Erratum: Higher-order spin effects in the amplitude and phase of gravitational waveforms emitted by inspiraling compact binaries: Ready-to-use gravitational waveforms [Phys. Rev. D 79, 104023 (2009)]

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The original paper [1] contained typographical errors in Eqs. (4.18), (C5) and (C10). In addition, Eq. (C11) was incorrect due to the erratum [2] to Ref. [3]. The transformation law (4.18) should read

$$h'_{\ell m'}(\Phi', \alpha', \iota', \chi_n^{x'}, \chi_n^{y'}, \chi_n^{z'}) = \sum_{m=-\ell}^{\ell} D^{*\ell}_{mm'}(A, B, \Gamma) h_{\ell m}(\Phi, \alpha, \iota, \chi_n^x, \chi_n^y, \chi_n^z), \tag{1}$$

with index m' instead of m on the left-hand side. Eqs. (C5), (C10) and (C11) should be replaced by

$$E_5 = \left[\left(8 - \frac{121}{9}\nu + \frac{2}{9}\nu^2\right)\boldsymbol{\chi}_s \cdot \hat{\mathbf{L}}_N + \left(8 - \frac{31}{9}\nu\right)\delta\boldsymbol{\chi}_a \cdot \hat{\mathbf{L}}_N\right], \tag{2}$$

$$F_4 = -\frac{44711}{9072} + \frac{9271}{504}\nu + \frac{65}{18}\nu^2 + \left(\frac{287}{96} + \frac{\nu}{24}\right)(\boldsymbol{\chi}_s \cdot \hat{\mathbf{L}}_N)^2 - \left(\frac{89}{96} + \frac{7\nu}{24}\right)\boldsymbol{\chi}_s^2 + \left(\frac{287}{96} - 12\nu\right)(\boldsymbol{\chi}_a \cdot \hat{\mathbf{L}}_N)^2 + \left(-\frac{89}{96} + 4\nu\right)\boldsymbol{\chi}_a^2 + \frac{287}{48}\delta(\boldsymbol{\chi}_s \cdot \hat{\mathbf{L}}_N)(\boldsymbol{\chi}_a \cdot \hat{\mathbf{L}}_N) - \frac{89}{48}\delta(\boldsymbol{\chi}_s \cdot \boldsymbol{\chi}_a), \tag{3}$$

$$F_5 = \left(-\frac{8191}{672} - \frac{583}{24}\nu\right)\pi + \left[\left(-\frac{59}{16} + \frac{227}{9}\nu - \frac{157}{9}\nu^2\right)\boldsymbol{\chi}_s \cdot \hat{\mathbf{L}}_N + \left(-\frac{59}{16} + \frac{701}{36}\nu\right)\delta\boldsymbol{\chi}_a \cdot \hat{\mathbf{L}}_N\right]. \tag{4}$$

Because of the erratum of Ref. [2], Eq. (6.25) was computed incorrectly and should read

$$\gamma = \left(\frac{732985}{2268} - \frac{24260}{81}\nu - \frac{340}{9}\nu^2\right)\boldsymbol{\chi}_s \cdot \hat{\mathbf{L}}_N + \left(\frac{732985}{2268} + \frac{140}{9}\nu\right)\delta\boldsymbol{\chi}_a \cdot \hat{\mathbf{L}}_N. \tag{5}$$

TABLE I. For several binary configurations observable by Advanced LIGO, we list the SNR as the PN order of the amplitude corrections is varied. In each column, we show the component spins $(\boldsymbol{\chi}_1 \cdot \hat{\mathbf{L}}_N, \boldsymbol{\chi}_2 \cdot \hat{\mathbf{L}}_N)$. We include all nonspinning, SO and SS corrections up to the orders given in the first column. For example, 2.5PN + 1.5PNSO + 2PNSS means we include nonspinning amplitude corrections from Newtonian to 2.5PN order, 1PN and 1.5PN SO corrections, and the 2PN SS correction. Regardless of the PN order of the amplitude, we always use the SPA phase with nonspinning terms up to 3.5PN order, and spin terms up to 2.5PN order, as given in Eqs. (6.22)–(6.25). The binary is at a distance of 100 Mpc with orbital angular momentum inclined relative to the line of sight by $\theta = \pi/3$, sky location $\bar{\theta} = \bar{\phi} = \pi/6$ and polarization angle $\bar{\psi} = \pi/4$ [see Eqs. (2.4),(2.5)].

	Advanced LIGO SNR			
	$(50 + 5)M_\odot$		$(30 + 30)M_\odot$	
	(1, 1)	(−1, −1)	(1, 1)	(−1, −1)
Newt	76.4	76.4	131.1	131.1
0.5PN	84.9	82.3	131.1	131.1
1PN	74.2	71.9	116.9	115.8
1PN + 1PNSO	74.1	72.1	116.9	115.8
1.5PN	69.2	67.6	116.9	115.8
1.5PN + 1.5PNSO	79.7	58.1	134.2	98.8
2PN + 1.5PNSO	75.8	55.1	123.1	88.3
2PN + 1.5PNSO + 2PNSS	75.5	54.8	121.4	86.7
2.5PN	64.0	62.6	106.3	105.3
2.5PN + 1.5PNSO	74.2	53.6	123.5	88.5
2.5PN + 1.5PNSO + 2PNSS	73.9	53.4	121.7	86.9

This change to Eq. (6.25) causes small variations to the numbers reported in Tables I, II, III, and IV. These tables should read

TABLE II. For several binary configurations observable by LISA we list the SNR as the PN order of the amplitude corrections is varied. In each column we show the component spins ($\boldsymbol{\chi}_1 \cdot \hat{\mathbf{L}}_N, \boldsymbol{\chi}_2 \cdot \hat{\mathbf{L}}_N$). We include all nonspinning, SO and SS corrections up to the orders given in the first column. Regardless of the PN order of the amplitude, we always use the SPA phase with nonspinning terms up to 3.5PN order, and spin terms up to 2.5PN order, as given in Eqs. (6.22)–(6.25). The binary is at a distance of 3 Gpc with the same orientation as in Table I. The binary masses and distances refer to the redshifted quantities.

	LISA SNR			
	$(2 \times 10^6 + 10^4)M_\odot$		$(10^6 + 10^6)M_\odot$	
	(1, 1)	(−1, −1)	(1, 1)	(−1, −1)
Newt	382.6	382.6	2764.4	2764.4
0.5PN	598.5	598.6	2764.4	2764.4
1PN	620.1	621.5	2510.0	2469.7
1PN + 1PNSO	619.9	621.7	2510.0	2469.7
1.5PN	512.2	517.0	2510.0	2469.7
1.5PN + 1.5PNSO	551.9	484.1	2875.9	2118.2
2PN + 1.5PNSO	523.6	457.5	2608.5	1870.5
2PN + 1.5PNSO + 2PNSS	523.5	457.4	2570.2	1836.1
2.5PN	479.4	481.1	2280.3	2242.0
2.5PN + 1.5PNSO	516.5	451.6	2639.2	1901.9
2.5PN + 1.5PNSO + 2PNSS	516.4	451.6	2601.4	1868.4

TABLE III. For a typical binary observable by Advanced LIGO, we compare the SNR obtained using the 2.5PN amplitude corrected waveform without spin effects, with spin-orbit effects, and with spin-orbit and spin-spin effects. In each column we show the component spins ($\boldsymbol{\chi}_1 \cdot \hat{\mathbf{L}}_N, \boldsymbol{\chi}_2 \cdot \hat{\mathbf{L}}_N$). In all cases we use the SPA phase with nonspinning terms up to 3.5PN order, and spin terms up to 2.5PN order, as given in Eqs. (6.22)–(6.25). The binary is at a distance of 100 Mpc with the same orientation as in Table I.

	Advanced LIGO SNR			
	$(60 + 40)M_\odot$			
	(1, −1)	(0.8, −0.8)	(0.5, −0.5)	(0.2, −0.2)
2.5PN	81.0	80.5	80.8	81.8
2.5PN + 1.5PNSO	84.4	83.3	82.5	82.5
2.5PN + 1.5PNSO + 2PNSS	85.8	84.2	82.8	82.5

TABLE IV. For a typical binary observable by LISA, we compare the SNR obtained using the 2.5PN waveform without spin effects, with spin-orbit effects, and with spin-orbit and spin-spin effects. In each column we show the component spins ($\boldsymbol{\chi}_1 \cdot \hat{\mathbf{L}}_N, \boldsymbol{\chi}_2 \cdot \hat{\mathbf{L}}_N$). In all cases we use the SPA phase with nonspinning terms up to 3.5PN order, and spin terms up to 2.5PN order, as given in Eqs. (6.22)–(6.25). The binary is at a distance of 3 Gpc with the same orientation as in Table I. The binary masses and distances refer to the redshifted quantities.

	LISA SNR			
	$(10^6 + 10^5)M_\odot$			
	(1, −1)	(0.1, −1)	(0.01, −1)	(0.001, −1)
2.5PN	2538.7	2570.4	2522.2	2572.4
2.5*PN* + 1.5*PNSO*	2917.5	2583.8	2500.6	2546.7
2.5PN + 1.5PNSO + 2PNSS	2930.4	2585.0	2500.8	2546.7

[1] K. G. Arun, A. Buonanno, G. Faye, and E. Ochsner, Phys. Rev. D **79**, 104023 (2009).
[2] L. Blanchet, A. Buonanno, and G. Faye, Phys. Rev. D **81**, 089901(E) (2010).
[3] L. Blanchet, A. Buonanno, and G. Faye, Phys. Rev. D **74**, 104034 (2006).