Active Galactic Nuclei and Related Phenomena
IAU Symposium, Vol. 194, 1999
Yervant Terzian, Daniel Weedman, Edward Khachikian, eds.

Spectrophotometry of Selected AGN Seyfert Galaxy AKN 564

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Akn 564 ($\alpha_{1950} = 22^h40^m18.3^s$, $\delta_{1950} = 29°27'47"$) is a Sy1.5G SBb type galaxy. According to Zwicky (1966) it has a photographic magnitude $m_p = 14.4$ and a redshift of 0.025. The spectra of the galaxy were obtained at the 2.6-m telescope of the Crimean Astrophysical Observatory with a spectrograph having a dispersion of 100 A mm^{-1}. They were processed with the help of SPEC and LONG packages integrated in MIDAS. As a result of the spectrophotometry we obtain the fluxes at $\lambda\lambda$ 4363, 4959, 5007 A: I(4363), I(4959), I(5007). The spectrum of the galaxy in $\lambda\lambda$ 4000-7000 is shown in Figure 1. We use the relation of the fluxes of those narrow forbidden emission lines:

$$R = [j(\lambda 4959) + j(\lambda 5007)]/j(\lambda 4363) \quad (1)$$

$$= [8.32exp(3.29 \times 10^4/T]/(1 + 4.5 \times 10^{-4} Ne/T^{1/2}, \quad (2)$$

sensitive at a greater extent to the electron temperature T_e than to the electron density n_e. The value of R = 74.3 we got, having a typical value of n_e = 5×10^5 cm^{-3} for the NLR (Narrow Line Region), leads to the estimation of a typical temperature of $T_e = 10^4$ K.

We can evaluate the effective volume V_{eff} and respectively the size R_{eff}, the mass M_g and the kinetic energy E_k of the emitting gas in the NLR with n_e = 5×10^5 cm^{-3} and $T_e = 10^4$K assumed and I(5007) measured via the equations (Dibay 1980):

$$L(H_\beta) = 4\pi R^2 (1+z)^2 I(H_\beta); \quad (3)$$

$$V_{\rm eff} = R^2 I(H_\beta)/j(H_\beta); \quad (4)$$

$$R = cz/H; \quad (5)$$

$$V_{\rm eff} = fV; \quad (6)$$

$$R_{\rm eff} = (3V_{\rm eff}/4)^{1/3}; \quad (7)$$

$$M_{\rm g} = n_{\rm e} m_{\rm p} V_{\rm eff}/M_{\rm o}; \quad (8)$$

$$E_{\rm k} = 1/2 M_{\rm g} v^2 = 1/4 M_{\rm g} FWHM; \quad (9)$$

$$M_{\rm c} = 3v_{\rm v}^2 R/G, \quad (10)$$

where V is the geometrical volume of the region, f $\approx 10^{-3}$ is the filling factor and j is the emmission coefficient.

T_e and n_e in the BRL (Broad Line Region) cannot be estimated directly. We accept representative of the BLR values of n_e = 5×10^5 cm^{-3} and T_e =

10^4K acquired by comparing photoionizational models with some observational parameters. As a result we evaluate V_{eff}, R_{eff}, M_g, E_k and the mass of the central object M_c, all of them given in the following table:

NLR		BLR	
n_e, [cm^{-3}]	$5x10^5$	n_e, [cm^{-3}]	10^9
T_e, [K]	10^4	T_e, [K]	10^4
I([OIII] λ5007), [$erg.cm^{-2}.s^{-1}$]	$1.04x10^{-12}$	I(H_β), [$erg.cm^{-2}.s^{-1}$]	$5.85\ x10^{-13}$
FWHM([OIII] λ5007), [$cm.s^{-1}$]	$663x10^5$	FWHM(H_β), [$cm.s^{-1}$]	$899\ x10^5$
L([OIII] λ5007), [$erg.s^{-1}$]	$9.18\ x10^{41}$	L(H_β), [$erg.s^{-1}$]	$5.18\ x10^{41}$
j([OIII] λ5007), [$erg.cm^{-3}.s^{-1}$]	$1.15\ x10^{-19}$	j(H_β), [$erg.cm^{-3}.s^{-1}$]	$6.63\ x10^{-9}$
V_{eff}, [cm^3]	$1.6\ x10^{55}$	V_{eff}, [cm^3]	$6.19\ x10^{48}$
R, [pc]	5	R, [pc]	0.037
M_g, [Mo]	$6.68\ x10^3$	M_g, [Mo]	5.17
E_k, [erg]	$7.34\ x10^{51}$	E_k, [erg]	$1.04\ x10^{49}$
		M_c, [Mo]	$0.52\ x10^7$

The errors of the fluxes are about 7×10^{-15} erg cm^{-2} s^{-1} and the errors of the other parameters are about 10-30 %.

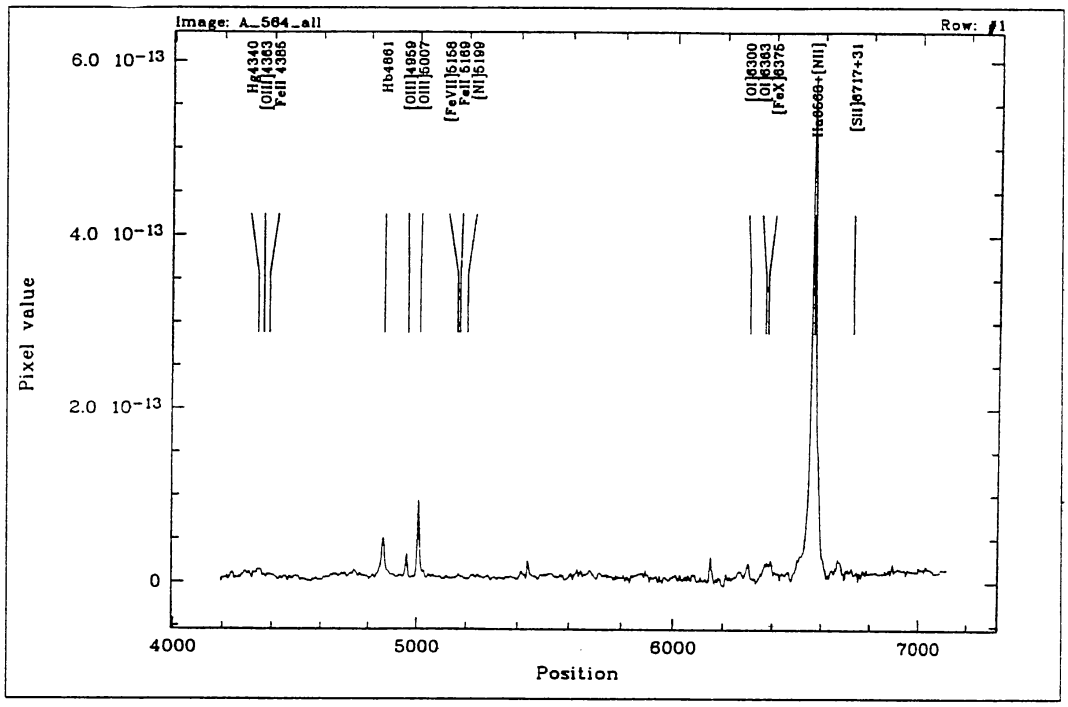

Figure 1. Energy distribution in $\lambda\lambda$ 4000-7000 A for Akn564. The data reduction was made by MIDAS 95NOV packages. The strongest forbidden and permitted lines are marked.

References

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