FILLING FACTORS AND IONIZED MASSES OF PLANETARY NEBULAE

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We present a study on the filling factors and ionized masses of four sets of galactic and extra–galactic planetary nebulae (PNe) at known distances. The calculation of filling factors and ionized masses has been pursued as to get a deeper insight on the evolution of this class of objects. We used a galactic set of PNe, another set of nebulae that are averagely located near the galactic center, and two sets of nebulae in the Magellanic Clouds. As input data, we used the electron densities derived from the forbidden line intensity ratios, the $H\beta$ nebular fluxes, the distances of galactic PNe derived from extinction, and the distances of galactic center PNe and of extra–galactic PNe derived from galaxy (or galactic region) memberships. All these quantities, plus the input angular radii, have been selected among the most recent measurements available in the literature. We obtained several interesting results. (1) The calculated filling factors are on average much smaller than what is usually assumed, independently for each set. (2) The ionized masses are all in good agreement with the theoretical predictions, with the possible exception of the Galactic Bulge PNe. (3) Both filling factors and ionized masses cover a wide range of values as it is shown in the cumulative histograms below (filled circles=local PNe; open circles=galactic center PNe; filled squares=LMC PNe; open squares=SMC PNe).