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Plasma diagnostics of emission-line galaxies in SDSS

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Abstract. We analyse a sample of 15,019 narrow emission-line galaxies, i.e. Seyferts, LINERs, composites and star-forming galaxies, from SDSS DR7 to study the differences between the different emission-line classes. We report two clear sequences of electron temperature (T_e) and density (n_e): $T_{e-LINER} \gtrsim T_{e-composite} > T_{e-Seyfert} > T_{e-star-forming}$ and $n_{e-Seyfert} \gtrsim n_{e-LINER} > n_{e-composite} > n_{e-star-forming}$. General transitions of n_e and T_e from central regions to disks are quantitatively confirmed.

Keywords. galaxies: active, galaxies: ISM, galaxies: Seyfert, galaxies: starburst, surveys

Brief Overview & Quick Results

We select an emission-line galaxy sample with S/N > 5, and divide into four classes by applying the galaxy classification schemes of Kewley *et al.* (2006). Plasma diagnostics are obtained through I[S II]λ6716 /λ6731 and I[O III] λ5007/λ4363 with simultaneous determination for n_e[S II] and T_e[O III] in 15,019 galaxies. We further identify three groups according to physical aperture size of the SDSS 3-arcsec diameter fibers ϕ (kpc) and $FWHM$ (km s^{-1}) of Hα (Bennert *et al.* 2006; Kollatschny & Wang 2006): $FWHM >$ 300 for "NLR-dominated" (labeled *ND*; ln$\phi < 1$) and "disk-contaminated NLR" (labeled *DC*; ln$\phi > 1$) objects; $FWHM < 300$ for "non-NLR" objects (labeled *NN*). See Table 1.

Table 1. Summary of the mean values of n_e and T_e.

	Seyfert			LINER			composite			Star-forming		
	ND	DC	NN	ND	DC	NN	ND	DC	NN	ND	DC	NN
Number	89	1,052	701	7	75	13	35	348	955	3	165	11,576
n_e [cm^{-3}]	415	332	160	230	201	113	208	150	77	166	152	57
T_e [10^4 K]	1.40	1.32	1.29	2.13	1.37	2.73	1.76	1.68	1.61	1.78	1.77	1.37

Notes. ND: "NLR-dominated" objects; DC: "disk-contaminated NLR" objects; NN: "non-NLR" ones.

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