Erratum: Post-Newtonian Cosmological Modelling [Phys. Rev. D 91, 103532 (2015)]

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There were a number of errors in the published version of our paper. These can be corrected for by replacing Eq. (71) with

$$\frac{1}{2}\int_S \mathbf{n}\cdot\nabla h_{tt} dA = \int_\Omega \left(\frac{1}{2}\nabla^2 h_{tt} - 2\Phi\nabla^2\Phi + |\nabla\Phi|^2\right) dV + O(\epsilon^6)\,, \tag{1}$$

by replacing Eq. (82) with $n^{x(2)} = -\Phi$, and by replacing Eq. (83) with

$$\kappa \int_S \left(\Phi_{,x} + \frac{h^{(4)}_{tt,x}}{2}\right) dS = -4\pi GM + \tfrac{1}{2}\int_\Omega \nabla^2 h^{(4)}_{tt}\ dV^{(0)} + 2\kappa\int_S \Phi\Phi_{,x}\ dS^{(0)} + \kappa\int_S X^{(2)}_{,A}\Phi_{,A}\ dS^{(0)}\ . \tag{2}$$

These corrections propagate throughout section VB, and the beginning of section VI. Firstly, Eq. (85) should read as

$$\kappa \int_S \left[\Phi_{,x} + \frac{h^{(4)}_{tt,x}}{2} - X^{(2)}_{,A}\Phi_{,A}\right] dS = -4\pi GM - 8\pi G\langle\rho v^2\rangle - 8\pi G\langle\rho\Phi\rangle - 4\pi G\langle\rho\Pi\rangle - 12\pi G\langle p\rangle\,. \tag{3}$$

Then Eq. (89) should read as

$$\begin{aligned} A\zeta_{,tt} \;=\; & -4\pi GM + \frac{\kappa S}{\alpha_\kappa X^2}\left(\frac{96\pi^2G^2M^2}{\alpha_\kappa X} - 12\pi GMC\right) + \kappa\int_S\left(\frac{8\pi GM\Phi}{\alpha_\kappa X^2} - h_{tx,t} - 3\Phi_{,t}X_{,t}\right) dS - 8\pi G\langle\rho v^2\rangle \\ & -8\pi G\langle\rho\Phi\rangle - 4\pi G\langle\rho\Pi\rangle - 12\pi G\langle p\rangle + \kappa\left(\frac{112\pi^2G^2M^2}{\alpha_\kappa^2 X^5} - \frac{12\pi GMC}{\alpha_\kappa X^4}\right)\int_S (y^2+z^2)\ dS + O(\epsilon^6)\,, \end{aligned} \tag{4}$$

Eq. (92) should take the following form

$$\begin{aligned} A\zeta_{,tt} \;=\; & -4\pi GM + \frac{\kappa S}{\alpha_\kappa (X^{(0)})^2}\left(\frac{96\pi^2G^2M^2}{\alpha_\kappa X^{(0)}} - 12\pi GMC\right) + \kappa\int_S\left(\frac{8\pi GM\Phi}{\alpha_\kappa (X^{(0)})^2} - 3\Phi_{,t}X^{(0)}_{,t}\right) dS - 3\int_\Omega \Phi_{,tt}\ dV - 8\pi G\langle\rho v^2\rangle \\ & -8\pi G\langle\rho\Phi\rangle - 4\pi G\langle\rho\Pi\rangle - 12\pi G\langle p\rangle + \kappa\left(\frac{112\pi^2G^2M^2}{\alpha_\kappa^2 (X^{(0)})^5} - \frac{12\pi GMC}{\alpha_\kappa (X^{(0)})^4}\right)\int_S (y^2+z^2)\ dS + O(\epsilon^6)\,. \end{aligned} \tag{5}$$

Then the acceleration equation (Eq. (93)) should be given by

$$\begin{aligned} X_{,tt} \;=\; & -\frac{4\pi GM}{A} - \frac{12\pi GMC}{\alpha_\kappa (X^{(0)})^2} - \frac{4\pi G}{\alpha_\kappa (X^{(0)})^2}\Big[2\langle\rho v^2\rangle + 2\langle\rho\Phi\rangle + \langle\rho\Pi\rangle + 3\langle p\rangle\Big] \\ & + \frac{\kappa}{\alpha_\kappa (X^{(0)})^2}\int_S\left(\frac{8\pi GM\Phi}{\alpha_\kappa (X^{(0)})^2} - 3\Phi_{,t}X^{(0)}_{,t}\right) dS - \frac{3}{\alpha_\kappa (X^{(0)})^2}\int_\Omega \Phi_{,tt}\ dV + \frac{1}{\alpha_\kappa (X^{(0)})^3}\left[\frac{96\pi^2G^2M^2}{\alpha_\kappa}\right] \\ & + \left(\frac{112\pi^2G^2M^2}{\alpha_\kappa^2 (X^{(0)})^5} - \frac{12\pi GMC}{\alpha_\kappa (X^{(0)})^4}\right)\left[\frac{\kappa}{\alpha_\kappa (X^{(0)})^2}\int_S (y^2+z^2)\ dS - (y^2+z^2)\right] + O(\epsilon^6)\,. \end{aligned} \tag{6}$$

where A is the total surface area of the cell and it contains both a zeroth order and an $O(\epsilon^2)$ part. In the specific case of cubic cells, the acceleration equation (Eq. (94)) should be given by

$$\begin{aligned} X_{,tt} \;=\; & -\frac{\pi G}{6\zeta^2}\Big[M + 5MC + 2\langle\rho v^2\rangle + 2\langle\rho\Phi\rangle + \langle\rho\Pi\rangle + 3\langle p\rangle\Big] + \frac{1}{8(X^{(0)})^2}\left[\int_S\left(\frac{4\Phi\pi GM}{3(X^{(0)})^2} - 6\Phi_{,t}X^{(0)}_{,t}\right) dS - \int_\Omega \Phi_{,tt}\ dV\right] \\ & + \frac{1}{(X^{(0)})^3}\left[\frac{7\pi^2G^2M^2}{27}\right] - \left(\frac{7\pi^2G^2M^2}{36(X^{(0)})^5} - \frac{\pi GMC}{2(X^{(0)})^4}\right)(y^2+z^2) + O(\epsilon^6)\,. \end{aligned} \tag{7}$$

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For the specific case of regularly arranged point-like masses at the centre of each cell, there is a correction to Eq. (110), which should read as

$$\begin{aligned} X_{,tt} \;&=\; -\frac{GM}{6\zeta^2}\left[\pi + 5\pi C - 9EC - 3FC\right] + \frac{\pi G^2 M^2}{6(X^{(0)})^3}\left[2D + \frac{P}{2} - F - 3E + \frac{14\pi}{9}\right] \\ &\quad -\left(\frac{7\pi^2 G^2 M^2}{36(X^{(0)})^5} - \frac{\pi GMC}{2(X^{(0)})^4}\right)(y^2+z^2) + O(\epsilon^6)\ . \end{aligned} \tag{8}$$

A correction is also required to Eq. (111), which should have read

$$X_{,tt} = -\frac{GM}{6X^2}\left[\pi + 5\pi C - 9EC - 3FC\right] + \frac{\pi G^2 M^2}{6X^3}\left[2D + \frac{P}{2} - F - 3E + \frac{14\pi}{9}\right] + O(\epsilon^6)\,. \tag{9}$$

This correction propagates though section VII, in the values of the numerical factors in Eqs. (121), (124) and (140). These equations should take the following form

$$\mathcal{L}_{,t}^2 \simeq \frac{16N}{\mathcal{L}} - \frac{64.9 G^2 M^2}{\mathcal{L}^2} - 4C\,, \tag{10}$$

$$\left(\frac{d\mathcal{L}}{d\tau}\right)^2 \simeq \frac{(16N - 54.0GMC)}{\mathcal{L}} - \frac{4.41 G^2 M^2}{\mathcal{L}^2} - 4C(1-3C)\,. \tag{11}$$

$$\left(\frac{d\hat{\mathcal{L}}}{d\tau}\right)^2 \simeq \frac{(16N - 54.0GMC)}{\hat{\mathcal{L}}} - \frac{8.06 G^2 M^2}{\hat{\mathcal{L}}^2} - 4C(1-3C)\,. \tag{12}$$

Finally, Eq. (132) in the published version should have read

$$\hat{h}^{(2)}_{\hat{t}\hat{t}} = h^{(2)}_{tt} - \tfrac{a_{,tt}}{a}(x^2+y^2+z^2) + O(\epsilon^4)\,. \tag{13}$$

These corrections, their consequences, and a few smaller typos, are all fully incorporated into the latest arXiv version of the paper (arxiv:1503.08747v4).