Here are the more notable corrections and changes made in the paperback edition of *Optically polarized atoms: understanding light–atom interactions*:

- Page v, first paragraph of Acknowledgments, “and Andrey Jarmola”→“Andrey Jarmola, and Kyle Beloy”
- Page 10, Eq. (2.7), write \( l \) as vector:
  \[ l^2 = l_x^2 + l_y^2 + l_z^2. \]
- Page 14, Eq. (2.20), divide by \( \hbar \):
  \[ \mu = -\mu_B (L + 2S)/\hbar. \]
- Page 26, Eq. (2.27), divide by \( \hbar \):
  \[ \mu_I = g_I \mu_N I/\hbar, \]
- Page 26, last line: replace “can only support multipole moments of rank \( 2^\kappa \)” with “can only support multipole moments of rank \( \kappa \)”
- Page 44, in Eq. (3.69), replace \( \psi'_{m_1} = \mathcal{D}_{m,m_1} \psi_{m_2} \)” with “\( \psi'_{m_1} = \mathcal{D}_{m,m_1} \psi_{m_2} \)”
- Page 44, in beginning of Eq. (3.70), replace \( |\psi\rangle = \mathcal{D}^{-1} |\psi\rangle \)” with \( |\psi\rangle = \mathcal{D}^{-1} |\psi\rangle \)
- Page 56, Eq. (4.6), multiply by \( -\mu_B/\hbar \):
  \[ \mu = \mu_L + \mu_S = -\mu_B (g_L L + g_S S)/\hbar. \]
- Page 57, Eq. (4.7), multiply by \(-1\):
  \[ \mu_J = \mu_L \cos \alpha + \mu_S \cos \beta \]
  \[ = -\mu_B \sqrt{L(L + 1)} \cos \alpha - 2\mu_B \sqrt{S(S + 1)} \cos \beta. \]
- Page 57, Eq. (4.10), multiply by \(-1\):
  \[ g_J = \frac{-\mu_J \hbar}{\mu_B |\mathbf{J}|} = 1 + \frac{J(J + 1) + S(S + 1) - L(L + 1)}{2J(J + 1)}. \]
- Page 58, before Eq. (4.17), “since \( \langle F \rangle = m_F \hbar \)”→“since for an eigenstate of \( F_z \),
  \( \langle F \rangle = m_F \hbar \hat{\mathbf{z}} \)”
- Page 58, Eq. (4.17), multiply by \( \hat{\mathbf{z}} \):
  \[ \langle \hat{\mu} \rangle = -g_F \mu_B m_F \hbar \hat{\mathbf{z}} = -g_J \mu_B \langle \mathbf{J} \rangle /\hbar, \]
• Page 68, last line of Eq. (4.62), add minus sign to third case:

\[
\delta_{m'm} \langle \xi J \parallel d \parallel \xi' J' \rangle \times \begin{cases} 
\frac{\sqrt{J-m^2}}{\sqrt{(2J+1)(2J+1)}} & \text{for } J' = J - 1 \\
\frac{m}{\sqrt{(2J+1)(2J+1)}} & \text{for } J' = J \\
\frac{\sqrt{(J+1)^2-m^2}}{\sqrt{(2J+1)(2J+3)}} & \text{for } J' = J + 1 \\
0 & \text{for } |J' - J| > 1 \text{ or } J = J' = 0.
\end{cases}
\]

• Page 69, Eq. (4.67), change first case from 1 to -1:

\[
\frac{\alpha_2}{\alpha_0} = \begin{cases} 
-1 & \text{for } J' = J - 1 \\
\frac{2J-1}{J+1} & \text{for } J' = J \\
\frac{-J(J-1)}{(2J+1)(2J+3)} & \text{for } J' = J + 1.
\end{cases}
\]

• Page 86, footnote, “Bluhm et al. (1996)”—“Blum (1996)”

• Page 94, before, in, and following Eq. (5.49), and in Eq. (5.50), replace \( \Gamma \) with \( \hat{\Gamma} \)

• Page 94, following Eq. (5.49), change to “Here \( \hat{\Gamma} \) is a diagonal matrix with the population decay rate of each state on the diagonal.”

• Page 94, last sentence before Sec. 5.6, “Bluhm et al. (1996)”—“Blum (1996)”

• Page 102, Eq. (5.78), change \( J \) to \( F \):

\[
\rho_{FF}(\theta, \phi) = \sqrt{\frac{4\pi}{2F+1}} \sum_{k=0}^{2F} \sum_{q=-k}^{k} \langle FFk0|FF\rangle \rho_{0}^{q} Y_{kq}(\theta, \phi).
\]

• Page 116, first paragraph of Sec. 6.3, “Bluhm et al. 1996”—“Blum 1996”

• Page 144, inline equation in last paragraph, divide by \( \hbar \), to read “\( H_B = -\mu \cdot B = \mu_B (L + 2S) \cdot B / \hbar \)”

• Page 149, first partial paragraph: “and \( \mu \) is the intrinsic magnetic moment”→“and \( \mu \) is the intrinsic magnetic moment”

• Page 201, move “where we have used Eq. (7.62) with \( \Gamma = 1/\tau \)” from after Eq. (10.58d) to after Eq. (10.59d), and swap the period and comma at the ends of Eqs. (10.58d) and (10.59d)

• Page 228, before Sec. 11.6, replace “Grossetete (1965)” with “Grossetête (1964)”.

• Page 326, insert “(From Acosta et al. 2008.)” at the beginning of Fig. 18.14 caption
• Page 329, Eq. (19.1), change to
\[ \Delta E_{\xi Jm} = \frac{\mathcal{E}_0^2}{4} \sum_{\xi'J'm'} \langle \xi Jm|d_i|\xi'J'm'\rangle \langle \xi'J'm'|d_j|\xi Jm \rangle \left( \frac{e_i^* e_j}{E_{\xi Jm} - E_{\xi'J'm'} - \hbar \omega} + \frac{e_j^* e_i}{E_{\xi Jm} - E_{\xi'J'm'} + \hbar \omega} \right), \]

• Page 331, Eq. (19.8), change angle brackets to absolute value:
\[ \Delta E_{\xi Jm} = \mathcal{E}_0^2 \left[ C_0 + C_1 m V_z + C_2 \left( m^2 - \frac{J(J+1)}{3} \right) \left( |\epsilon_z|^2 - \frac{1}{3} \right) \right]. \]

• Page 331, replace passage

It is convenient to define AC-Stark polarizabilities \( \alpha_\kappa \) in terms of the \( C_\kappa \) so that \( \alpha_0 \) and \( \alpha_2 \) are consistent with the usual definitions for static electric polarizabilities as given by Eq. (4.65).

When extrapolating from low-frequency polarizabilities to static polarizabilities, it is important to take into account the discontinuity related to the fact that the time-averaged value of the square of an oscillating field is one-half of the amplitude squared, and this factor of one-half is absent for a static field.

The second-rank tensor polarizability is defined so that the tensor shift averaged over \( m \) is zero and also, if the electric field is applied along \( \hat{z} \), then the tensor shift of the stretched states \( m = \pm J \) is \( -\alpha_2 \mathcal{E}_0^2 \).

We adopt a similar convention for the vector term in the AC-Stark case: the vector shift of the \( m = J \) state for left circularly polarized light propagating along \( \hat{z} \) is \( -\alpha_1 \mathcal{E}_0^2 / 2 \). This leads to the expression:

with

The parameters \( C_\kappa \) are often written in terms of the AC-Stark polarizabilities \( \alpha_\kappa \), commonly defined so that the scalar and tensor AC polarizabilities, \( \alpha_0 \) and \( \alpha_2 \), become equal to the corresponding static polarizabilities in the limit of a very-low-frequency linearly polarized field. In making this correspondence, we must remember that the AC-Stark shift is the average shift over an oscillation cycle of the electric field. Thus a low-frequency oscillating field of amplitude \( \mathcal{E}_0 \) will produce an average AC shift that is one-half as large as the DC shift due to a static field \( \mathcal{E}_{\text{static}} = \mathcal{E}_0 \), since the average of the square of the oscillating field is \( \mathcal{E}^2 = \mathcal{E}_0^2 / 2 \).

Comparing with the definitions for the static electric polarizabilities as given by Eq. (4.65), and including the factor of one-half, we find that the AC scalar shift should be given by \( -\alpha_0 \mathcal{E}_0^2 / 4 \), while the value of \( \alpha_2 \) can be specified by fixing the AC tensor shift as \( -\alpha_2 \mathcal{E}_0^2 / 4 \) for the stretched states \( m = \pm J \) in the special case of a field linearly
polarized along $\hat{z}$. Since there is no vector polarizability in the limit of a static field, its definition is somewhat arbitrary; a commonly used convention is that the vector shift of the $m = J$ state for left circularly polarized light propagating along $\hat{z}$ is given by $-\alpha_1 E_0^2/8$. (Note that some variation in the literature may be encountered in the definitions of $\alpha_0$ and $\alpha_2$, as well as in the definition of $\alpha_1$.) Using these definitions, we have the expression:

- Page 331, Eq. (19.9), add a prefactor of 1/2, and an additional factor of 1/2 to the second term:
  \[
  \Delta E_{\xi J m} = -\frac{E_0^2}{4} \left( \alpha_0 + i\alpha_1 \frac{m}{2J} V_c + \alpha_2 \frac{3m^2 - J(J + 1)}{J(2J - 1)} \frac{3|\epsilon_c|^2 - 1}{2} \right).
  \]

- Page 341, Table A.2, after line “$R$ classical rotation operator” add line “$R$ classical rotation matrix”

- Page 350, in Eqs. (D.38), (D.39) (twice), (D.40), and between Eqs. (D.38) and (D.39), replace “$\tilde{R}$” with “$\tilde{R}$”

- Page 355, replace period at the end of Eq. (E.16) with comma

- Page 359, 3rd line, “different density matrix then” $\rightarrow$ “different density matrix than”

- Page 360, replace reference


  with


- Page 361, add new reference between Bluhm, R. and Blushs, K.:


- Page 361, replace reference Balabas, M.V. et al. with


- Page 363, replace pair of references


with


• Page 364, replace reference


with


• Page 367, replace reference


with