

AST 300B – Spring 2018

In-class/take-home Problems Due: Friday April 27th

45. Classify the following emission lines as (1) Permitted (resonance), (2) Intercombination, or (3) Forbidden and state which radiation multipole best describes each transition.

a. OI $1s^2 2s^2 2p^3 3s \ ^3S_1^0 \rightarrow 1s^2 2s^2 2p^4 \ ^3P_2$ $\lambda = 130.2 \text{ nm}$
 UV line seen in neutral medium of galaxies and in IGM

b. OIII $1s^2 2s^2 2p^2 \ ^1S_0 \rightarrow 1s^2 2s^2 2p^2 \ ^1D_2$ $\lambda = 436.4 \text{ nm}$
 Optical line commonly observed in HII regions

c. CII $1s^2 2s^2 2p^2 \ ^2P_{3/2}^0 \rightarrow 1s^2 2s^2 2p^2 \ ^2P_{1/2}^0$ $\lambda = 158 \text{ }\mu\text{m}$
 Bright far-IR line and important coolant in CNM, WNM

d. CIII $1s^2 2s 2p \ ^3P_2^0 \rightarrow 1s^2 2s^2 \ ^1S_0$ $\lambda = 190.9 \text{ nm}$
 Weak UV line seen in PN and AGN (hard ionization)

