**Erratum: Parametrized-4.5PN TaylorF2 approximants
and tail effects to quartic nonlinear order
from the effective one body formalism
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Because of a sign error in the *Mathematica* implementation of Eq. (4) of our paper, several equations of our paper as well as the figures have to be corrected. This eventually changes the numerical results, but does not affect the main philosophy of the paper for what concerns the construction of the frequency-domain, parametrized, PN-approximant TaylorF2. Equation (21) of our paper should read

$$\begin{aligned}
 \hat{\mathcal{F}}_{5\text{PN}} = & \left\{ -\frac{1}{1-3\nu} \left(\frac{18871411006842042701903}{8572327048161676800} \nu^6 - \frac{8304794249933147869141}{879213030580684800} \nu^5 \right. \right. \\
 & + \frac{54213912704395192610369}{3809923132516300800} \nu^4 - \frac{172540035537000238761889}{68578616385293414400} \nu^3 + \frac{57659237557872368147833}{6531296798599372800} \nu^2 \\
 & - \frac{27067677769101139535159}{4689136163096985600} \nu + \frac{236604322889830400443}{263890779741388800} \\
 & + \gamma_E \left(-\frac{2084604421\nu^3}{3056130} - \frac{6260414218\nu^2}{4584195} + \frac{32293584287\nu}{36673560} - \frac{1831381973}{15717240} \right) \\
 & + \pi^2 \left(-\frac{36678805}{677376} \nu^4 + \frac{888697001}{1016064} \nu^3 + \frac{1244952467}{4064256} \nu^2 - \frac{520672457}{1354752} \nu + \frac{424223}{6804} \right) \\
 & + \left(\frac{236925}{196} \nu^3 - \frac{2827305}{784} \nu^2 + \frac{1405755}{784} \nu - \frac{47385}{196} \right) \log(3) \\
 & + \left(-\frac{1327348993}{305613} \nu^3 + \frac{24248196139}{9168390} \nu^2 - \frac{22801392217}{36673560} \nu + \frac{233384303}{3143448} \right) \log(2) \\
 & + \left(-\frac{2084604421}{6112260} \nu^3 - \frac{3130207109}{4584195} \nu^2 + \frac{32293584287}{73347120} \nu - \frac{1831381973}{31434480} \right) \log(x) \\
 & + \left(-\frac{114}{7} + \frac{55}{7} \nu \right) \nu c_{22}^{4\text{PN}}(\nu) + 4\nu c_{22}^{5\text{PN}}(\nu) + \left(-\frac{1}{56} + \frac{151}{756} \nu - \frac{97}{189} \nu^2 \right) \nu c_{21}^{4\text{PN}}(\nu) \\
 & + \nu(1-4\nu) \left(\frac{1}{1344} c_{31}^{4\text{PN}}(\nu) + \frac{3645}{448} c_{33}^{4\text{PN}}(\nu) \right) + \nu(1-3\nu)^2 \left(\frac{10}{21} c_{32}^{3\text{PN}}(\nu) + \frac{10240}{567} c_{44}^{3\text{PN}}(\nu) + \frac{40}{3969} c_{42}^{3\text{PN}}(\nu) \right) \\
 & + \left. \nu(1-2\nu)^2(4\nu-1) \left(\frac{729}{560} c_{43}^{2\text{PN}} + \frac{1}{35280} c_{41}^{2\text{PN}}(\nu) + \frac{48828125}{1216512} c_{55}^{2\text{PN}}(\nu) + \frac{2187}{45056} c_{53}^{2\text{PN}}(\nu) + \frac{1}{12773376} c_{51}^{2\text{PN}}(\nu) \right) \right\} x^{10}.
 \end{aligned} \tag{1}$$

Similarly, also Eq. (22) of our paper should be amended as

$$\begin{aligned}
\hat{\mathcal{F}}_{5.5\text{PN}} = \pi \bigg\{ & \frac{2\nu}{9}(1-4\nu)c_{21}^{4\text{PN}}(\nu) + \frac{6058253667029\nu^4}{64076044032} + \frac{70029960211823\nu^3}{85434725376} + \frac{100004171503889\nu^2}{160190110080} \\
& - \nu \left(16c_{22}^{4\text{PN}}(\nu) - \frac{138140205552539713}{25630417612800} \right) + \frac{8399309750401}{101708006400} + \pi^2 \left(\frac{1015201\nu}{193536} - \frac{1605601\nu^2}{48384} \right) \\
& + \gamma_E \left(\frac{2781341\nu}{4410} + \frac{177293}{1176} \right) + \left(\frac{2360189\nu}{4410} + \frac{8521283}{17640} \right) \log(2) + \left(\frac{142155\nu}{196} - \frac{142155}{784} \right) \log(3) \\
& + \left(\frac{2781341\nu}{8820} + \frac{177293}{2352} \right) \log(x) \bigg\} x^{11/2}, \tag{2}
\end{aligned}$$

with a $-$ sign that replaces the $\times$ that was incorrectly introduced in front of the fifth term in the published version. These results are now fully consistent with the test-particle fluxes of Ref. [1]. In addition, because of the error in the implementation of Eq. (2), also Eq. (28) gets modified as

$$\begin{aligned}
\varphi_8 = [1 - \log(\pi M f)] \bigg\{ & \frac{40}{81}\nu(1-4\nu)c_{21}^{4\text{PN}}(\nu) + \frac{160}{9}\nu c_{22}^{4\text{PN}}(\nu) \\
& + \frac{1701517236935}{117958171968}\nu^4 - \frac{343998272757245}{1297539891648}\nu^3 + \left(\frac{4422488439318133}{5190159566592} - \frac{399545\pi^2}{27216} \right) \nu^2 \\
& + \left(-\frac{155581136701232029}{34601063777280} + \frac{9302215\pi^2}{54432} - \frac{1420688 \log(2)}{441} + \frac{26325 \log(3)}{49} \right) \nu \\
& + \gamma_E \left(-\frac{5322928\nu}{3969} - \frac{36812}{189} \right) - \frac{90490\pi^2}{567} + \frac{2550713843998885153}{830425530654720} - \frac{26325 \log(3)}{196} - \frac{1011020 \log(2)}{3969} \bigg\} \\
& + \left(\frac{2661464\nu}{11907} + \frac{18406}{567} \right) \log^2(\pi M f). \tag{3}
\end{aligned}$$

This makes the discussion of Sec. IV of our paper, as well as the figures, quantitatively incorrect. More precisely: we have the new Fig. 1 where the good value of the 4PN parameter that moves the 4.5PN TaylorF2 representation of $-\Psi'$ on top of the IMRPhenomD curve is $c_{22}^{4\text{PN}} = -200$. Figures 2 and 3 also get completely changed, with the “first-guess” values of $c_{22}^{4\text{PN}}(q)$ now given by $c_{22}^{4\text{PN}} = (-200, -290, -390, -480, -650, -750, -1050, -2000)$ for $q = (1, 2, 3, 4, 6, 7, 10, 18)$. One then finds that the rational function given in Eq. (31) of our paper should be replaced with

FIG. 1. Nonspinning case, $q = 1$. Comparison between different representations of the derivative of the phase of the Fourier transform, $-\Psi'(f)$. The plot shows: (i) the standard 3.5PN TaylorF2 approximant (blue); (ii) the parametrized 4.5PN one with $c_{22}^{4\text{PN}} = 0$ (red); the *tuned* parametrized 4.5PN one with $c_{22}^{4\text{PN}} = -200$ (orange, dashed); (iii) the phase derivative of the IMRPhenomD model [2] (black). A single parameter is able to improve the consistency between $T_{\text{F2}}^{4.5\text{PN}}$ and IMRPhenomD even below the standard Schwarzschild LSO frequency $Mf_{\text{LSO}}^{\text{Schw}} \approx 0.0217$.

FIG. 2. Qualitative exploration of the flexibility of the parametrized, nonspinning, 4.5PN Taylor F2 approximant. The figure shows the Newton-normalized derivative of the frequency-domain phase for mass ratios $q = (1, 2, 4, 6, 10, 18)$ computed for: (i) the IMRPhenomD phase (black); (ii) the 3.5PN approximant (blue); (iii) the 4.5PN approximant without tuning ($c_{22}^{4\text{PN}} = c_{21}^{4\text{PN}} = 0$); (iv) the 4.5PN approximant with $c_{21}^{4\text{PN}} = 0$ and $c_{22}^{4\text{PN}}$ tuned so to obtain an accurate representation the IMRPhenomD phase on the largest possible frequency interval.

$$c_{22}^{4\text{PN}}(\nu) = c_{1/4}^{4\text{PN}} \frac{1 + n_1(X_{12})^2 + n_2(X_{12})^4 + n_3(X_{12})^6}{1 + d_1(X_{12})^2}, \quad (4)$$

where $X_{12} \equiv X_1 - X_2 = \sqrt{1 - 4\nu}$, with $c_{1/4}^{4\text{PN}} = -200.821$, $n_1 = 3.1334$, $n_2 = -6.4605$, $n_3 = 5.0608$, $d_1 = -1.0027$.

FIG. 3. Relative differences between IMRPhenomD and TaylorF2 PN approximants: the 3.5PN disagreement is reduced with the 4.5PN tuned approximant, especially for nearly equal-mass binaries.

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- [2] S. Khan, S. Husa, M. Hannam, F. Ohme, M. Puerrer, X. Jimenez Forteza, and A. Bohe, *Phys. Rev. D* **93**, 044007 (2016).