

The Strength of the Low-Ionization Emission Lines in Type I PNe

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I have performed a statistical analysis on a group of emission line ratios of a sample of PNe. The optical data was taken from ELCAT2 Catalogue (<http://www.stsci.edu/pub/elcat>). Some observations of H–H objects were also included for comparison.

The main objective is to give insight into the properties that characterize the spectra of PNe. With this aim, I have plotted a group of diagrams based on line ratios involving [OI] λ 6300 Å, [OII] λ 3727 Å, [OIII] λ 4363, 5007 Å, [NI] λ 5200 Å, [NII] λ 5755, 6583 Å, [SII] λ 6717, 6731 Å and HeII λ 4686 Å as well as HI Balmer emission lines. Both PNe groups show different low-ionization spectra. The [SII] (6717+6731)/H α vs. [OI] 6300/H α diagram shows the cleanest separation, with three distinct zones corresponding to each group. The non-Type I PNe have the lowest values, while HH objects are located in the upper-right corner of the diagram. The Type I PNe adopt intermediate values.

The diagrams illustrate that: (i) it is possible to distinguish the spectra of a non-Type I and Type I PNe by some N independent ratios; and (ii) the spectra of the Type I PNe and the HH objects share some properties concerning the low-ionization emission lines.

There are some explanations that can be regarded as responsible for the spectral differences between the non-Type I and the Type I PNe: (i) the presence of shocked regions inside the latter group, (ii) the presence of filaments and/or dense condensations in the Type I PNe where the charge exchange reactions are enhanced (see Riera et al. also presented here).