CHEMICAL AND EXPANSION PROPERTIES OF COMPACT PLANETARY NEBULAE IN THE GALACTIC ANTI-CENTER REGION

Shin'ichi Tamura
Astronomical Institute, Tohoku University
Aobayama, Sendai, Japan 980

A spectroscopic diagnosis on M1-5, M1-9, K3-66, and K3-67 is presented. Our sample were chosen from the catalogue of radial velocities (Schneider et al 1983) by the reason of not only their kinetic peculiarity, but also apparently compact images. Main purpose is to analyze the chemical properties which should give us an information about galactic chemical abundance distribution in the direction of galactic anti-center region based upon kinetic peculiarity. Another one is to study on an expansion characteristics by which we can recognize intrinsically compact planetary nebulae in young phase.

Spectroscopic observations were made at the Okayama Astrophysical Observatory (Shibata and Tamura 1985), the Steward Observatory, and Lick Observatory (Tamura and Shaw 1987).

(1) Due to the chemical abundance diagnostic criteria (Peimbert 1983), M1-9 and K3-67 seem to have evolved from their massive progenitors in the relation between He/H versus N/O (Figure 1).
(2) K3-66 belongs chemically and kinematically to Population II, while K3-71 is a rather high-ionization planetary, and may have Population II kinematics.
(3) From the analyses of emission line profiles (Figure 2), K3-66 should be in distant site from us and M1-5 seems to be intrinsically compact planetary nebula.
(4) Due to the line profiles and the estimation of HI mass (Schneider et al 1987), there is still a possibility M1-9 is the really compact planetary nebula like M1-5.

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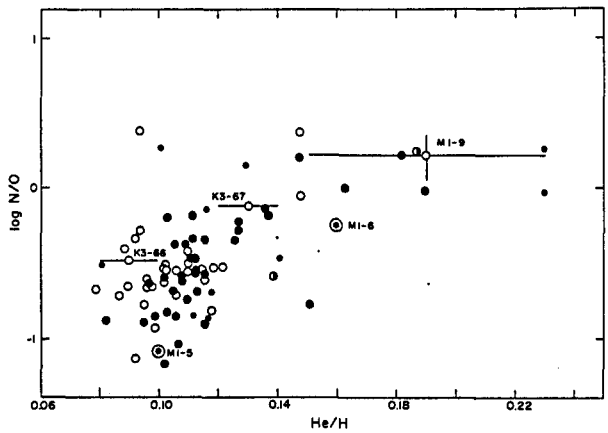

Fig. 1. He/H versus log N/O of M1-6 and M1-9 from Shibata and Tamura (1985) (as labeled), and of K3-66 and K3-67 from Tamura and Shaw(1987) superposed on Kaler's(1983) survey. Filled symbols: Population I; open symbols: Population II.

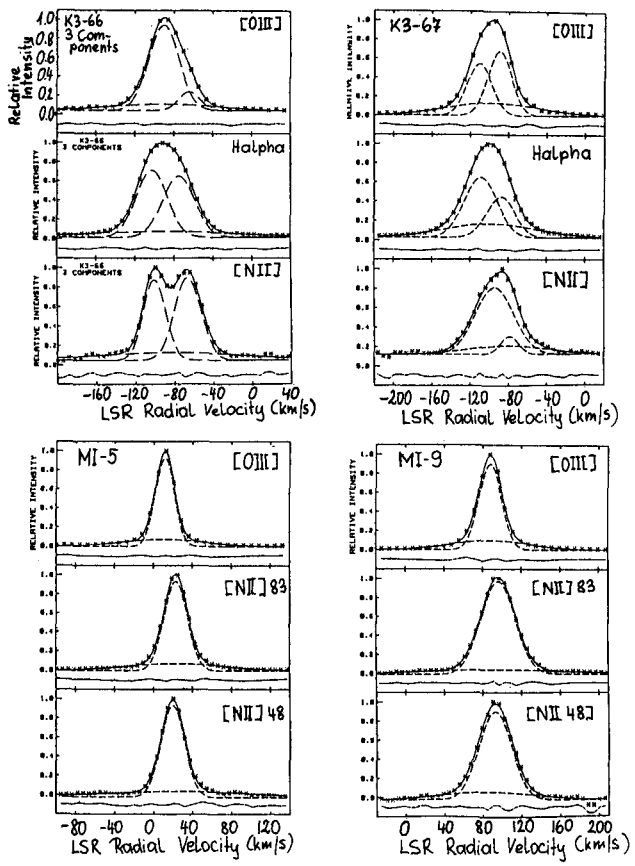

Fig. 2. Emission line profiles of M1-5, M1-9, K3-66, and K3-67. Crosses and real lines are observational results, broken lines are Gaussian components.

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