

Table 1.7. Some common optical and infrared forbidden lines of atoms

Atom	transition	wavelength	n_{crit} cm^{-3}
CI	$^3\text{P}_1 \rightarrow ^3\text{P}_0$	$610 \mu\text{m}$	(500)
	$^3\text{P}_2 \rightarrow ^3\text{P}_1$	$371 \mu\text{m}$	(1000)
CII (C ⁺)	$^2\text{P}_{3/2} \rightarrow ^2\text{P}_{1/2}$	$158 \mu\text{m}$	(3000)
NII (N ⁺)	$^1\text{D}_2 \rightarrow ^3\text{P}_2$	6583 \AA	66 000
	$^1\text{D}_2 \rightarrow ^3\text{P}_1$	6548 \AA	66 000
OI	$^1\text{D}_2 \rightarrow ^3\text{P}_2$	6300 \AA	2×10^6
	$^3\text{P}_1 \rightarrow ^3\text{P}_2$	$63.2 \mu\text{m}$	(10^6)
	$^3\text{P}_0 \rightarrow ^3\text{P}_1$	$145.5 \mu\text{m}$	(10^5)
OII(O ⁺)	$^2\text{D}_{5/2} \rightarrow ^4\text{S}_{3/2}$	3729 \AA	3 400
	$^2\text{D}_{3/2} \rightarrow ^4\text{S}_{3/2}$	3726 \AA	15 000
OIII (O ⁺⁺)	$^1\text{D}_2 \rightarrow ^3\text{P}_2$	5007 \AA	7×10^5
	$^1\text{D}_2 \rightarrow ^3\text{P}_1$	4959 \AA	7×10^5
	$^1\text{S}_0 \rightarrow ^1\text{D}_2$	4363 \AA	2×10^7
	$^3\text{P}_2 \rightarrow ^3\text{P}_1$	$51.8 \mu\text{m}$	(4000)
	$^3\text{P}_1 \rightarrow ^3\text{P}_0$	$88.4 \mu\text{m}$	(2000)
NeII (Ne ⁺)	$^2\text{P}_{1/2} \rightarrow ^2\text{P}_{3/2}$	$12.8 \mu\text{m}$	7×10^5
NeIII (Ne ⁺⁺)	$^3\text{P}_1 \rightarrow ^3\text{P}_2$	$15.6 \mu\text{m}$	2×10^5
	$^3\text{P}_0 \rightarrow ^3\text{P}_1$	$36.0 \mu\text{m}$	3×10^4
NeV (Ne ⁴⁺)	$^1\text{D}_2 \rightarrow ^3\text{P}_2$	3426 \AA	2×10^7
SII (S ⁺)	$^2\text{D}_{5/2} \rightarrow ^4\text{S}_{3/2}$	6716 \AA	2 000
	$^2\text{D}_{3/2} \rightarrow ^4\text{S}_{3/2}$	6731 \AA	2 000
SIII (S ⁺⁺)	$^3\text{P}_2 \rightarrow ^3\text{P}_1$	$18.7 \mu\text{m}$	10 000
	$^3\text{P}_1 \rightarrow ^3\text{P}_0$	$33.5 \mu\text{m}$	2 000
SiII (Si ⁺)	$^2\text{P}_{3/2} \rightarrow ^2\text{P}_{1/2}$	$34.8 \mu\text{m}$	(3×10^5)
FeII (Fe ⁺⁺)	$a^4\text{D}_{7/2} \rightarrow a^4\text{D}_{9/2}$	$1.64 \mu\text{m}$	3×10^5

The line is close to maximum strength at the critical density n_{crit} . This density is calculated for collision with electrons at $T = 10\,000 \text{ K}$, except quantities in () which refer to collisions with H atoms or molecules near 100 K .