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Tridimensional spectroscopy of Seyfert Galaxy 3C 120

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Abstract. Tridimensional spectroscopy of the Seyfert 1 galaxy 3C 120 was carried out with Spectronebulagraph (SNG). We constructed a data cube which is free from atmospheric variations during the scans. We then separated the blended lines by deconvolving the line profiles, to obtain pure narrow-line images and narrow-line intensity ratio diagram.

1. Observations and Data Reductions

The observations were made with 1.88m telescope at Okayama Astrophysical Observatory using SNG (Kosugi et al. 1994a). The object was scanned within 30″ by the 4′.5 slit of the spectrograph in two directions which were orthogonal to each other. The data reductions were made with SNG data processing system developed on IRAF.[3] The intensities of 2D spectra obtained were scaled so that the intensities at the overlapping points of two orthogonal spectra coincide at a selected wavelength. Thus, we constructed a data cube with no infection from atmospheric variations. In order to deconvolve the narrow-lines and measure the intensities, multi/single-Gaussian profiles were fitted to the spectra. We then reconstructed the pure narrow-line images (Fig. 1).

The details, more results and discussions will appear in a forthcoming paper (Kosugi et al. 1994b).

2. Results and Discussions

Emission line regions are well classified by two dimensional diagram of selected line ratios (Veilleux & Osterbrock 1987; VO diagram hereafter). The reddening free narrow-line ratios [OIII]5007Å/Hβ of the region shown in Fig. 1(d) are plotted as a function of [NII]6583Å/Hα (Fig. 2) . On Fig. 2, we overplotted the model curves calculated by photoionization code CLOUDY (Ferland 1991)

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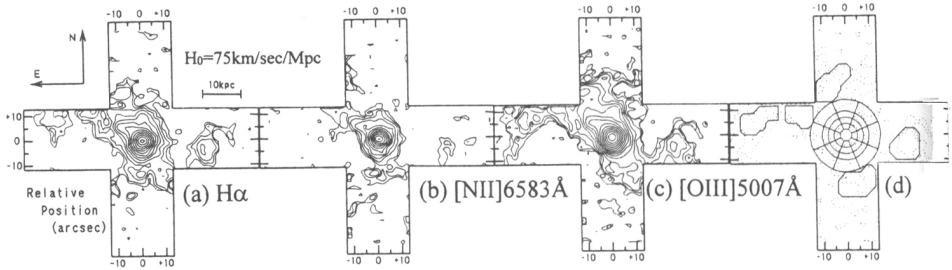

Figure 1. The pure narrow-line images. (a) Hα, (b) [NII]6583Å, (c) [OIII]5007Å and (d) integrated sections.

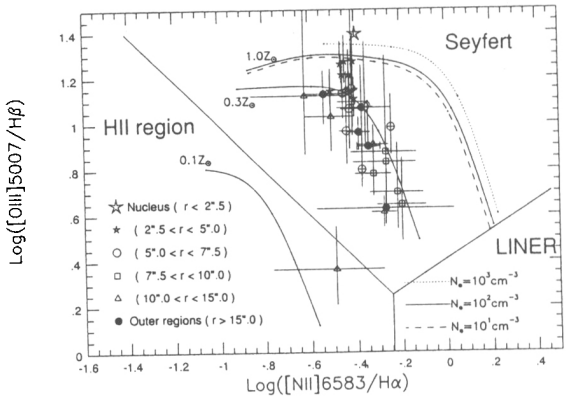

Figure 2. The VO diagram of 3C 120. Each plot shows the line ratios of integrated spectra at the regions shown in Fig.1(d). The solid lines indicate the empirical boundaries between Seyfert, LINER and HII region. N_e and $Z_\odot$ represent electron density and the solar abundance value, respectively. Ionization parameter U varies along the curves

using the optimized model ionizing continuum. This curve is not so affected by the change of N_e. If the emission from HII region is contaminated, it's hard to explain the behaviors of the data points along the model curve. Then EELR is attributable mainly to the nuclear UV radiation, with varying the ionization parameter U. The regions outer 5".0 from the nucleus have roughly 0.3 times solar abundance, whereas the nuclear abundance is solar.

References

Ferland, G. J. 1991, OSU Internal Report 91-01

Kosugi, G., Ohtani, H., Sasaki, T., Shimizu, Y., Koyano, H., Yoshida, M., Baba, A., Aoki, K., & Sasaki, M. 1994a, in preparation

Kosugi, G., Ohtani, H., Yoshida, A., & Aoki, K. 1994b, in preparation

Veilleux, S., & Osterbrock, D. E. 1987, ApJS, 63, 295

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