Erratum: Complete energy conversion between light beams carrying orbital angular momentum using coherent population trapping for a coherently driven double-Λ atom-light-coupling scheme [Phys. Rev. A 100, 023811 (2019)]

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A number of errors have been detected in the published article. The x axis of Figs. 3 and 4 should be scaled to $z/(40L_{abs})$ rather than to z/L_{abs}, so L_{abs} should be replaced with $40L_{abs}$ in all relevant discussions of these figures. Consequently, the total length of the medium becomes $L = 1600L_{abs}$ in the calculations of Figs. 3 and 4. Also, there should be $\bar{z} = 80L_{abs}$ and $z_0 = 800L_{abs}$ in Fig. 3, and one has $\sigma = 640L_{abs}$ in Fig. 4.

In Eq. (1), the $\hbar$ is missing and the single-photon detuning should be included for the probe fields so that

$$H = \hbar\delta|e_2\rangle\langle e_2| - \hbar\left(\Omega_{p_1}|e_2\rangle\langle g_1| + \Omega_{p_2}|e_2\rangle\langle g_2| + \Omega_{c_1}|e_1\rangle\langle g_1| + \Omega_{c_2}|e_1\rangle\langle g_2| + \text{H.c.}\right), \tag{1}$$

where we have assumed that the strong control fields are at single-photon resonance with each respective transition. Also, in the paragraph below Eq. (3), it should be $\delta_1 = \delta_2 = -\delta$.

In the density-matrix equations presented in the Appendix, one should add in appropriate places complex conjugations of the Rabi frequencies of the probe fields Ω_{p_1} and Ω_{p_2}. Specifically, the second terms on the right-hand sides of Eqs. (A6)–(A8) should read $i\Omega_{p_2}^*\rho_{e_2g_1}$, $i\Omega_{p_1}^*\rho_{e_2g_1} - i\Omega_{p_1}\rho_{g_1e_2}$, and $i\Omega_{p_2}^*\rho_{e_2g_2} - i\Omega_{p_2}\rho_{g_2e_2}$, respectively. The first and second terms on the right-hand side of Eq. (A9) should read $i\Omega_{p_1}\rho_{g_1e_2} - i\Omega_{p_1}^*\rho_{e_2g_1}$ and $i\Omega_{p_2}\rho_{g_2e_2} - i\Omega_{p_2}^*\rho_{e_2g_2}$, respectively. Note that the Rabi frequencies of the control fields Ω_{c_1} and Ω_{c_2} are considered to be real quantities, so no complex conjugation is needed for them. Finally, below Eq. (A9) it should be $\Delta_{e_2g_1} = \Delta_{e_2g_2} = 0$. We stress that the numerical calculations presented in Figs. 1–3 have been obtained with the correct form of the density-matrix equations.

The above corrections have no consequences on any of the discussed effects and do not affect the conclusions of the article.

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