

Two-Dimensional Optical Spectroscopy

Minhaeng Cho

Errata

1. Chapter 1. Page 6, line 6. "...processes.." → "...processes **will be discussed.**"
2. Chapter 2. Page 20, equation 2.62. There are two thick arrows pointing left and right. The arrow pointing left appears to be a bit larger than that pointing right. Please reduce the size of the arrow pointing left to make it equal in size for both.
3. Chapter 2. Page 24. Eq. (2.89). Remove "+..."
4. Chapter 2. Page 25, line 3. "...over τ_1 , and τ_2 ," → "...over τ_1 and τ_2 ,"
5. Chapter 3. Page 60, equation 3.144, the last line of this equation. $\mathbf{e}_2^* \mathbf{e}_1 \rightarrow \mathbf{e}_2^* \mathbf{e}_1$.
6. Chapter 3. Page 38. $\beta = 1/k_B T$ not $\beta = 1/k_\beta T$.
7. Chapter 5. Page 94. Eq. (5.35). " $iQ_j(t_2)t_3$ " → " $-iQ_j(t_2)t_3$ "
8. Chapter 5. Page 95. Eq. (5.40). All $\bar{C}_{xy}(0) = 0$.
9. Chapter 5. Page 110. $\Omega^2 = 2\lambda k_B T / \hbar^2$
10. Chapter 11. Page 223, , the first sentence. This sentence is grammatically incorrect. In line 2, "detail, **where** the effects..." → "detail, **such as** the effects..."
11. Chapter 11. Page 239, Figure caption of Figure 11.3. "...Equations 11.43 and **11.44**" → "...Equations 11.43 and **11.45**"
12. Chapter 14. Page 305, the sentence just above equation 14.40. "The polarization that is associated with this DFG is then diagrammatically represented as" → "The polarization components that are associated with this DFG are then diagrammatically represented as"
13. Chapter 14. Page 305, equation 14.40. In fact, one more diagram should be added to this equation so that the corrected equation 14.40 should be

$$\langle \mu \left\langle \frac{\mu \mathbf{E}_2^* \mu \mathbf{E}_1}{e \xi f \xi} \right\rangle_{|g\rangle \langle g|} \rangle \quad \langle \mu \left\langle \frac{\mu \mathbf{E}_1}{e \xi} \right\rangle_{\mu \mathbf{E}_2^*} \right\rangle_{|g\rangle \langle g|} \rangle$$

14. Chapter 14. Page 306, equation 14.42. This equation requires a minor modification as

$$\begin{aligned} \widehat{\mathbf{E}}_{DFG}(t) = & -\frac{i\omega_s}{\hbar^2} e^{i(\mathbf{k}_1 - \mathbf{k}_2) \cdot \mathbf{r} - i(\omega_1 - \omega_2)t} \boldsymbol{\mu}_{ge} \boldsymbol{\mu}_{ef} \boldsymbol{\mu}_{fg} : \mathbf{e}_2^* \mathbf{e}_1 \int_0^\infty dt_2 \int_0^\infty dt_1 \{ G_1(t_2, t_1) e^{i(\omega_1 - \omega_2 - \bar{\omega}_{eg})t_2 + i(\omega_1 - \bar{\omega}_{fg})t_1} \\ & - G_2(t_2, t_1) e^{i(\omega_1 - \omega_2 - \bar{\omega}_{fe})t_2 + i(\omega_1 - \bar{\omega}_{fg})t_1} \} E_2^*(t - t_2) E_1(t - t_2 - t_1). \end{aligned}$$

15. Chapter 14. Page 306, equation 14.43. This equation needs to be rewritten as

$$\tilde{\mathbf{E}}_{XYZ}^{DFG}(\omega_\tau, \omega_\tau) = -\frac{i\omega_s}{6\hbar^2} \boldsymbol{\mu}_{ge}^M \cdot (\boldsymbol{\mu}_{ef}^M \times \boldsymbol{\mu}_{fg}^M) \{ \Gamma(\bar{\omega}_{eg}, \Delta_{ee}^2, \bar{\omega}_{fg}, \Delta_{ff}^2) - \Gamma(\bar{\omega}_{fe}, \Delta_{ff}^2 + \Delta_{ee}^2, \bar{\omega}_{fg}, \Delta_{ff}^2) \}$$