Erratum: Near-horizon geodesics of high spin black holes **[Phys. Rev. D 101, 084042 (2020)]**

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- (1) First, the captions of Figs. 1 and 2 should be inverted.
 (2) Second, Eq. (2.24) should read as

$$\Theta(z) = \begin{cases} \epsilon_0(\frac{Q}{\epsilon_0} + z)(1 - z), & \epsilon_0 \neq 0 \\ Q(1 - z), & \epsilon_0 = 0, \end{cases}$$

i.e., one should replace the Q of the published version with $-Q$ in the first line of the right-hand side. This affects the discussion in items (a) and (b) of the subsequent paragraph as well as the content of Table 2 and Fig. 2 but nothing else. The corrected version of these items is provided below with replacements highlighted.

- (a) $\epsilon_0 > 0$ leads to a *polar* motion $0 \leq z \leq 1$ for $Q > 0$. For $Q = 0$ and $z = 0$, the motion is *equatorial*. For $Q = 0$ and $z \neq 0$, $z = 0$ is an asymptotic attractor of the motion which only takes place in one of the hemispheres. It is therefore a special case of *equator-attractive* motion where the turning point is at the pole $z = 1$. For $Q < 0$, the motion is either *vortical* ($0 < -\frac{Q}{\epsilon_0} \leq z \leq 1$) for $-\epsilon_0 < Q < 0$ or *axial* with $z = 1$ for $Q \leq -\epsilon_0 < 0$.
- (b) $\epsilon_0 < 0$ leads to a polar motion $0 \leq z \leq 1$ for $Q \geq -\epsilon_0 > 0$ and to a *pendular* one ($0 \leq z \leq -\frac{Q}{\epsilon_0} < 1$) for $0 < Q < -\epsilon_0$. For $Q = 0$, the motion is either equatorial or axial for the potential to be positive. For $Q < 0$, the motion also has to take place along the axis $z = 1$.

 TABLE I. Polar taxonomy of Kerr geodesics with $\ell = 0$.

Energy	Carter constant	Polar range	Denomination
$\epsilon_0 < 0$ ($ \hat{E} < \mu$)	$Q < 0$	$z = 1$	Axial ⁰ ($\hat{E}, Q$)
	$Q = 0$	$z = 0, 1$	Equatorial ⁰ ($\hat{E}$)
	$0 < Q < -\epsilon_0$	$0 \leq z \leq -\frac{Q}{\epsilon_0} < 1$	Axial ⁰ ($\hat{E}$)
	$0 < -\epsilon_0 \leq Q$	$0 \leq z \leq 1$	Pendular ⁰ ($\hat{E}, Q$)
$\epsilon_0 = 0$ ($ \hat{E} = \mu$)	$-(a\hat{E})^2 \leq Q < 0$	$z = 1$	Axial ⁰ (Q)
	$Q = 0$	$z = \text{constant}$	Azimuthal ⁰
	$Q > 0$	$0 \leq z \leq 1$	Polar ⁰ (Q)
$\epsilon_0 > 0$ ($ \hat{E} > \mu$)	$Q \leq -\epsilon_0 < 0$	$z = 1$	Axial ⁰ ($\hat{E}, Q$)
	$-\epsilon_0 < Q < 0$	$0 < -\frac{Q}{\epsilon_0} \leq z \leq 1$	Vortical ⁰ ($\hat{E}, Q$)
	$Q = 0$	$0 < z \leq 1$ (sign(cos θ) fixed)	Equator-attractive ⁰ ($\hat{E}$)
	$Q > 0$	$z = 0$	Equatorial ⁰ ($\hat{E}$)
$\epsilon_0 \in \mathbb{R}$	$Q > 0$	$0 \leq z \leq 1$	Polar ⁰ ($\hat{E}, Q$)
	$Q \geq -(a\hat{E})^2$	$z = 1$	Axial ⁰ ($\hat{E}, Q$)

FIG. 1. Polar taxonomy of $\ell = 0$ Kerr geodesics.

Let us finally notice that, for any value of ϵ_0 and $Q \geq -(a\hat{E})^2$, an axial motion is always possible.

The corrected polar classification of $\ell = 0$ geodesics is provided in Table I. The taxonomy is also pictorially depicted in Fig. 1.

We thank Edward Teo for pointing out this mistake.

(3) Finally, there is a typo in Equation (2.37), which should read

$$\hat{T}_\theta = \frac{-2z_+}{\sqrt{-\epsilon_0 z_-}} \left[2mE' \left(\frac{z_+}{z_-} \right) + (\pm_\theta) E' \left(\Psi^+(\cos \theta), \frac{z_+}{z_-} \right) - s_\theta^i E' \left(\Psi^+(\cos \theta_i), \frac{z_+}{z_-} \right) \right].$$