Erratum: Precision mass measurements of ^{67}Fe and ^{69,70}Co: Nuclear structure toward $N = 40$ and impact on r-process reaction rates [Phys. Rev. C 101, 041304(R) (2020)]

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In the original paper, we reported on precision mass measurements of neutron-rich Fe and Co isotopes. After the publication, typographical errors were found in the frequency-ratio uncertainties listed in Table I. All mass-excess values and their uncertainties were also rechecked and updated. Only minor changes were found. The uncertainties for the ground and isomeric states of ^{69}Co were revised and Figs. 2–4 updated accordingly (see Figs. 1–3 of this erratum). The changes in Fig. 5 are negligible and, hence, not updated here. The values reported here (see Table I) should be used instead of Table I of the original paper. The reported changes do not affect the results or conclusions of the paper.

On p. 2 the text should be "The mass-excess values for the longer- and shorter-living states ($\Delta_{l,s}$) were determined from the measured mass-excess values [$\Delta_{\rm meas}(t = 226$ ms$) = -50\,296(17)$ and $\Delta_{\rm meas}(t = 726$ ms$) = -50238(25)$ keV] using $\Delta_{\rm meas}(t) = [1 - f_l(t)]\Delta_s + f_l(t)\Delta_l$. The determined mass-excess value for ^{69}Co, $-50385(86)$ keV agrees well with the most recent AME16 [8] value based on measurements using the TOFI spectrometer [10,11], $B\rho$-time-of-flight method [12,13], and isochronous mass spectrometry [14]. The obtained mass-excess value for the isomer ^{69}Co^m, $-50203(50)$ keV is in perfect agreement with the ground-state value of $-50\,214(14)$ keV [9], reported recently from the LEBIT Penning trap, suggesting they have actually measured the isomer."

On p. 3, the text should now be "We have determined the excitation energy $E_x = 182(100)$ keV for the longer-living $(1/2^-)$ state in ^{69}Co for the first time."

On p. 4, the text should be "The mass of ^{69}Co was also found to be around 100 keV lower and 1.6 more precise than in AME16 [8]." On the same page, the Q value for ^{68}Co(n,γ) ^{69}Co based on our result on ^{69}Co and ^{68}Co from Ref. [8] is $Q = 6.53(21)$ MeV instead of $Q = 6.52(20)$ MeV in the original paper.

TABLE I. The half-lives, spins, and parities for the ions of interest based on Ref. [15], measured frequency ratios $r = \nu_{\rm ref}/\nu$, and mass-excess values Δ in comparison with the literature values from Refs. [8,15]. "#" denotes a value based on extrapolations or systematics. Singly charged ions of ^{84}Kr ($m = 83.911\,497\,729(4)u$ [8]) were used as a reference for all studied cases.

Nuclide	$T_{1/2}$ (ms)	I^π	r	$\Delta_{\rm JYFL}$ (keV)	$\Delta_{\rm lit}$ (keV)	Difference (keV)
^{67}Fe	394(9)	$(1/2^-)$	0.797874191(49)	−45709.1(3.8)	−45610(270)	−99(270)
^{69}Co	180(20)	$7/2^-$#	0.82164916(110)[a]	−50385(86)	−50280(140)	−105(170)
^{69}Co^m	750(250)	$1/2^-$#	0.82165149(64)[a]	−50203(50)	−49780(240)#	−423(250)#
^{70}Co[b]	508(7) [16]	$(1^+, 2^+)$ [16]	0.83361594(15)	−46525(11)	−46430(360)#	−95(360)#

[a]Calculated based on the isomeric fractions f_l for the longer-living state and the frequency ratios determined from the files using the 226-ms cycle [$f_l = 49(13)\%,\ r = 0.82165030(21)$] and the 726-ms cycle [$f_l = 81(9)\%,\ r = 0.82165105(32)$], see the text for details.

[b]Assigned as the ground state in Ref. [16]. Considered as a 3^+# isomer 200(200)# keV above a $(6^-, 7^-)$, $T_{1/2} = 112(7)$-ms state in Ref. [15].

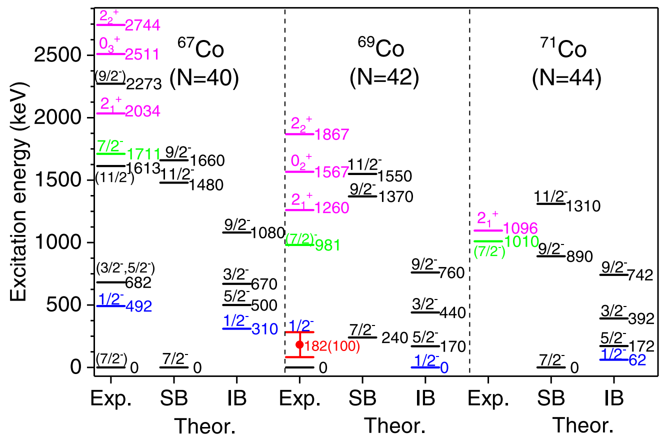

FIG. 1. Revised Fig. 2 of the original paper. Experimental level schemes for ^{67}Co [1,2] and ^{69}Co in comparison with the shell-model calculations for the spherical (SB) and $1/2^-$ intruder (IB) bands in ^{67,69,71}Co. The $1/2^-$ states in Co (in blue and in red from the Rapid Communication) follow a similar trend as the 2^+ and prolate 0^+ [3–6] intruder states in Ni (in magenta) and $7/2^-$ [7] states in Cu isotones (in green).

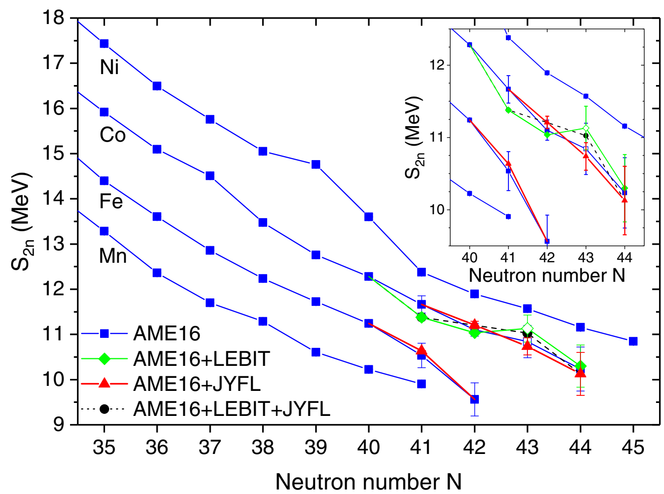

FIG. 2. Revised Fig. 3 of the original paper. Two-neutron separation energies based on experimental values from atomic mass evaluation (AME16) [8] (in blue) and including the results from this erratum (in red). The recent ^{68,69}Co measurements at LEBIT [9] (in green) introduce a kink, the same is true if only the result for ^{68}Co from Ref. [9] is included, indicating that it is likely to belong to the isomer ^{68}Co^m. For ^{70}Co, AME16 is based on extrapolations (indicated with an open symbol), and our value is for the $(1^+, 2^+)$ state.

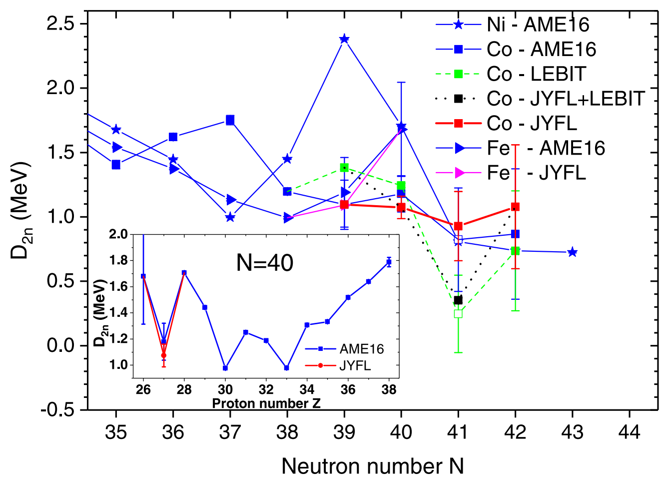

FIG. 3. Revised Fig. 4 of the original publication. Two-neutron shell gap parameter $D_{2n}(Z,N) = S_{2n}(Z,N) - S_{2n}(Z,N+2)$ based on AME16 [8] (in blue) and this erratum (red/magenta). Including ^{68,69}Co from LEBIT [9] (in green), or only ^{68}Co (in black), results in a kink at $N = 40$, pointing toward an isomeric state measurement. The inset shows D_{2n} for $N = 40$.

[1] D. Pauwels, O. Ivanov, N. Bree, J. Büscher, T. E. Cocolios, J. Gentens, M. Huyse, A. Korgul, Y. Kudryavtsev, R. Raabe *et al.*, Phys. Rev. C **78**, 041307(R) (2008).

[2] F. Recchia, S. M. Lenzi, S. Lunardi, E. Farnea, A. Gadea, N. Mărginean, D. R. Napoli, F. Nowacki, A. Poves, J. J. Valiente-Dobón, M. Axiotis, S. Aydin, D. Bazzacco, G. Benzoni, P. G. Bizzeti, A. M. Bizzeti-Sona, A. Bracco, D. Bucurescu, E. Caurier, L. Corradi, G. de Angelis, F. Della Vedova, E. Fioretto, A. Gottardo, M. Ionescu-Bujor, A. Iordachescu, S. Leoni, R. Mărginean, P. Mason, R. Menegazzo, D. Mengoni, B. Million, G. Montagnoli, R. Orlandi, G. Pollarolo, E. Sahin, F. Scarlassara, R. P. Singh, A. M. Stefanini, S. Szilner, C. A. Ur, and O. Wieland, Phys. Rev. C **85**, 064305 (2012).

[3] C. J. Chiara, D. Weisshaar, R. V. F. Janssens, Y. Tsunoda, T. Otsuka, J. L. Harker, W. B. Walters, F. Recchia, M. Albers, M. Alcorta *et al.*, Phys. Rev. C **91**, 044309 (2015).

[4] C. J. Prokop, B. P. Crider, S. N. Liddick, A. D. Ayangeakaa, M. P. Carpenter, J. J. Carroll, J. Chen, C. J. Chiara, H. M. David, A. C. Dombos *et al.*, Phys. Rev. C **92**, 061302(R) (2015).

[5] F. Flavigny, D. Pauwels, D. Radulov, I. J. Darby, H. De Witte, J. Diriken, D. V. Fedorov, V. N. Fedosseev, L. M. Fraile, M. Huyse *et al.*, Phys. Rev. C **91**, 034310 (2015).

[6] C. Mazzocchi, R. Grzywacz, J. Batchelder, C. Bingham, D. Fong, J. Hamilton, J. Hwang, M. Karny, W. Krolas, S. Liddick *et al.*, Phys. Lett. B **622**, 45 (2005).

[7] S. Franchoo, M. Huyse, K. Kruglov, Y. Kudryavtsev, W. F. Mueller, R. Raabe, I. Reusen, P. Van Duppen, J. Van Roosbroeck, L. Vermeeren *et al.*, Phys. Rev. C **64**, 054308 (2001).

[8] M. Wang, G. Audi, F. Kondev, W. Huang, S. Naimi, and X. Xu, Chin. Phys. C **41**, 030003 (2017).

[9] C. Izzo, G. Bollen, M. Brodeur, M. Eibach, K. Gulyuz, J. D. Holt, J. M. Kelly, M. Redshaw, R. Ringle, R. Sandler *et al.*, Phys. Rev. C **97**, 014309 (2018).

[10] H. L. Seifert, J. M. Wouters, D. J. Vieira, H. Wollnik, X. G. Zhou, X. L. Tu, Z. Y. Zhou, and G. W. Butler, Z. Phys. A **349**, 25 (1994).

[11] Y. Bai, D. J. Vieira, H. L. Seifert, and J. M. Wouters, in *Exotic Nuclei and Atomic Masses (ENAM 98)*, edited by B. M. Sherrill, AIP Conf. Proc. No. 455 (AIP, New York, 1998), p. 90.

[12] A. Estradé, M. Matoš, H. Schatz, A. M. Amthor, D. Bazin, M. Beard, A. Becerril, E. F. Brown, R. Cyburt, T. Elliot *et al.*, Phys. Rev. Lett. **107**, 172503 (2011).

[13] M. Matoš, A. Estradé, H. Schatz, D. Bazin, M. Famiano, A. Gade, S. George, W. Lynch, Z. Meisel, M. Portillo *et al.*, Nucl. Instrum. Methods Phys. Res., Sect. A **696**, 171 (2012).

[14] X. Xing, W. Meng, Z. Yu-Hu, X. Hu-Shan, S. Peng, T. Xiao-Lin, Y. A. Litvinov, Z. Xiao-Hong, S. Bao-Hua, Y. You-Jin *et al.*, Chin. Phys. C **39**, 104001 (2015).

[15] G. Audi, F. Kondev, M. Wang, W. Huang, and S. Naimi, Chin. Phys. C **41**, 030001 (2017).

[16] A. Morales, G. Benzoni, H. Watanabe, Y. Tsunoda, T. Otsuka, S. Nishimura, F. Browne, R. Daido, P. Doornenbal, Y. Fang *et al.*, Phys. Lett. B **765**, 328 (2017).