

UNUSUAL EMISSION LINE PROFILES OF M1-1

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In order to seek out intrinsically compact PN, we have observed high-excitation and angularly small PN, M1-1, with the intensified Reticon system (one-dimensional 1024 pixel-array) at the Coude focus of the 188 cm telescope. We have obtained highly resolved emission line profiles of [NII] λ 6583, H α , [OIII] λ 5007, and HeII λ 4686 at several slit position angles. These lines were analyzed with the aid of Multiple Gaussian Method. From the analysis of their radial velocities and decomposed profiles, we can summarize our observational results as follows.

(a) HeII were fitted by three Gaussians, those are main blue and red-components and an extremely red-shifted sub-component. H α and [OIII] were decomposed into blue and red components. [NII] were fitted by single Gaussian.

(b) The radial velocities at both peaks of red and blue components of HeII coincide well with those of H α . Since it is inferable that He exist in the nearest part from the central star while H α distribute in the whole of PN, we decided the radial velocity of M1-1 at the center between blue and red components in H α and HeII lines, and obtained $V_{LSR} = -26.0 \pm 1.1$ km/sec.

(c) The radial velocities at the peak of blue components of [OIII] and [NII] shifted to blueward considerably than that of H α and HeII.

(d) In the line profiles of H α , [OIII], and HeII, red components were weaker than blue ones. In particular, the red component of [OIII] is very weak.

(e) Though we put the slit across the whole image of M1-1, the line radiation which corresponds to the components of -26.0 km/sec is hardly seen in [OIII] and [NII].

From these facts and arguments, we can get following conclusions.

- (1) O⁺⁺ and N⁺ should exist in the outermost part of M1-1. The expansion velocities of these regions are 38.8 ± 2.6 , 37.8 ± 1.8 km/sec respectively.
- (2) The line profiles reveal that M1-1 is a bipolar planetary nebula and observed from a direction near the pole.