

DETERMINATION OF ELECTRONIC TEMPERATURE AND DENSITY IN NARROW LINE REGIONS

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We use observations of forbidden emission lines: [SII], [OII], N[II] and [OIII] from a sample of objects located in the Sloan Digital Sky Survey (SDSS) and determined the electronic temperature and densities.

Narrow line regions could be found in AGNs or regions like HII, planetary nebulae and supernova remnants. Performing the classical development of the temperature and density interpolation equations, we obtain, using the Einstein coefficients from Osterbrock and Ferland (2006) (Table 1), the expressions for temperature and density.

TABLE 1

VALUES OF EINSTEIN COEFFICIENTS FOR SPONTANEOUS EMISSION

Transition	Species	$\lambda(\text{\AA})$	2006
$^1D_2, ^1S_0$	[OIII]	4363	1.6
$^3P_2, ^1D_2$	[OIII]	5007	2.0×10^{-2}
$^3P_1, ^1D_2$	[OIII]	4959	6.8×10^{-3}
$^4S_{3/2}, ^2D_{5/2}$	[SII]	6716	2.6×10^{-4}
$^4S_{3/2}, ^2D_{3/2}$	[SII]	6731	8.8×10^{-2}
$^1D_2, ^1S_0$	[NII]	5755	1.0
$^3P_2, ^1D_2$	[NII]	6583	3.0×10^{-3}
$^3P_1, ^1D_2$	[NII]	6548	9.8×10^{-4}
$^4S_{3/2}, ^2D_{5/2}$	[OII]	3729	3.6×10^{-5}
$^4S_{3/2}, ^2D_{3/2}$	[OII]	3726	1.6×10^{-4}

Observations of forbidden emission lines: [SII], [OII], [OIII] and [NII], from the Sloan Digital Sky Survey (SDSS) and limited by the instrument resolution, were made and the fluxes of these lines were extracted and measured, using the LINER software, subsequently the electronic temperature and densities were estimated by employing a Python's code (Table 2). For the Was2 object, the [OII] and [OIII] pair was also used, obtaining a temperature value of 14050 K and an electron density of 7819 cm^{-3} .

TABLE 2

RESULTS OF TEMPERATURE AND DENSITY USING THE PAIR OF OIII AND SII

Reference	2006	
Object	T	Ne
AKN347	20938	812
ARK160	21179	166
Mich317	56634	243
Mich625	17493	716
MRK67	12556	132
MRK403	14710	486
MRK724	12676	139
NGC4388	12403	1445
NGC5506	11950	482
Was2*	15073	639
Was5	14771	153
Was6	10828	127
Was32	10981	202
Was31	10989	201
Was66	11891	136
Was69	11630	169

REFERENCES

Osterbrock, D. E. & Ferland, G. J. 2006, *Astrophysics of Gaseous Nebulae and Active Galactic Nuclei*. University Science Books

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