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PLANETARY NEBULAE NEAR THE GALACTIC CENTRE: CHEMICAL ABUNDANCES

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In this work, we report physical parameters and abundances derived for a sample of high extinction planetary nebulae located in the Galactic bulge, near the Galactic Centre, based on low dispersion spectroscopy secured at the SOAR telescope using the Goodman spectrograph. The results show that the abundances of our sample are similar to those from other regions of the bulge. Nevertheless, the average abundances of the Galactic bulge do not follow the observed trend of the radial abundance gradient in the disk.

Planetary nebulae (PNe) are the offspring of stars within a large mass interval ($0.8 - 8\,M_{\odot}$). They constitute an important tool to study the chemical evolution of the Milky Way and other galaxies, probing the nucleosynthesis processes, abundance gradients and the chemical enrichment of the interstellar medium (ISM). The fact that PNe are originated from stars of different masses difficults the construction of representatives samples for unbiased chemical composition studies. So that, the presently available chemical composition studies of PNe are strongly biased, since they were focused on brighter objects, predominantly located in Galactic regions of low interstellar reddening.

In this work, we report physical parameters and abundances derived for a sample of high extinction PNe located in the Galactic bulge, near the Galactic Centre (GC), based on low dispersion spectroscopy secured at the SOAR telescope using the Goodman spectrograph. The results point to weaker, highly obscured PNe, with E(B-V) roughly 2.3 on the average, that are at the faint end of the PNe luminosity function (PNLF). With such high extinction, no lines are seen in the blue part of the spectra, at wavelengths shorter than Hβ(486.1 nm). From the point of view of the abundances, Fig. 1 (top) shows sulfur as a function of oxygen abundances. Triangles and stars represent the data obtained with SOAR, and filled circles the data from Cavichia et al. (2010), hereafter CCM10. We assumed a temperature of 10000 K for PNe to which we could not observe all the diagnostic lines. These data are represented with triangles in the figure. Bottom panel shows argon versus oxygen abundances and the symbols are as in top panel. In this figure, sulfur and argon abundances are linearly correlated with oxygen, so that these abundances grow in lock step. The mean oxygen abundance for the PNe near the GC is 8.29 ± 0.84, while the mean oxygen abundance for those from CCM10 is 8.51 ± 0.58, both in logarithmic units. These mean oxygen abundances are lower than that for PNe located at the inner disc, which is 8.69 from the work of CCM10.

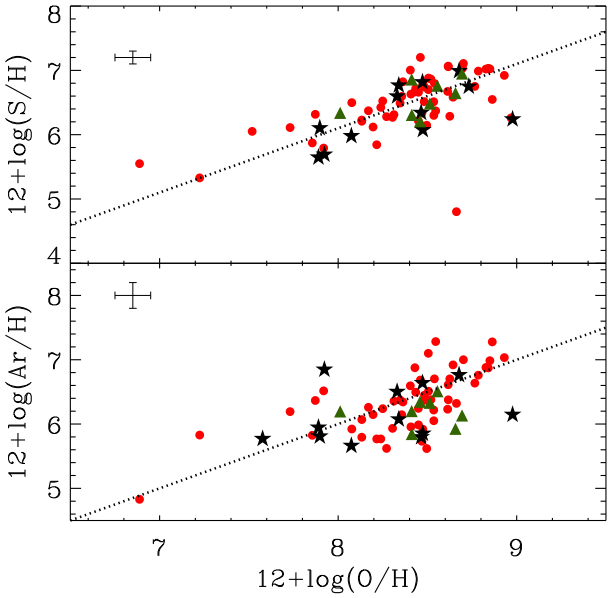

Fig. 1. Top: Sulfur versus oxygen abundances for CCM10 (filled circles) data compared with the samples of this work indicated by stars (direct T_e measurement) and triangles (adopted T_e of 10000 K). The dashed line represent a straight line with slope equal to one. A typical error bar for the CCM10 data is shown at the top left. Bottom: same as the top figure but for argon versus oxygen.

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