RevMexAA (Serie de Conferencias), **12**, 169–169 (2002)

EXPANSION VELOCITIES FROM DIFFERENT IONS OF PLANETARY NEBULAE WITH [WC]-TYPE CENTRAL STARS

S. Medina and M. Peña

Instituto de Astronomía, Universidad Nacional Autónoma de México, Apdo. Postal 70-264, 04510 México, D. F., México (selene,miriam@astroscu.unam.mx)

Ionized Gaseous Nebulae (Mexico City, 21-24 November 2000)
Editors: William Henney, José Franco, Marco Martos, & Miriam Peña

About 50 PNe in our Galaxy are known to have central stars of the carbon sequence Wolf-Rayet ([WC]) type stars and their atmospheres are almost pure helium and carbon. It has been suggested that the spectral sequence of [WC] stars and the "weak emission line stars" (WELS, as defined by Tylenda et al. 1993) corresponds to the following evolutionary sequence: late-[WC] $\rightarrow$ early-[WC] $\rightarrow$ WELS $\rightarrow$ PG 1159 type stars. This suggestion is based upon both the analysis of the stellar atmospheres and the nebular properties of the planetary nebulae around [WC] stars (WRPNe) (e.g., Parthasarathy et al. 1998). This suggestion is controversial (Gorny & Tylenda 2000; Peña et al. 2001) and in order to study the nature and evolution of WRPNe and WELS, we have obtained a homogeneous high spectral resolution (echelle) data set of 30 planetary nebulae and their nuclei using the 2.1-m telescope at the Observatorio Astronómico Nacional, San Pedro Mártir, México.

High resolution is essential to estimate the expansion velocities of the nebular envelopes and in the present work we present preliminary results of the kinematic analysis of these objects from several nebular lines of different ionization degrees in order to map the kinematics along the ionization structure of the nebula.

We have analyzed the expansion velocities ($V_{\rm exp}$) of different ionization species and we have found no systematic trends. In each object, high and low ionization species show the same $V_{\rm exp}$. Although $V_{\rm exp}$(H I) vs. $V_{\rm exp}$(low ionization stages) diagrams show larger spreading than $V_{\rm exp}$(H I) vs. V(high ionization stages) diagrams.

In general, expansion velocities show no correlation with nebular physical conditions ($T_{\rm e}$, $N_{\rm e}$, excitation class) nor with stellar [WC]-type. This latter result seems to un-favor the stellar evolutionary sequence previously proposed.

Another result is that no correlation has been found between the [O II]/[O III] expansion velocity ratios and the nebular parameters.

A few objects, BD+30 3639, K2-16 and IC1747, show an anomalous behavior. In the cases of BD+30 3639 and K2-16, they show $V_{\rm exp}$ in [O III] higher than in H I by a factor of two, while IC1747 shows a higher $V_{\rm exp}$ in H I than in [O II]. A thorough study is needed to explain such anomalies.

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