Quantum theory of coherent transverse optical magnetism: erratum

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Received July 27, 2010 (Doc. ID 132358); published September 16, 2010

Several corrections of detail are made to an earlier paper. The main results and conclusions are unchanged.

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OCIS codes: 190.0190, 190.4410, 190.7110, 320.7120.

For irreducible field components to be represented consistently throughout Ref. [1], the conjugation of some Rabi frequencies must be corrected in Eqs. (20), (21), (24), and (25).

\[ V_{12}^{(e)} = \langle 1 | V^{(e)} | 2 \rangle = -\frac{1}{2} \hbar (1 [\Omega_0^{(e)} + \Omega_0^{(e)*}] e^{i \varphi} + h.c. | 2 \rangle, \]  
(20)

\[ V_{12}^{(m)} = \langle 1 | V^{(m)} | 2 \rangle = -\frac{1}{2} \hbar (1 [\Omega_0^{(m)} + \Omega_0^{(m)*}] + h.c. | 2 \rangle  
\]

- \frac{1}{2} \hbar (1 [\Omega_0^{(m)} + \Omega_0^{(m)*}] e^{2i \varphi} + h.c. | 2 \rangle, \]  
(21)

\[ \rho_{12}^{(e)} = \frac{1}{2} \left( \frac{[\Omega_0^{(e)} + \Omega_0^{(e)*}]_{12}}{(\Delta_1 + i \Gamma_{12})} \right) e^{i \omega t} (\rho_{11} - \rho_{22}), \]  
(24)

\[ \rho_{12}^{(m)} = \frac{1}{2} \left( \frac{[\Omega_0^{(m)} + \Omega_0^{(m)*}]_{12}}{(\omega_m + i \Gamma_{12})} e^{-i \omega t} + \frac{[\Omega_0^{(m)} + \Omega_0^{(m)*}]_{12}}{(\Delta_2 + i \Gamma_{12})} e^{i \omega t} \right) (\rho_{11}^{(0)} - \rho_{22}^{(0)}). \]  
(25)

The asterisk in Eq. (26) should be dropped. The same notational correction is needed in the sentence, “Hence the specific replacement \( \Omega_0^{(m)} = [\Omega_0^{(e)} + \Omega_0^{(e)*}] \) has been made for the magnetic term, and \( \Omega_0^{(e)} = \frac{1}{2} (\Omega_0^{(e)} + \Omega_0^{(e)*}) \) for the electric term.”

The subscript on resonant frequency \( \omega_0 \) in Eqs. (25), (28), (30), and (42) should be \( \varphi \), not 0, to denote the ground state resonant frequency \( \omega_2 \) of magnetically induced torsional vibrations that are azimuthal with respect to the optical \( B \) field:

\[ \tilde{M}(t) = -\frac{j}{m} \left( \frac{Ne}{2} \right) \left\{ \frac{1}{2} \left( \frac{2 |L| \Omega_0^{(1)} [\Omega_0^{(1)*}]_{12} \Omega_0^{(2)*}}{(\Delta_1 + i \Gamma_{12}) (\Delta_2 + i \Gamma_{12})} \right) e^{i \omega t} \right. \]  
\[ + \left. \frac{2 |L| \Omega_0^{(1)*} [\Omega_0^{(2)}]_{12} \Omega_0^{(2)*}}{(\omega_2 + i \Gamma_{12}) (\Delta_2 + i \Gamma_{12})} e^{-i \omega t} \right\} + h.c., \]  
(28)

\[ \tilde{M} = -\frac{j}{m} \left( \frac{Ne}{2} \right) \left\{ \frac{1}{2} \left( \frac{2 |L| \Omega_0^{(1)} [\Omega_0^{(1)*}]_{12} \Omega_0^{(2)*}}{(\Delta_1 + i \Gamma_{12}) (\Delta_2 + i \Gamma_{12})} \right) e^{i \omega t} \right. \]  
\[ + \left. \frac{2 |L| \Omega_0^{(1)*} [\Omega_0^{(2)}]_{12} \Omega_0^{(2)*}}{(\omega_2 - i \Gamma_{12}) (\Delta_2 + i \Gamma_{12})} e^{-i \omega t} \right\} (\rho_{11} - \rho_{22}). \]  
(30)

Similarly, \( \omega_0 \) should be \( \omega_2 \) in the sentence, “We also note that the second term in Eq. (30) is much smaller than the first due to the \( \omega_2 \) factor in the denominator (unless \( \omega_2 \) is small compared to \( \Delta_1 \)).”

The exponential time factors were interchanged in Eq. (42). It should read

\[ \tilde{P}(t) = N \frac{\sinh}{\cosh} \left( \frac{\mu_2 \rho_{12}^{(0)}(t) \rho_{12}^{(0)*} + h.c.}{} \right) \]  
\[ = N \left\{ \frac{1}{2} \left( \frac{\mu_2 \rho_{12}^{(0)}(t) \rho_{12}^{(0)*} + h.c.}{} \right) \right. \]  
\[ + \left. \frac{1}{2} \left( \frac{\mu_2 \rho_{12}^{(0)}(t) \rho_{12}^{(0)*} + h.c.}{} \right) \right\}. \]  
(42)

The conclusions from Eq. (42) regarding frequency-dependent enhancement of magnetic effects were similarly interchanged. The discussion should state, “Just like
the magnetization at frequency $\omega$ in Eq. (31), the second harmonic signal is longitudinally polarized and contains the parametric resonance factor $[\Delta_2 + i\epsilon_{2}^{(m)}]^{-1}$. The first term is a zero frequency interaction that predicts a static charge separation induced in dielectric media by moderately intense light. Since it is inversely proportional to $\omega$, its magnitude may be strongly enhanced when this quantity is small. All other results and conclusions of the paper are unchanged.

REFERENCES