Erratum: Complete energy conversion between light beams carrying orbital angular momentum using coherent population trapping for a coherently driven double-$\Lambda$ atom-light-coupling scheme
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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 $z/(40 \lambda_{abs})$ rather than to $z/\lambda_{abs}$, so $\lambda_{abs}$ should be replaced with $40 \lambda_{abs}$ in all relevant discussions of these figures. Consequently, the total length of the medium becomes $L = 1600 \lambda_{abs}$ in the calculations of Figs. 3 and 4. Also, there should be $z = 80 \lambda_{abs}$ and $z_0 = 800 \lambda_{abs}$ in Fig. 3, and one has $\sigma = 640 \lambda_{abs}$ in Fig. 4.

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

$$H = \hbar \delta |e_2\rangle\langle e_2| - \hbar (\Omega_{p1} |e_2\rangle\langle g_1| + \Omega_{p2} |e_2\rangle\langle g_2| + \Omega_{c1} |e_1\rangle\langle g_1| + \Omega_{c2} |e_1\rangle\langle g_2| + \text{H.c.}),$$

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 $\Omega_{p1}$ and $\Omega_{p2}$. Specifically, the second terms on the right-hand sides of Eqs. (A6)–(A8) should read $i \Omega_{p1}^* \rho_{g1e1}$, $i \Omega_{p1}^* \rho_{g1e2}$, and $i \Omega_{p2}^* \rho_{g2e1}$, respectively. The first and second terms on the right-hand side of Eq. (A9) should read $i \Omega_{p1} \rho_{g1e2} - i \Omega_{p1}^* \rho_{g1e1}$, and $i \Omega_{p2} \rho_{g2e2} - i \Omega_{p2}^* \rho_{g2e1}$, respectively. Note that the Rabi frequencies of the control fields $\Omega_{c1}$ and $\Omega_{c2}$ are considered to be real quantities, so no complex conjugation is needed for them. Finally, below Eq. (A9) it should be $\Delta_{e1g1} = \Delta_{e2g2} = 0$. 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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