Erratum: Graviton photoproduction by a Kerr-Newman black hole with worldline EFT [Phys. Rev. D 114, 025003 (2026)]

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Matching of the electric quadrupole coefficient. The electric quadrupole Wilson coefficient of the Kerr-Newman black hole is $c_3 = -e$, not $c_3 = e$ as stated in Sec. III A. A relative sign was missed due to an inconsistency in the metric signature convention, which affects the covariant time component. The corrected value of c_3 changes the $\mathcal{O}(S^2)$ terms. The term proportional to $ie/4m^2$ is replaced by

$$+\frac{ie}{4m^2}(k_A\cdot\epsilon_h)\left[-\frac{(S\cdot k_h+S\cdot k_A)^2\omega(\epsilon_h\cdot\epsilon_A)}{k_h\cdot k_A}+2\omega(S\cdot\epsilon_h)(S\cdot\epsilon_A)-\frac{2}{\omega}\epsilon^{k_A\epsilon_A Sv}\epsilon^{k_h\epsilon_h Sv}\right]. \tag{1}$$

Figures. The figures are corrected accordingly at $\mathcal{O}(S^2)$. The statement that spin effects cancel at aligned or antialigned incidence is replaced by: for aligned or antialigned incidence, the $\mathcal{O}(S^2)$ correction is azimuthally symmetric but nonzero, both in the helicity channels and unpolarized scattering. The statement that spin effects are strongest near orthogonal incidence is replaced by: the spin effects are strongest for parallel incidence.

TABLE I. Transcription errors in Appendixes C and E.

Location	Correction
(C2), term $\propto e$	Third term in the bracket: $\frac{(\epsilon_h\cdot v)(k_A\cdot\epsilon_h)}{\omega}\to\frac{(\epsilon_A\cdot v)(k_A\cdot\epsilon_h)}{\omega}$
(C2), term $\propto c_2\epsilon^{\epsilon_h\epsilon_A Sv}$	Delete $-\omega(\epsilon_h\cdot v)$
(C2), term $\propto c_2\epsilon^{\epsilon_h k_A Sv}$	Delete $-(\epsilon_h\cdot v)(\epsilon_A\cdot v)$
(C3), term $\propto ec_4$, coefficient of $(S\cdot k_h)^2$	Last term: $\frac{(\epsilon_h\cdot v)(k_h\cdot\epsilon_A)}{2\omega}\to\frac{(\epsilon_h\cdot v)^2(k_h\cdot\epsilon_A)}{2\omega}$
(C3), term $\propto c_2$	First term in the bracket, $\epsilon^{k_A\epsilon_A Sv}\epsilon^{k_h\epsilon_h Sv}(\ldots)$: overall sign $+\to-$
(E17), spatial part of ϵ_h^μ	$i\lambda(\sin\theta\cos\alpha,\sin\theta\sin\alpha,-\cos\theta)\to i\lambda(-\sin\alpha,\cos\alpha,0)$
(E18), spatial part of ϵ_A^μ	$-i\lambda(\sin\phi\cos\beta,\sin\phi\sin\beta,-\cos\phi)\to-i\lambda(-\sin\beta,\cos\beta,0)$

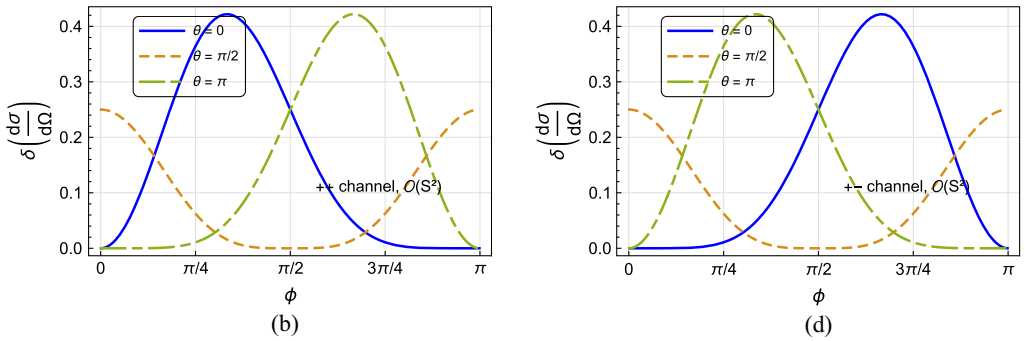
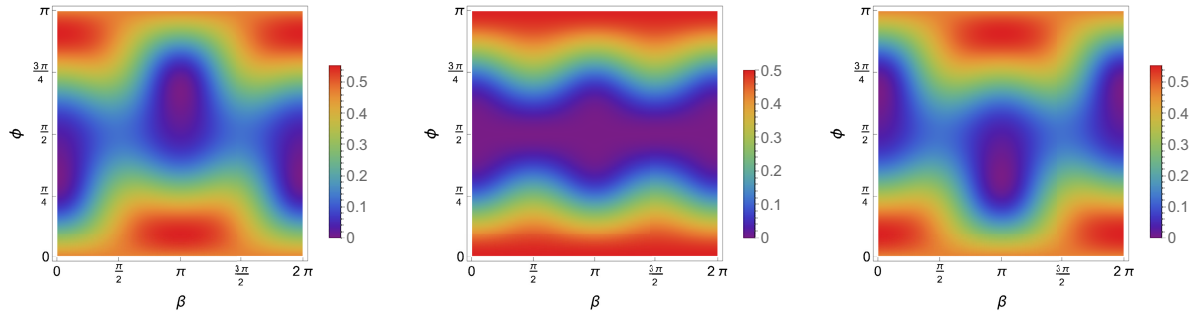


FIG. 2. Corrected panels (b) and (d) of Fig. 2: $\mathcal{O}(S^2)$ corrections to the differential cross section versus the polar angle ϕ of the outgoing photon, for $\alpha=\beta=0$ and incidence aligned ($\theta=0$), orthogonal ($\theta=\pi/2$), and antialigned ($\theta=\pi$) with the spin. (b) $++$ channel; (d) $+-$ channel.

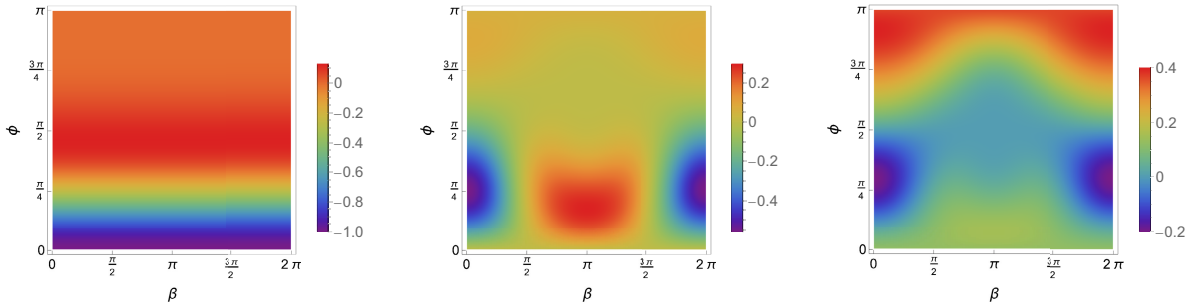
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Transcription errors in the Appendixes. The Appendices C and E contain transcription errors, corrected in Table I. The amplitudes, cross sections, and figures were computed with the correct expressions and are unaffected.



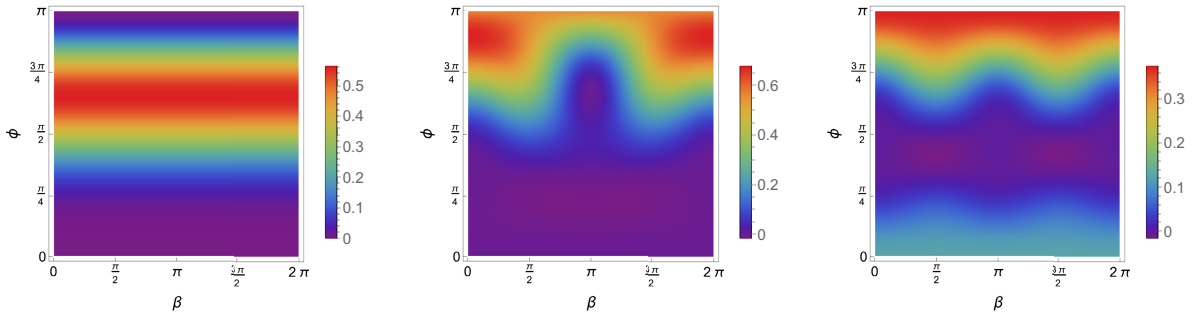
(a) $\theta = \pi/3$ (b) $\theta = \pi/2$ (c) $\theta = 2\pi/3$

FIG. 3. Spin correction to the unpolarized differential cross section versus the outgoing photon direction (β, ϕ), for $\alpha = 0$. It enters at $\mathcal{O}(S^2)$ and is symmetric between aligned and antialigned incidence.



(a) $\theta = 0$ (b) $\theta = \pi/3$ (c) $\theta = \pi/2$

FIG. 4. Spin correction to the differential cross section in the $++$ channel versus (β, ϕ), for $\alpha = 0$; the $--$ channel follows from Eq. (55). For incidence along the spin (a), the correction is independent of β and has both $\mathcal{O}(S)$ and $\mathcal{O}(S^2)$ parts.



(a) $\theta = 0$ (b) $\theta = \pi/3$ (c) $\theta = \pi/2$

FIG. 5. As Fig. 4, for the $+-$ channel; the $-+$ channel follows from Eq. (55).