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TITLE: Chemical Abundance Gradient in the Milky Way Galaxy from Planetary Nebulae Spectroscopic Data
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ABSTRACT:
Spectroscopic observations have been conducted for 15 planetary nebulae located along the disk of the Milky Way galaxy, with distances ranging from 4 kpc to 10 kpc from the galactic center. The observations were performed at the Bosscha Observatory using a low-resolution spectrograph (R~1000), resulting in spectra with a wavelength coverage of 3800-7700 Å. From these spectra, we derived the abundance of several chemical elements, including
oxygen, argon, sulfur, and helium. Additionally, we employed photoionization modeling to derive the abundance of other elements, such as carbon, nitrogen, neon, and chlorine. By utilizing distances obtained from astrometric data from the Gaia DR3 mission, we constructed a distribution of chemical element abundances throughout the Milky Way galaxy.
Based on the constructed radial distribution, we observed a decreasing trend of -0.011 dex/kpc for C, -0.080 dex/kpc for N, -0.057 dex/kpc for O, -0.054 dex/kpc for Ne, -0.046 dex/kpc for Ar, -0.073 dex/kpc for S, -0.065 dex/kpc for Cl, and -0.085 dex/kpc for He. These values are generally consistent with the range of abundance gradients in the Galaxy determined by several other studies, although they are slightly higher. The values are also greater compared to the abundance gradients derived from HII regions. This could indicate the temporal flattening of the abundance of global chemical elements within the Milky Way galaxy.