

PLANETARY NEBULAE AND STELLAR POPULATIONS

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Recent work on galactic planetary nebulae (PN) has emphasized the complex nature of this galactic subsystem (W. J. Maciel, *31st Herstmonceux Conference*, ed. R. Terlevich, in press). A fairly large amount of data is now available, including distances, galactic distribution, kinematical properties, and chemical composition of the nebular gas, supplemented by data on the central stars for some objects. In this work, a large sample of PN is used to study the different stellar populations associated with the galactic nebulae. It is seen that the available data imply a physical description of the PN phenomenon that is consistent with an evolutionary model based on stellar populations.

Our total sample includes about 160 objects. The average height $\langle |z| \rangle$ from the galactic plane and the height where half of the sample is contained $|z_{1/2}|$ vary according to the PN type, as follows: 150/110 pc (Type I); 280/210 pc (Type IIa); 350/250 pc (Type II); 420/300 pc (Type IIb); 660/400 pc (Type III); and 7200/6900 pc (Type IV). Although the absolute value of the scale given can be affected by the incompleteness of the sample, it is clear that the average distance from the plane increases according to the sequence I, IIa, IIb, III, and IV.

The average peculiar velocities of PN $\langle |\Delta V| \rangle$, and the velocity where half of the sample is contained, $|\Delta V_{1/2}|$ also show a progression according to PN types: 19.9/18.2 (Type I); 21.3/18.0 (Type IIa); 20.7/19.3 (Type II); 20.1/20.5 (Type IIb); 79.7/66.1 (Type III); 172.8/167.2 (Type IV). Notice that for Types I and II the velocities are essentially the same, given the average uncertainty of about 10 km/s in the radial velocities.

The chemical composition analysis confirms the results given above, both for the elements synthesized by large mass stars (O, Ne, S, Ar, and Cl) and for the elements synthesized by intermediate mass stars (He, N, C). As a conclusion, a tentative classification for galactic PN would be, which updates the scheme given previously (W. J. Maciel, *IAU Symp. 131*, ed. S. Torres-Peimbert, Kluwer, 1989): Type I (Pop. I old); Type IIa (Pop. I old/I disk); Type IIb (Pop. I disk); Type III (Pop. II intermediate); Type IV (Pop. II extreme); Type V (Pop. I old/II extreme).

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