

Solutions to the Exercices of

C. J. Foot's Atomic Physics

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(Dated: June 28, 2011)

1 Early atomic physics

Key formulas:

$$\frac{1}{\lambda} = R \left(\frac{1}{n^2} - \frac{1}{n'^2} \right) \quad (1.1)$$

$$R_H = R \frac{m_H}{m_e + m_H} \quad (1.2)$$

$$a_0 = \frac{\hbar^2}{(Ze^2/4\pi\epsilon_0)m_e} = 0.529 \times 10^{-10} \text{ m} \quad (1.3)$$

$$E = - \frac{Ze^2/4\pi\epsilon_0}{2a_0} \frac{1}{n^2} \propto Z^2 \quad (1.4)$$

$$\Delta E = \frac{\alpha^2}{n^2} E \quad (1.5)$$

$$\alpha = \frac{e^2/4\pi\epsilon_0}{\hbar c} = 1/137 \quad (1.6)$$

$$\frac{f}{c} = R_\infty ((Z - \sigma_K)^2 - (Z - \sigma_L)^2) \quad (1.7)$$

$$\rho(\omega) = \frac{\hbar\omega^3}{\pi^2 c^3} \frac{1}{\exp \hbar\omega/kT - 1} \quad (1.8)$$

$$\frac{N_2}{g_2} = \frac{N_1}{g_1} \exp \left(- \frac{\hbar\omega}{kT} \right) \quad (1.9)$$

$$P = \frac{e^2 E_0^2 \omega^4}{12\pi\epsilon_0 c^3} \quad (1.10)$$

$$\Omega_L = \frac{eB}{2m_e} \quad (1.11)$$

$$\tau = \frac{6\pi\epsilon_0 m_e c^3}{e^2 \omega^3} \quad (1.12)$$

Atomic Physics Solution Manual Foot

David Halliday, Robert Resnick, Jearl Walker



Atomic Physics Solution Manual Foot:

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Technical Abstract Bulletin Defense Documentation Center (U.S.),1964 **The Publishers' Trade List Annual** ,1969 *Signals* ,1966 *List* ,1948 *Atomic Industry Reporter* ,1959 **The British National Bibliography** Arthur James Wells,2004 **Modern Atomic And Nuclear Physics (Revised Edition): Problems And Solutions Manual** Fujia Yang,Joseph H Hamilton,2010-06-01

This problems and solutions manual is intended as a companion to an earlier textbook Modern Atomic and Nuclear Physics Revised Edition World Scientific 2010 This manual presents solutions to many end of chapter problems in the textbook These solutions are valuable to the instructors and students working in the modern atomic field Students can master important information and concept in the process of looking at solutions to some problems and become better equipped to solve other problems that the instructors propose

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