Erratum: Relativistic electron vortex beams in a constant magnetic field **[Phys. Rev. A **95**, 063812 (2017)]**

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Equation (26) of the published article contains an error. J_n^{l+2s} for negative total angular momentum m has to be changed to J_{n+2s}^{l+2s} . The correct expression for the spinor wave function in a uniform magnetic field in terms of the sign of m reads

$$\begin{aligned} \psi(\vec{r}, t)_{m>0} &= C\delta_{s,1/2} \begin{pmatrix} \mathbf{J}_n^l\left(\frac{2r^2}{\omega^2}\right) \\ 0 \\ \frac{k_z}{E+m_0}\mathbf{J}_n^l\left(\frac{2r^2}{\omega^2}\right) \\ \frac{2i\sqrt{(2n+|l|+1+l+2s)}}{\omega(E+m_0)}\mathbf{J}_{n+2s}^{l+2s}\left(\frac{2r^2}{\omega^2}\right) \end{pmatrix} + C\delta_{s,-(1/2)} \begin{pmatrix} 0 \\ \mathbf{J}_n^l\left(\frac{2r^2}{\omega^2}\right) \\ -\frac{2i\sqrt{(2n+|l|+1+l+2s)}}{\omega(E+m_0)}\mathbf{J}_{n+2s}^{l+2s}\left(\frac{2r^2}{\omega^2}\right) \\ -\frac{k_z}{E+m_0}\mathbf{J}_n^l\left(\frac{2r^2}{\omega^2}\right) \end{pmatrix}, \\ \psi(\vec{r}, t)_{m<0} &= C\delta_{s,1/2} \begin{pmatrix} \mathbf{J}_n^l\left(\frac{2r^2}{\omega^2}\right) \\ 0 \\ \frac{k_z}{E+m_0}\mathbf{J}_n^l\left(\frac{2r^2}{\omega^2}\right) \\ -\frac{2i\sqrt{(2n+|l|+1+l+2s)}}{\omega(E+m_0)}\mathbf{J}_{n+2s}^{l+2s}\left(\frac{2r^2}{\omega^2}\right) \end{pmatrix} + C\delta_{s,-(1/2)} \begin{pmatrix} 0 \\ \mathbf{J}_n^l\left(\frac{2r^2}{\omega^2}\right) \\ \frac{2i\sqrt{(2n+|l|+1+l+2s)}}{\omega(E+m_0)}\mathbf{J}_{n+2s}^{l+2s}\left(\frac{2r^2}{\omega^2}\right) \\ -\frac{k_z}{E+m_0}\mathbf{J}_n^l\left(\frac{2r^2}{\omega^2}\right) \end{pmatrix}. \end{aligned}$$

Accordingly the probability density and the azimuthal component of the current should read where (LG) represents the Laguerre-Gaussian beam,

$$\begin{aligned} \rho^{\text{LG}}(r)_{m>0} &= \left(1 - \frac{eB(2n + |l| + |2s| + l + 2s)}{2E(E + m_0)}\right) \left|\mathbf{J}_n^l\left(\frac{2r^2}{\omega^2}\right)\right|^2 + \frac{eB(2n + |l| + |2s| + l + 2s)}{2E(E + m_0)} \left|\mathbf{J}_{n+2s}^{l+2s}\left(\frac{2r^2}{\omega^2}\right)\right|^2, \\ \rho^{\text{LG}}(r)_{m<0} &= \left(1 - \frac{eB(2n + |l| + |2s| + l + 2s)}{2E(E + m_0)}\right) \left|\mathbf{J}_n^l\left(\frac{2r^2}{\omega^2}\right)\right|^2 + \frac{eB(2n + |l| + |2s| + l + 2s)}{2E(E + m_0)} \left|\mathbf{J}_{n+2s}^{l+2s}\left(\frac{2r^2}{\omega^2}\right)\right|^2, \\ j_\varphi^{\text{LG}}(r)_{m>0} &= \frac{2n!}{E\omega} \sqrt{\frac{(2n + |l| + |2s| + l + 2s)}{(n + |l|)!(n + |l + 2s|)!}} e^{-(2r^2/\omega^2)} \left(\frac{\sqrt{2}r}{\omega}\right)^{|l|+|l+2s|} \mathbf{L}_n^{|l|}\left(\frac{2r^2}{\omega^2}\right) \mathbf{L}_{n+2s}^{|l+2s|}\left(\frac{2r^2}{\omega^2}\right), \\ j_\varphi^{\text{LG}}(r)_{m<0} &= -\frac{2}{E\omega} \sqrt{\frac{n!(n + 2s)!(2n + |l| + |2s| + l + 2s)}{(n + |l|)!(n + |l + 2s|)!}} e^{-(2r^2/\omega^2)} \left(\frac{\sqrt{2}r}{\omega}\right)^{|l|+|l+2s|} \mathbf{L}_n^{|l|}\left(\frac{2r^2}{\omega^2}\right) \mathbf{L}_{n+2s}^{|l+2s|}\left(\frac{2r^2}{\omega^2}\right). \end{aligned}$$

FIG. 1. This figure replaces Fig. 2 of the original paper.

FIG. 2. This figure replaces Fig. 3 of the original paper.

For $m < 0$ and $s = -\frac{1}{2}$, the radial quantum number n starts from 1. The illustrations in Figs. 1 and 2 of the corrected equations replace Figs. 2 and 3 of the original paper.

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