Table 1: Errata: Synchrotron Radiation and Free-Electron Lasers

Page #	**Where**	**Corrections**
18	Fig. 1.8 caption	radiation energy → photon energy
26	Section 1.2.5	This discussion largely follows that presented in Ref. [6] of Chapter 4.
33	fourth line	a high-brightness flux → high-brightness beams
41	second paragraph, second line	(2.26) → (2.23)
45	second line of footnote	and conserved → are conserved
52	Eq. (2.77) right side	$\frac{\Delta\omega}{\omega} \to \frac{1}{\omega}$
52	paragraph between Eqs. (2.77) and (2.78) should be replaced with	We plot the function $hK^2[\mathrm{JJ}]_h^2/(1+K^2/2)$ in Fig. 2.8(b). If we consider the fundamental harmonic $h=1$, and take $K \sim 1$, then Eq. (2.77) becomes roughly $d\mathcal{F}_1 \sim \alpha N_u (I/e) d\omega/\omega$. This can be understood in the following way. Since the deflection angle per period is $\sim 1/\gamma$, each electron emits roughly α photons every period in view of Eq. (2.29), and of order αN_u photons over the length of the undulator. Thus, an electron beam of current I radiates $\mathcal{F}_1 \sim \alpha N_u (I/e)$ photons per unit time. This estimate is for all photons in the full spectral range $\Delta\omega/\omega \sim 1$. The number of emitted photons $d\mathcal{F}_1$ in a narrow spectral range $d\omega/\omega \ll 1$ will then be given by $d\mathcal{F}_1 \sim \alpha N_u (I/e) d\omega/\omega$, as stated in the above. Note that the number of photons produced in the characteristic spectral width $\Delta\omega/\omega \sim 1/N_u$ in the central cone is independent of N_u. In practical units, the undulator photon flux in the central cone, Eq. (2.77), can be written as
52	Eq. (2.78) left side	$\frac{d\mathcal{F}_h}{d\omega} \to \frac{d\mathcal{F}_h}{d\omega/\omega}$
52	Eq. (2.78) right side	$\frac{h[\mathrm{JJ}]_h^2}{1+K^2/2} \to \frac{hK^2[\mathrm{JJ}]_h^2}{1+K^2/2}$
81	below Eq. (3.18)	(2.61) → (2.67)
85	below Eq. (3.36)	electron deviation → electron energy deviation
97	second line below Eq. (3.93)	growth length → gain length
100	third line below (3.111)	length length → length
101	item 7	$P_{\mathrm{in}} \sim \rho\gamma mc^2/N_{l_{\mathrm{coh}}} \to P_{\mathrm{in}} \sim \rho P_{\mathrm{beam}}/N_{l_{\mathrm{coh}}}$
105	below Eq. (4.4)	$\omega_1 \int d\omega E_\nu \to \omega_1 \int d\nu E_\nu$
119	below Eq. (4.70)	no indentation
124	fourth line	(4.47) → (4.31)
147	fourth line below Eq. (5.27)	than → then (and in numerous places)

147	Eq. (5.28)	$\sigma_y \to \sigma_x$
150	third line	$\bar{k}_\beta \to k_\beta$
150	second to last line	$\beta_x \to \bar{\beta}_x$
156	third line	[7], Here → [7]. Here
159	end of first paragraph	missing)
160	below Eq. (5.84)	low-amplitude gain → small-signal gain
161	second line below Eq. (5.90)	detuning $x \to$ detuning x_0
161	third line below Eq. (5.92)	(5.85) → (5.92)
161	fifth line below Eq. (5.92)	(5.85) → (5.92)
161	second to last line	(5.4.1) → (5.92)
162	Figure 5.9 (a)	horizontal axis $x \to x_0$
162	Figure 5.9 caption	$x \to x_0$
166	first line	$A_\ell^\dagger \to \mathcal{A}_\ell^\dagger$
169	below Eq. (5.130)	(5.123) → (5.109)
169	second line below (5.132)	$U = 0$ otherwise $\to U = 0$ if $\lvert\boldsymbol{x}\rvert \geq \sqrt{2}\sigma_x$
169	third line below (5.133)	$y \to \lvert y\rvert$
171	second line above (5.140)	it it → it
202	Second line of Eq. (7.13)	$\exp\left[-\frac{\sqrt{G}c\sigma_{\text{filter}}}{2\sigma_z}\tau^2\right] H_p\left(G^{1/4}\sqrt{\frac{c\sigma_{\text{filter}}}{\sigma_z}}\tau\right)$ $\to \exp\left[-\frac{\sqrt{G}\sigma_{\text{filter}}}{2c\sigma_z}\tau^2\right] H_p\left(G^{1/4}\sqrt{\frac{\sigma_{\text{filter}}}{c\sigma_z}}\tau\right)$
202	second line of last paragraph	$\sigma_{\text{refl}} \ll 1/N_u\lambda_1 \to \sigma_{\text{refl}} \ll c/N_u\lambda_1$
203	below (7.16)	recell → recall
204	sentence just before Eq. (7.19)	The matrix $M_{2\text{res}}$ → The matrix $\mathsf{M}_{2\text{res}}$
204	Eq. (7.19)	$\mathbf{M}_{1\text{res}} \to \mathbf{M}_{2\text{res}}$
206	Figure 7.3(a)	F_1 and F_2 lens should switch positions
206	third to last line	$Z_R^2/l_1 \to Z_R^2/l_1^2$
213	last line of first paragraph	high intensity X-ray pulses of sub-femtosecond duration can be generated. → high intensity, ultra-short x-ray pulses can be generated using techniques like those developed for SASE that we describe in Sec. 8.2.3.
216	below Eq. (8.3)	$2L_G \to L_G$
222	sixth line of second paragraph	fractional → relative

222	Figure 8.3 caption, second to last line	dashed curve $\to$ gray curve
233	second to last line	delete length
236	second line below Eq. (8.14)	$u^2 \to \lvert u \rvert$
241	Eq. (A.7)	$\mathcal{H} \to \mathscr{H}$
241	Eq. (A.8)	$\mathcal{H} \to \mathscr{H}$
241	second line above Eq. (A.9)	$H \to \mathcal{H}$
244	second to last line	being $\to$ begin
245	above Eq. (A.27)	$\partial F_2/\partial p \to \partial F_2/\partial \theta$
252	third line above (B.11)	beam $\to$ beamlet
257	fourth line below (C.12)	non-commutivity $\to$ non-commutativity
262	Eq. (C.53)	incomplete equation, set it equal to zero
263	below Eq. (C.56)	The Gaussian distribution (C.55) has an RMS width in $\tilde{\theta}$ equal to $\sqrt{q}$ and an RMS width in p ... $\to$ By integrating (C.55) over p, we find that the distribution in $\tilde{\theta}$ is Gaussian with RMS width $\sqrt{q}$; likewise, marginalizing over $\tilde{\theta}$ results in a Gaussian in p with RMS width ...
263	second line below Eq. (C.56)	(C.50) $\to$ (C.52)
264	right side of Eq. (C.59)	$\frac{G}{2}\left[\frac{1}{q}\left(\sigma_\theta^2 + \frac{q^2}{4\sigma_\theta^2} + \frac{1}{2}\right)\right] \to \frac{G}{2}\left[\frac{1}{q}\left(\sigma_\theta^2 + \frac{q^2}{4\sigma_\theta^2}\right) + \frac{1}{2}\right]$
264	second line after (C.59)	$\frac{1}{2}\left\langle \mathscr{F}_Q^\dagger \mathscr{F}_Q \right\rangle_\Psi = 3G/2 \to \frac{1}{2}\left\langle \mathscr{F}_Q^\dagger \mathscr{F}_Q \right\rangle_\Psi = 3G/4$
266	Eq. (C.69)	$\hbar\omega/c = \hbar(k,k) \to k = \hbar(\omega/c, \omega/c)$
266	second line below Eq. (C.69)	its $\to$ it is a
266	Eqs. (C.75) and (C.76)	$\mathcal{J} \to \mathfrak{J}$
270	first line	assume that $d\gamma/dt \ll \gamma$ $\to$ assume that the second-order time derivative is negligible
271	Eq. (D. 18)	$x_\eta \to x_\beta$