

Errata

Statistical Mechanics, Third Edition,
First Printing, R.K. Pathria and Paul D. Beale,
(Academic, 2011)

Page 22, Problem 1.4, replace the index n by j in three places in lines 2 and 3.

Page 112, Problem 4.15, the latent heat of sublimation of ice near the triple point is 2833 kJ/kg.

Page 156, first line after equation (2), replace “the factor in the curly brackets” with “the factor V/λ^3 ”.

Page 174, the Hamiltonian in problem 6.9 should read

$$\mathcal{H}(r, \theta, z, p_r, p_\theta, p_z) = \frac{p_r^2}{2m} + \frac{(p_\theta - mr^2\omega)^2}{2mr^2} + \frac{p_z^2}{2m} - \frac{mr^2\omega^2}{2}.$$

Page 197, equation (7.2.18) should read

$$\begin{aligned} C_N(T) &= \left(\frac{\partial U}{\partial T} \right)_N = \left(\frac{\partial U}{\partial T} \right)_\mu + \left(\frac{\partial U}{\partial \mu} \right)_T \left(\frac{\partial \mu}{\partial T} \right)_N \\ &= \left(\frac{\partial U}{\partial T} \right)_\mu - \frac{\left(\frac{\partial U}{\partial \mu} \right)_T \left(\frac{\partial N}{\partial T} \right)_\mu}{\left(\frac{\partial N}{\partial \mu} \right)_T}. \end{aligned}$$

Page 204, the h in the second line of equation (7.3.23) should read \hbar , i.e.

$$\begin{aligned} \bar{N} &= \frac{V}{\pi^2 c^3} \int_0^\infty \frac{\omega^2 d\omega}{e^{\hbar\omega/kT} - 1} \\ &= V \frac{2\zeta(3)(kT)^3}{\pi^2 \hbar^3 c^3} \propto VT^3 \end{aligned}$$

Page 260, line 4. Replace ‘helium.’ with ‘helium, carbon and oxygen.’ Starting at line 12, replace the text “The microscopic ... the electron density by” with “Since the most stable isotopes of helium, carbon and oxygen have equal numbers of protons and neutrons, the ratio of the number of nucleons to the number of electrons is approximately 2; see Liebert (1980). Therefore, the mass of a star with N electrons is given by

$$M \simeq N(m + 2m_p) \simeq 2Nm_p, \quad (1)$$

where m_p is the proton mass. Hence, the electron density is given by”

Page 275, Section 9.1, item 1, replace “Hubble was the first ... Telescope.” with “Hubble was the first to observe this by measuring both the distances to nearby galaxies and their apparent velocities relative to our own galaxy. The former is based on standard candles, astronomical objects with known absolute luminosity. The latter is based on measurements of the cosmological redshift of spectral lines. Standard candles include Cepheid variable stars and type Ia supernovae. Supernovae luminosities are calibrated using Hubble Space Telescope measurements of Cepheids in the same galaxies as nearby supernovae.”

Page 276, Figure 9.1, change ‘red-shift’ to ‘redshift’; footnote 3, line 3, replace ‘Doppler shift’ with ‘cosmological redshift’; footnote 3, line 4, replace ‘redshifted’ with ‘redshifted’; footnote 3, line 5, replace ‘Doppler shift’ with ‘cosmological redshift’

Page 280, Figure 9.4: upper figure label should read $\Omega_b h^2$.

Page 283, line 4, replace ‘1’ with ‘(1)’; last line before eqn. (3a), remove duplicate word ‘are’. Equation (9.3.3a) should have a \pm in front of the last expression, so it should read

$$P(T) = \pm kT \int a(\epsilon) \ln(1 \pm e^{-\beta\epsilon}) d\epsilon = \pm \frac{g_s (kT)^4}{2\pi^2 (\hbar c)^3} \int_0^\infty x^2 \ln(1 \pm e^{-x}) dx.$$

Footnote 9, line 3, change 0.58 eV to 1.3 eV.

Page 285, in equation (9.3.9) the constant inside the square root should be 0.99s. In equations (9.4.1b) and (9.4.1c) the electron antineutrinos on the right hand side of the reactions should be indicated by $\bar{\nu}_e$.

Page 296, in problem 1, line 3, the constant inside the square root should be 0.99s. In the equations in problems 9.4 and 9.5 should read

$$\frac{n_-}{n_\gamma} \approx \frac{n_+}{n_\gamma} \sim (\beta m_e c^2)^{3/2} \exp(-\beta m_e c^2),$$

and

$$\frac{n_+}{n_\gamma} \sim (\beta m_e c^2)^{3/2} \exp(-2\beta m_e c^2).$$

In problem (9.6), the energy density should read $u_{\text{total}} = (1 + (21/8)(4/11)^{4/3})u_\gamma$, and the constant inside the square root in line 5 should be 1.78s.

Page 399, Problem 11.17, line 3, the dimensionless wavefunction should read

$$\psi = a_{\text{osc}}^{3/2} \Psi / \sqrt{N}.$$

Pages 428-431, the symbol for the partition function should be Q not Z .

Page 635, Problem 15.20, the correlation function relation should read:

$$G_{AB}(t) = G_{BA}(-t - i\beta\hbar).$$

Page 635, Problem 15.2: should read “Use the initial result in Problem 15.20 to show that, in the classical limit, $\hat{\chi}''_{AB}(t)$ becomes $\left\langle \frac{dA(t)}{dt} B(0) \right\rangle$. Further show that this leads to equation (15.6.39).”

Page 673, equation (F.18): the semicolon after the equation should be a comma.

Page 677, equation (H.4) should read

$$\Gamma(N, V, U; \Delta U) = \text{Tr}(\Delta_{\Delta U}(U - \mathcal{H}))$$

Page 679, the line before equation (H.12a) should read “density $n = N/V$ ”

Page 682, to be consistent with the remainder of the text, the symbol for magnetic field in Appendix H, section **Magnetic free energy** should be B instead of H in every instance.

Page 683, there is a factor of T missing from the third expression in equation (H.27). The equation should read

$$C_V = T \left(\frac{\partial S}{\partial T} \right)_{V,N} = -T \left(\frac{\partial^2 A}{\partial T^2} \right)_{V,N} = \frac{\langle \mathcal{H}^2 \rangle - \langle \mathcal{H} \rangle^2}{kT^2} \geq 0,$$

Page 698, new reference, Liebert, James (1980), *Annual Review of Astronomy and Astrophysics*, **18**, 363.