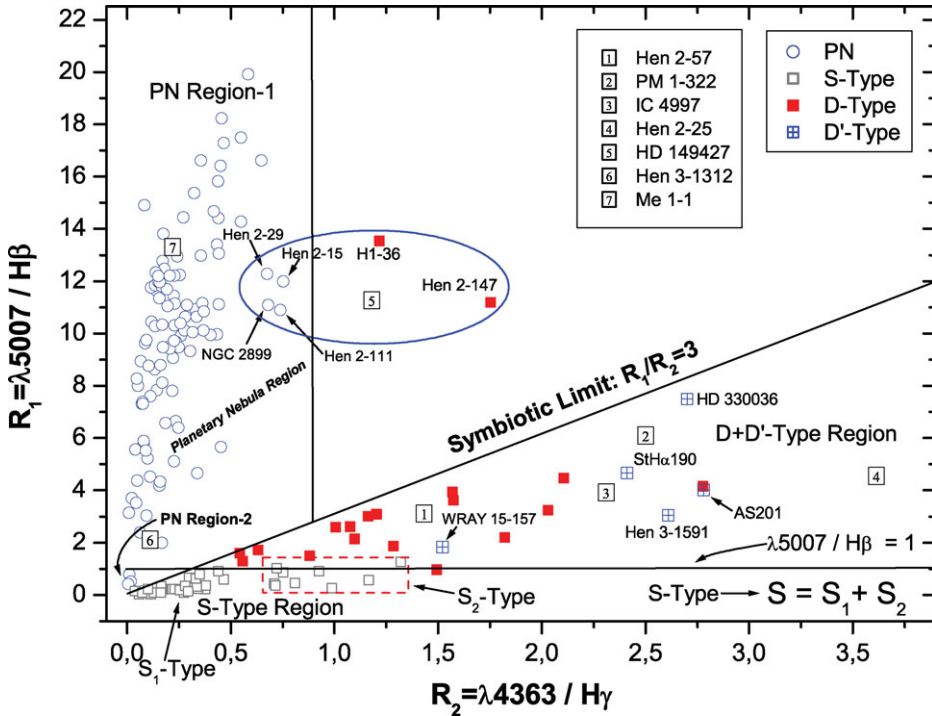


Figure 1. The $\lambda 5007/H\beta$ vs. $\lambda 4363/H\gamma$ Diagnostic Diagram.

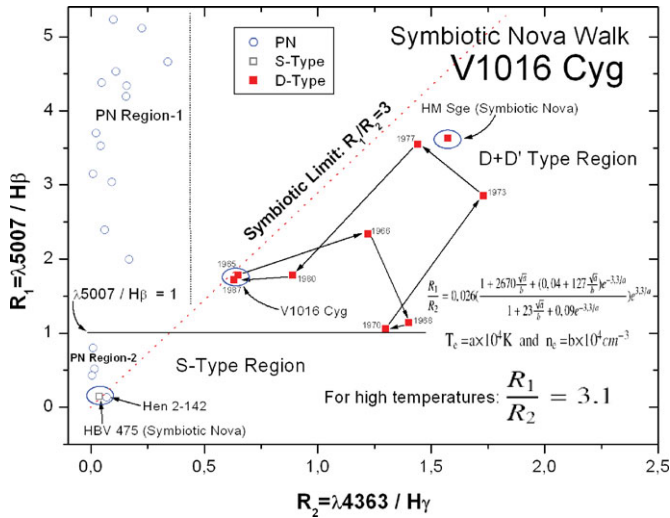


Figure 2. Symbiotic Nova 'Walk' (V1016 Cyg)