Erratum: Energy-density functionals inspired by effective-field theories: Applications to neutron drops [Phys. Rev. C 98, 034319 (2018)]

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While performing additional calculations using the YGLO and ELYO functionals adjusted for neutron drops, we realized that some points need to be rectified in the original paper.

On page 3, six lines before the end of Sec. II A there is a typo: "the latter" should be replaced by "the former." The YGLO parameters in Table I and all figures starting from Fig. 3 refer to YGLO (FP) and not to YGLO (Akmal).

There is an evident typo on page 8, last line of the second column, where $N^{1/3}$ should be $N^{4/3}$.

There is an error in Eq. (19) of the original paper, where 5 in the denominator should be replaced by 10. Thus, the correct parameter values for the ELYO case are given in new Table I below and replace those reported in the original Table I. The spin-orbit and pairing coupling constants are slightly modified but the splitting parameter sensibly changes.

We comment in what follows how results change using the corrected set of parameters. In the original paper, the ELYO functional was unstable, in the case $\hbar\omega = 10$ MeV, for neutron numbers $N \geqslant 22$. It turns out that the correct calculations are even more unstable than those presented in the original article. The adjustment of the parameters, which is performed in the case of $\hbar\omega = 10$ MeV, is now possible only for two values, $N = 8$ and 12.

The corrected version of Fig. 3— comparing the maximal densities obtained for the considered functional with the Thomas-Fermi approximation—is consistent with the observed worsening of the finite-size instabilities.

In Figs. 4(b), 5(b), 8(b), and 10, it would be meaningless to show only two points corresponding to $N = 8$ and 12 for $\hbar\omega = 10$ MeV (one should not consider anymore the red curves in those figures of the original article). It is, however, interesting to report here the values of $E/\hbar\omega N^{4/3}$, which are 0.8385 and 0.8563 for $N = 8$ and 12, respectively, for $\hbar\omega = 10$ MeV. The red solid curves in panels (c) and (d) of Fig. 6 and in panel (c) of Fig. 7 should not be considered anymore (for the frequency and the values of N at play in these figures calculations are now unstable).

Panels (a) of Figs. 4, 5, and 8, respectively describing energies, internal energies, and pairing gaps for $\hbar\omega = 5$ MeV, should be replaced by the new version provided in the present Erratum (only the red curves change). One observes that the ELYO calculations are indeed more unstable now (the curves stop at $N = 40$). The ELYO energy in Fig. 4 is now closer to *ab initio* results, whereas the ELYO internal energy in Fig. 5 is now closer to the SLy5 curve. Finally, the ELYO pairing gap in Fig. 8 still has the lowest maximum values compared to the other plotted cases (around 0.5 MeV).

Figures 6(a), 6(b) and 7(a), 7(b) displaying density profiles and mean-field potentials for $N = 8$ and $\hbar\omega = 5$, 10 MeV, should be replaced by Figs. 6 and 7 below.

Finally, this Erratum also modifies Fig. 9 of the original paper. The isoscalar ELYO effective mass changes very little compared to Fig. 9, whereas the neutron effective mass is lowered and is much closer to *ab initio* points now. We also realized that the YGLO curves plotted in the original figure do not correspond to the adopted parameters and should be replaced by the ones shown here. One notices that the obtained YGLO isoscalar and neutron effective masses are lower than those displayed in Fig. 9 of the original paper. In particular, differently than what was written in the paper, the correct curve for the isoscalar YGLO effective mass does not follow the SLy5 one and the isoscalar effective mass $(m^*/m)_s$ is equal to 0.445 at saturation density. Moreover, the value of the neutronic effective mass at saturation is $(m^*/m)_n = 0.476$.

TABLE I. This table replaces Table I of the original paper. Only values for the ELYO functional differ between the two versions. the spin-orbit coupling constants are given in MeV fm^5, and the pairing strengths in MeV fm^3.

	YGLO	KIDS	ELYO	Sly5	SkM*	UNEDF0
W	−0.084	0.110	−0.098			
V_{so}	138.2	110.0	49.83	125.0	130.0	91.3
V_{pp}	−275.1	−183.9	−159.98	−213.1	−233.9	−170.4

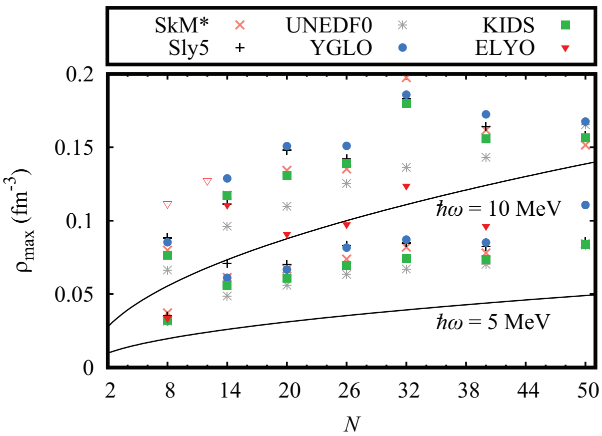

FIG. 3. This figure replaces Fig. 3 in the original paper. The open (full) triangles correspond to the values obtained for ELYO with $\hbar\omega = 10$ (5) MeV.

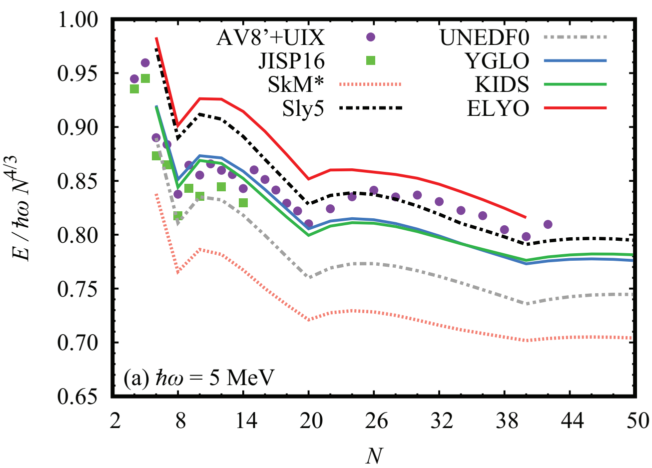

FIG. 4. This figure replaces panel (a) of Fig. 4 in the original paper.

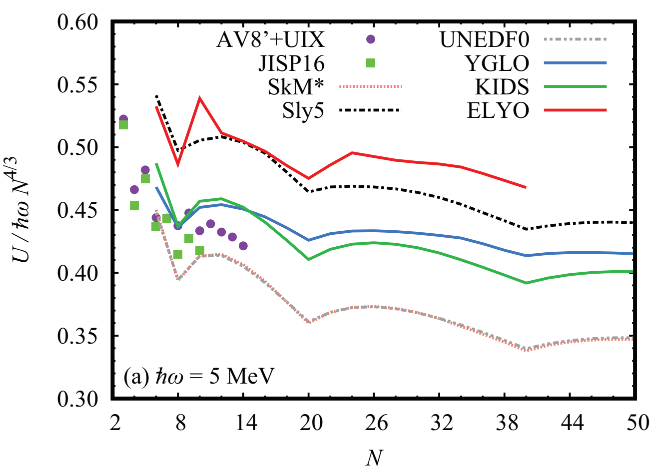

FIG. 5. This figure replaces replaces panel (a) of Fig. 5 in the original paper.

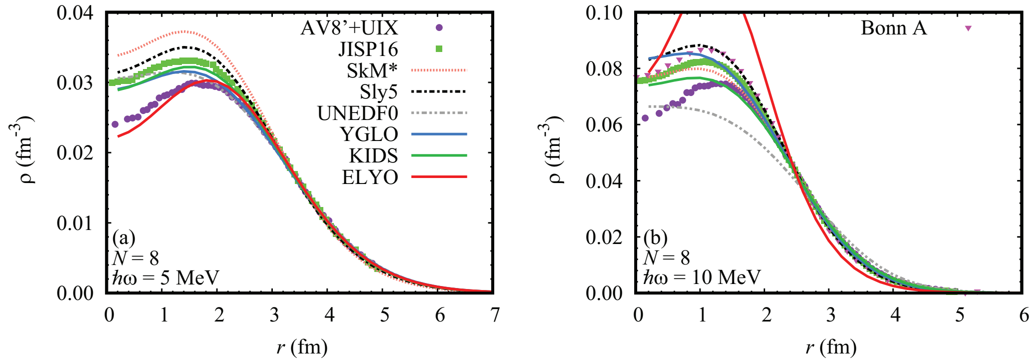

FIG. 6. These figures replace panels (a) and (b) of Fig. 6 in the original paper.

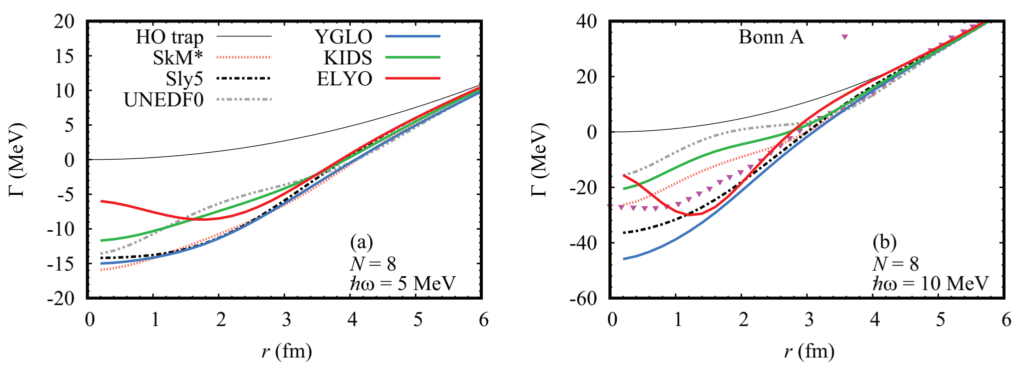

FIG. 7. These figures replace panels (a) and (b) of Fig. 7 in the original paper.

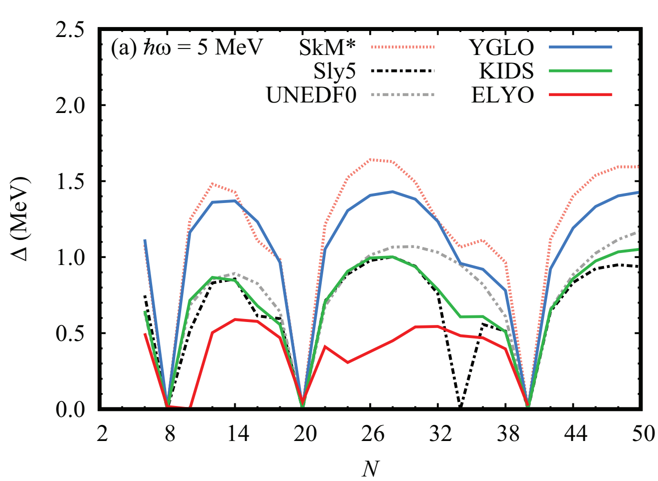

FIG. 8. This figure replaces panel (a) of Fig. 8 in the original paper.

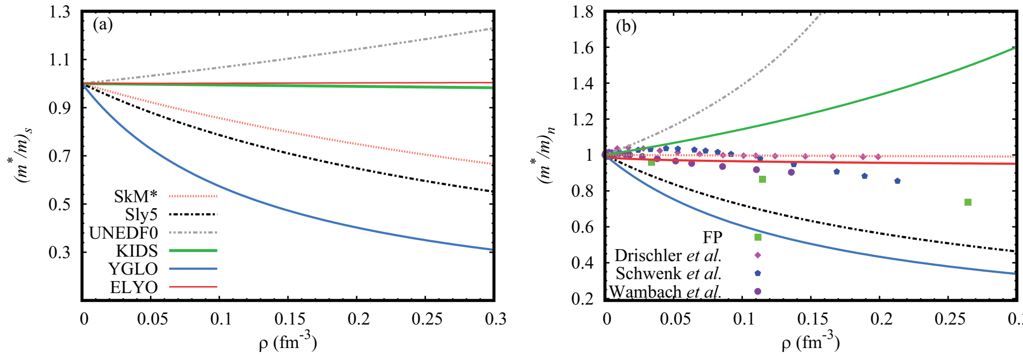

FIG. 9. This figure replaces Fig. 9 of the original paper.

Despite the mentioned modifications, the conclusions of the original paper do not change. In particular, owing to the numerous instabilities that were already found in the original paper for ELYO (ascribed to the fact that the first version of the ELYO functional contained only *s*-wave contributions), that version was regarded as a temporary step. This was discussed in the conclusions of the article and those conclusions are not modified by the present corrections (instabilities are even more severe now). The complete and final version of the ELYO functional was recently published in Ref. [1]. It contains also *p*-wave contributions and, having a significantly improved equation of state for neutron matter, is able to provide stable results for neutron drops at different trap frequencies and for different numbers of neutrons. It is worth noticing that the results referred to as ELYO-*s* in Ref. [1], being reproductions of those presented in the original article, should not be considered anymore.

[1] J. Bonnard, M. Grasso, and D. Lacroix, Phys. Rev. C **101**, 064319 (2020).