Errata: Soft X-Rays and Extreme Ultraviolet Radiation / David Attwood

(April 2009)

Page #	Corrections	Where
7	bonds → bands	1st sentence
9	$1/e^{x} \rightarrow 1/e^{\rho\mu x}$ (Fig. 1.8)	Fig. 1.8e
17	Add L_{β_2} (N_5 to L_3); remove L_{β_1} (historically correct, but confusing)	Fig. 1.11
50	(2.71) → (2.71a)	renumber equation
50	(2.72) → (2.71b)	renumber equation
67	$\lvert \mathbf{k} \rvert = \lvert \mathbf{k}'' \rvert = \omega/c$	eq. 3.31
74	$(\theta \;\; \theta_c) \rightarrow (\theta \;\; \theta_c)$	4 lines below eq. 3.50
75	(3.51)	boxed equation
90	subscript → superscript	below eq. for $f^0(\omega)$
99	interference transition → interface transition	Fig. 4.1 caption, 5th sentence
101	(4.5a) → (4.4b)	1st sent. below eq. 4.4b
101	Remove right-most $\sqrt{\;}$ sign	footnote
102	Table 1.4 → the periodic Table of the Elements	(pg. 102) end of 1st para.
103	(continued from above) on the inside back cover	(pg. 103) below eg. 4.8
106	observed → theoretical	1st sentence
123	(5.80), (5.82), (5.85)	wiggler eg. #s
131	Appendix B → Appendix D.1	1st sentence
134	ϕ-dependence → ψ-dependence	para. above eq. 5.8
135	correct magnet arrows	Fig. 5.8
148	5.3.3 → 5.3.2	1st sentence
154	$J_n(x) = \ldots (x/2)^{n+2s}$	below eq. 5.40a
161	$P_{T,1} \rightarrow \overline{P}_{T,1}$ (two places)	eqs. 5.50a and 5.50b
162	(5.51b) → (5.51) (two places)	above and below eq. 5.52
168	$B_{\Delta\omega/\omega}(0) \rightarrow \overline{B}_{\Delta\omega/\omega}(0)$	eq. 5.65
175	$\gamma^*\omega_u{}^1 \rightarrow \gamma^*\omega_u$	above eq. 5.71
183	$P_T \rightarrow \overline{P}_T$ (two places)	eqs. 5.85a and 5.85b
183	$1.90 \times 10^{-6}(\mathrm{W}) \rightarrow (1.90 \times 10^{-6}\mathrm{W})$	eq. 5.85b
184	(5.76b) → (5.7b)	below eq. 5.88b
189	1.6 → 1.16	footnote
196	Larmor radius*	4th sent. below eq. 6.8
196	*See pg. 280 footnote for practical units	
198	$\partial(r - r_i) / \partial r_i \rightarrow \partial\delta(r - r_i) / \partial r_i$	middle of page
198	Appendix B → Appendix D.7	1st sentence & middle of page
205	$\partial ne/\partial t + \nabla \cdot (n_e \mathbf{v}) = 0$	eq. 6.40

Page #	Corrections	Where
208	$\tilde{\mathbf{v}}^2 \equiv \tilde{\mathbf{v}} \cdot \tilde{\mathbf{v}} \rightarrow \tilde{\mathrm{v}}^2 \equiv \tilde{\mathbf{v}} \cdot \tilde{\mathbf{v}}$	2nd sent. below eq. 6.53
209	Replace with $\mathbb{P}_j = mn_j\overline{\tilde{\mathrm{v}}^2}/3\ \ \mathbf{1} = \mathrm{P}_j\mathbf{1}$	eq. 6.57
211	Eq. 6.60b → Eq. 6.60a	3rd line below 6.64
211	... so that for a one-dimensional plasma ...	Just above Eq. 6.61
212	$n_i = n_{i0}e^{-x/\mathrm{v}_{\exp}t}$	Eq. 6.72
213	..., a 1 keV plasma of Ne-like titanium ions with an average charge state of Z = +12 will expand at a velocity of approximately 0.20 μm/ps.	Sentence below eq. 6.73
215	$\omega_r + i\omega_i$	last line above eq.6.85
220	$\nabla n_\mathrm{o} \rightarrow \nabla n_\mathrm{e}$	eq. 6.102
224	(6.18b) → (6.118b)	boxed eq. at top of page
225	$e/\mathrm{cm}^2 \rightarrow e/\mathrm{cm}^3$	last line
226	$N_D \simeq 3.4 \times 10^3 \rightarrow N_D \simeq 2.4 \times 10^3$	1st para., 3rd line
226	$\upsilon_{ei}/\omega_p \simeq 2.4 \times 10^{-3} \rightarrow \upsilon_{ei}/\omega_p \simeq 3.4 \times 10^{-3}$	1st para., 3rd line
226	$\upsilon_{ei} \simeq 3.3 \times 10^{12}/\mathrm{s} \rightarrow \upsilon_{ei} \simeq 4.6 \times 10^{12}/\mathrm{s}$	1st para., 4rd line
226	$l_\mathrm{abs} \simeq 130\ \mathrm{m} \rightarrow l_\mathrm{abs} \simeq 93\ \mathrm{m}$	1st para., 5th line
230	6.10b → 6.11b	Last para., line 2
248	titanium atoms → titanium ions	7th line from end of 2nd para.
252	targets → plasmas	1st line
254	Kr-like closed shell → [Kr] $4d^{10}$ closed sub-shell	2nd & 3rd lines of footnote
255	0.35 $\mathrm{w/cm}^2$ → 0.35 μm	Fig. 6.27 caption, 2nd line
272	$\lambda^2/\Delta\lambda \rightarrow \lambda^2/2\Delta\lambda$	2nd para., last line
273	pum-laser → pump-laser	4th line from bottom of para.
277	$\mathrm{v}_i/c \rightarrow 2\sqrt{2\ln 2}\ \mathrm{v}_i/c$	middle of eq.7.19a
278	e/cm → $\mathrm{e/cm}^3$ (three places)	para. below eq. n_uFL
280	target → plasma	2nd line, last para.
289	340 eV → 220 eV	6th line of Fig. 7.18 caption
289	Ti(100 eV) → κTi(100 eV)	in Fig. 7.18
290, 291	13.99 nm → 13.89 nm	4 places
311	curve goes to zero power at 428 eV in Fig. 8.9c	Fig. 8.9
315	$(d_y, \theta_y) \rightarrow (d_y\theta_y)$	eq. 8.10a
316	3.5 m → 4.3 m	end of 2nd para.
317	Shift photon energy axis by 50 eV, so that 50 eV → 100 eV 100 eV → 150 eV, etc. Extend curve to zero power at 428 eV	Fig. 8.11b
323	Fig. 8.17 → Fig. 8.18a	above eq. 8.13
324	$\delta\ell \ldots = \xi x/z \ldots$ and $\delta\psi \ldots = -k\xi x/z$	both in Fig. 8.18b

Page #	Corrections	Where
326	Eq. 8.12 → 8.17; Eq. 8.18 → 8.18a	1st para., 4th & 5th lines
327	$\delta\psi = -kr\rho/x \rightarrow = -kr\rho/z$	Fig. 8.20
328	statistically → spatially ;	both on 2nd line below
328	point source → Gaussian with	eq. $\lvert\mu_{OP}\rvert$ = . . . 0.88
330	(8.26) → (8.27)	2nd para, 4th line
330	interface → interference	last line
330	charged → charge	footnote, 2nd line
331	magnification → reduction	1st para., 4th line
331	(8.26) → (8.27)	1st para., 4th line from bottom
332	8.24(a) → 8.25(a)	last para., 2nd from last line
333	8.24(b) → 8.25(b)	last paragraph, 4th line
343	$\simeq \rightarrow =$	in Fig. 9.5
350	lower → longer	1st line
361	The depth of focus of a lens, or depth of field of an imaging system, is the . . .	1st line of Sec. 9.5
363	. . . spread by an amount . . .	2nd para., 1st line
388	, A.G. Michette and C.J. Buckley, editors	add to reference 15
392	*J. Microscopy* $\overline{197}$, 185 (2000)	add to reference 86
396	Add "θ" to Fig. 10.1	half-angle left of wafer
397	$NA_{obj} = \mathrm{Sin}\theta_{obj} \rightarrow NA = \mathrm{Sin}\theta$ at the wafer	2nd para, 1st line
398	focus → field	above eq. 10.2
398	$NA \rightarrow NA_{obj}$	end of para. below eq. 10.3
400	$NA_{obj} = 0.6 \rightarrow NA = 0.6$	1st sentence
401	Fig. 9.34 → Fig. 9.37	4th line from bottom of 2nd para.
403	Update Table 10.1 to 23 nm node	see new Table 10.1
418, 419	Update Tables A.4 and A5: http://physics.nist.gov/cuu/Constants/index.html Display ⊙ table (pdf), then "extensive listings."	
419	$\in_0^2 \rightarrow \in_0$ (in Bohr radius)	in Table A.5
423	Ti → Tl	z = 81
425	Yb(70), K_{β_1} = 59,370; W(74), K_{β_1} = 67,244; Po(84), K_{β_1} = 89,800 For elements At(85) through Ra(88) multiply × 10 values for K_{α_1}, K_{α_2}, and K_{β_1}. Also × 10 for Fr(87) L_{β_2} and Ac(89) K_{α_2} and K_{β_1}.	Table B.2
429-436	Add μ (2 places for each element), as for Be	Upper left table for each element
439	5p → 5d	(W) below 5s
439	4p → 4d	(Au) below 4f
455	reference to equation E1-E4 should be F1-F4	3rd sentence from bottom

Errata: Updated Table 10.1

TABLE 10.1. The National Technology Roadmap for Semiconductors in tabular form, showing anticipated technological characteristics for selected parameters of high volume microprocessors and DRAM chips. The projections cover five generations of technology, denoted by half-pitch of periodic patterns ("nodes"). (Courtesy of the Semiconductor Industry Association, San Jose, CA; updated 2006.)

First year of volume production*	~~**2007**~~	**2007** ~~**2010**~~	**2009** ~~**2013**~~	**2011** ~~**2016**~~	**2013** ~~**2019**~~
Technology Generation (half pitch, 1:1, printed in resist)	65 nm	45 nm	32 nm	22 nm	16 nm
Isolated Lines (in resist) [Physical gate, metalized]	42 nm [25 nm]	30 nm [18 nm]	21 nm [13 nm]	15 nm [9 nm]	11 nm [6 nm]
Chip Frequency (chip to board)	4.9 GHz	9.5 GHz	19 GHz	35 GHz	60 GHz
Transistors per chip (HV) (3 × for HP ; 8 × for ASICs)	390 M	770 M	1.5 B	3.1 B	6.2 B
DRAM Memory (bits per chip)	2.2 G	4.3 G	8.6 G	17 G	34 G
Field Size (mm × mm)	26 × 33	26 × 33	26 × 33	26 × 33	26 × 33
Wafer Size (diameter)	300 mm	300 mm	450 mm	450 mm	450 mm

*Leading high volume chip manufacturers strive to maintain a two year cycle.