Corrections for "Solution of the Skyrme–HF+BCS equation on a 3D mesh, II: A new version of the Ev8 code"

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This document is an unfortunately growing set of corrections for the **original** published version of the paper on the `Ev8` code, Ref. [1]. Please note that this does not concern any errors in the source code; when found, these errors will be corrected (and documented) in history of this git repository.

1. There is a missing factor of 1/2 in the expression for the direct Coulomb energy, Eq. (43). The correct formula is
$$E_{\text{Coul}}^{\text{d}} = \frac{1}{2}\int d^3r\, U(\mathbf{r})\rho_p(\mathbf{r})\,. \tag{1}$$

2. The equations for the pairing cutoff, Eqs. (51) and (52), are affected by a misprint: neither should have a square root. Additionally, the exponent in the second factor of Eq. (52) has the wrong overall sign. Equations (51) and (52) should read respectively
$$f_k = [1+e^{(+\epsilon_k-\lambda_q-\Delta\epsilon_q)/\mu_q}]^{-1}\,, \tag{2}$$
$$f_k = [1+e^{(+\epsilon_k-\lambda_q-\Delta\epsilon_q)/\mu_q}]^{-1}[1+e^{(-\epsilon_k+\lambda_q-\Delta\epsilon_q)/\mu_q}]^{-1}\,. \tag{3}$$

3. Eq.(68) and Eq.(70) of the original paper are affected by an error of notation: all squares should affect *expectation values* instead of *operators*. In addition, there is a missing factor of 2 in Eq.(68), in front of $\langle\hat{Q}_{22}\rangle^2$. Corrected, Eqs.(68-69-70) should read:
$$q = \sqrt{\frac{16\pi}{5}\left(\langle\hat{Q}_{20}\rangle^2+2\langle\hat{Q}_{22}\rangle^2\right)} = \sqrt{\frac{2}{3}\left(\langle\hat{Q}_x\rangle^2+\langle\hat{Q}_y\rangle^2+\langle\hat{Q}_z\rangle^2\right)}\,, \tag{4}$$
$$\gamma = 2\arctan\left(\frac{\sqrt{2}\langle\hat{Q}_{22}\rangle}{\sqrt{\langle\hat{Q}_{20}\rangle^2+2\langle\hat{Q}_{22}\rangle^2}+\langle\hat{Q}_{20}\rangle}\right) = 2\arctan\left(\frac{\langle\hat{Q}_x\rangle-\langle\hat{Q}_y\rangle}{\sqrt{2\left(\langle\hat{Q}_z\rangle^2-\langle\hat{Q}_x\rangle\langle\hat{Q}_y\rangle\right)}+\langle\hat{Q}_x\rangle-\langle\hat{Q}_y\rangle}\right)\,. \tag{5}$$

4. Eq. (96) in the original paper contains several errors. Two of these were already corrected in the corrigendum [2]: a global sign and a factor $\frac{\pi^2}{3}$ given in the second line that should not be squared. A third error was not corrected: the equation for the second derivative in Ref. [2] still contains a superfluous factor of two for $i \neq j$. The correct version of Eq. (96) reads:
$$\left.\frac{d^2f_t(x)}{dx^2}\right|_{x=x_s} = \begin{cases} (-1)^{t-s+1}2\left(\frac{\pi}{Ndx}\right)^2\frac{\cos[\pi(t-s)/N]}{\sin^2[\pi(t-s)/N]} & \text{for } t\neq s\ , \\ -\frac{\pi^2}{3dx^2}\left(1-\frac{1}{N^2}\right) & \text{for } t=s\ . \end{cases} \tag{6}$$

[1] W. Ryssens, V. Hellemans, M. Bender and P.-H. Heenen, *Solution of the Skyrme-HF+BCS equation on a 3D mesh, II: A new version of the Ev8 code*, Computer Physics Communications **187**, 175-194 (2015). DOI:10.1016/j.cpc.2014.10.001.
[2] W. Ryssens, V. Hellemans, M. Bender and P.-H. Heenen, *Corrigendum to "Solution of the Skyrme-HF+BCS equation on a 3D mesh, II: A new version of the Ev8 code"*, Computer Physics Communications **190**, 231 (2015). DOI:10.1016/j.cpc.2015.01.011.

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