ABSTRACTS OF CONTRIBUTED PAPERS

THE UNIFORMITY OF CHEMICAL COMPOSITION OF GALACTIC PLANETARY NEBULAE

Timothy Barker
Wheaton College

The relative abundances of H, He, Ne, O, and N have been determined in thirty planetary nebulae of widely-differing kinematical properties. Helium abundances are found to be affected by incomplete ionization of He, an effect that is strongly correlated with the abundance of S^+. The He and N abundances appear to be positively-correlated, suggesting that nebular material has been contaminated through mixing with CNO-processed material. There is some evidence for a radial galactic abundance gradient in He, N, and possibly O and Ne; abundances increase toward the galactic center. This gradient is evident only from the nebulae that appear to be moving in circular orbits. All nebulae (except the previously studied planetary in the galactic halo and the one in the globular cluster M 15) have nearly the same abundances of O and Ne as galactic HII regions and the sun, and there is little correlation between these abundances and the kinematical properties of the planetaries. Apparently either Ne and O are not representative of the true heavy metal abundance, or the vast majority of planetaries belong to a metal-rich population. The latter possibility seems more likely in view of recent observations of the S^{++} abundances of nineteen of the nebulae, which show them to have generally solar S abundances. (Paper will appear in The Astrophysical Journal.)

IMPROVED ABUNDANCES IN THREE HALO PLANETARY NEBULAE

Steven A. Hawley, Joseph S. Miller
Lick Observatory, University of California, Santa Cruz

With the Lick Observatory 3m telescope and image dissector scanner we have obtained new spectrophotometric observations of three halo planetary nebulae; 49 + 88°1, 108 - 76°1, and K 648. Based on the observed line intensities we are able to compute temperatures, densities, and abundances of He, O, N, and Ne. Our data show that the helium abundance in the halo planetaries is normal with respect to disk planetaries. Oxygen is consistently less abundant in the halo planetaries by factors of 4, 12, and 20. The ratio N/O in 49 + 88°1 and K 648 is

Yervant Terzian (ed.), Planetary Nebulae, Observations and Theory, 245-248.

typical of disk planetaries while N/O in 108 - 76°1 is an order of magnitude larger. This suggests to us the possibility that varying amounts of mixing of CNO processed material has taken place in the progenitor stars. We do not detect [S II] or [S III] emission in K 648 or 108 - 76°1. In 49 + 88°1 [S II] and [S III] are present but weak and we derive an S abundance which is roughly a factor of 10 smaller than for disk planetaries. K 648 has the lowest abundances of O, N, and Ne of all these halo planetary nebulae.

CHEMICAL ABUNDANCES OF PLANETARY NEBULAE IN NGC 185, 205, AND 221

David C. Jenner and Holland C. Ford
Department of Astronomy, University of California, Los Angeles

Results are most complete for NGC 185-1, where the electron temperature is 17,900±1600°K. Compared to typical galactic planetary nebulae the abundance ratio in NGC 185-1 of helium/hydrogen (0.24±0.08) is approximately twice that normally found, the abundance ratio of oxygen/hydrogen $(7.7\pm1.3)10^{-5}$ is approximately one-tenth that normally found, and the ratio of nitrogen/hydrogen (1.4×10^{-4}, poorly known) is approximately equal to that normally found.

A total of thirteen nebulae, two in NGC 205 and eleven in NGC 221, have partially complete observations - mostly at λ5007 and λ6563. The average nebula in NGC 185 and NGC 205 has weak [N II] λ6584 emission relative to Hα λ6563, while the average nebula in NGC 221 has comparatively strong nitrogen emission. No gradient in the nitrogen/hydrogen emission ratio as a function of projected radial distance from the nucleus of NGC 221 is evident.

Although alternative explanations exist for the enhancement of the nitrogen lines in NGC 221, an enhanced abundance of nitrogen is the simplest explanation. Most likely, stars of the same age produce the planetary nebulae observed in these three galaxies. Thus, differences in the nitrogen emission-line strengths are most simply explained as being due ultimately to differences of chemical composition.

https://doi.org/10.1017/S0074180900143086 Published online by Cambridge University Press