Erratum: Systematic shell-model study of β-decay properties and Gamow-Teller strength distributions in $A \approx 40$ neutron-rich nuclei [Phys. Rev. C 97, 054321 (2018)]

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Corrections to the original paper

In this Erratum, we report corrections to the original paper. The corrections do not affect the main conclusions of the original article, but some figures and tables must be replaced. The corrections pertain to essentially two items and are described as follows:

(i) Quenching factor for Gamow-Teller (GT) transitions: In some figures and tables of the original paper, we showed the total half-lives $T_{1/2}$ and beta-delayed one-neutron emission probabilities P_n. As discussed in the original paper, we declared use of the quenching factor $q_{\rm GT} = 0.74$ for GT transitions. While the B(GT) and $\log ft$ values associated with each state (summarized in the Supplemental Material) were calculated correctly, the $T_{1/2}$ and P_n shown in the figures and tables were evaluated with $q_{\rm GT} = 0.77$. This mistake makes the half-lives $(0.74/0.77)^2 \approx 8\%$ shorter. In addition to this, the calculations were performed using numbers with fewer digits (e.g., 0.123 MeV, 5.67×10^{-1} s) when evaluating theoretical $Q(\beta^-)$ values and summing up each partial half-life to evaluate the total half-lives. This, giving $\approx$1% round-off errors in half-lives, should also be corrected.

(ii) Matrix elements of first-forbidden (FF) transitions: We found a bug in the code used in the original paper to evaluate $M_0^{S'}$, which contributes to the rank 0 components, Eq. (15). Since the $\log ft$ values for FF transition matrix elements are typically larger than those of the GT transitions by about 2 or more, this change does not have much effect on $T_{1/2}$ and P_n. Another small correction is for a typo in Eq. (16), $K_1^{(1)} = -\frac{4}{3}\mu_1 Y - \frac{1}{9}W_0(4x^2 + 5u^2)$; μ_1 in the first term should be u,

$$K_1^{(1)} = -\tfrac{4}{3}uY - \tfrac{1}{9}W_0(4x^2 + 5u^2). \tag{16}$$

Since the corresponding evaluations were carried out with the correct expression, this error does not affect the results.

With these modifications, the theoretical half-lives become approximately 10% longer than the original numbers, and we need to replace the figures and tables relevant to this change:

(a) In Table I, error analyses are shown using our results and the FRDM calculation [3]. This replaces the original Table III, and some numbers are modified due to the corrections.
(b) The corrected half-lives and β-delayed one neutron emission probabilities are shown in Figs. 1 and 2, and summarized in Tables II–VII.
(c) Figure 3 replaces the original Fig. 3 comparing the ratio between the GT + FF and GT-only results of half-lives.

TABLE I. This table replaces Table III in the original paper. Discrepancies of calculated $T_{1/2}$ values [see Eqs. (24) and (25) in the original paper], comparing our calculations and the FRDM-QRPA calculations of Möller *et al.* [3]. Concerning this work, the results with the theoretical and and experimental $Q(\beta^-)$ values are shown. The experimental half-lives are available for 48 nuclei. If one exclude the cases where the Q values are not experimental data but evaluations in AME2020 [2], the number of target nuclei becomes 37. This is the reason why n differs in the Q (exp.) column from the others.

	This work		
	Q (theory)	Q (exp.)	FRDM [3]
$\bar{r}$	−0.13	−0.05	−0.08
σ	0.29	0.20	0.47
$10^{\bar{r}}$	0.73	0.89	0.83
10^{σ}	1.95	1.58	2.93
n	48	37	48

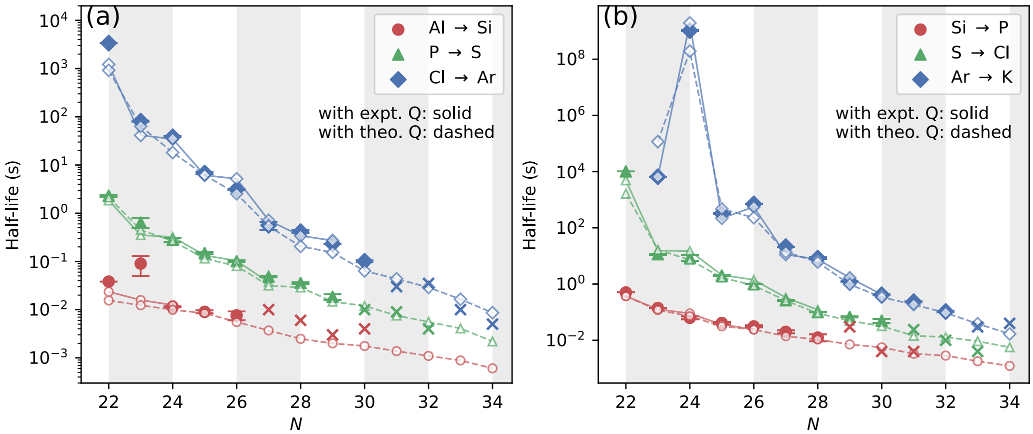

FIG. 1. This figure replaces Fig. 2. in the original paper. Comparison of β-decay half-lives between theory and experiment. The panels (a) and (b) correspond to β decays from odd-Z and even-Z isotopes, respectively. The open symbols connected by the solid and dotted lines correspond to the calculated half-lives using the experimental and calculated $Q(\beta^-)$ values, respectively. The experimental values from NUBASE2020 [1] are shown by the filled symbols. The cross symbols show the values which are not directly measured, but estimated from the trends. The $T_{1/2}$ values with the # in Tables II–VII correspond to these nuclei. See Ref. [1] for more details.

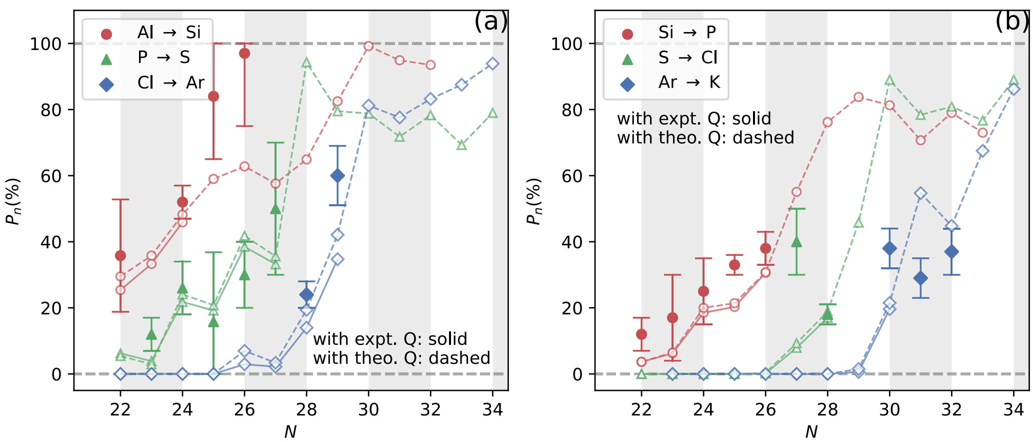

FIG. 2. This figure replaces Fig. 4. in the original paper. Comparison of β-delayed one-neutron emission probabilities $P_n(\%)$ between theory and experiment. The experimental values from NUBASE2020 [1] are shown by the filled symbols.

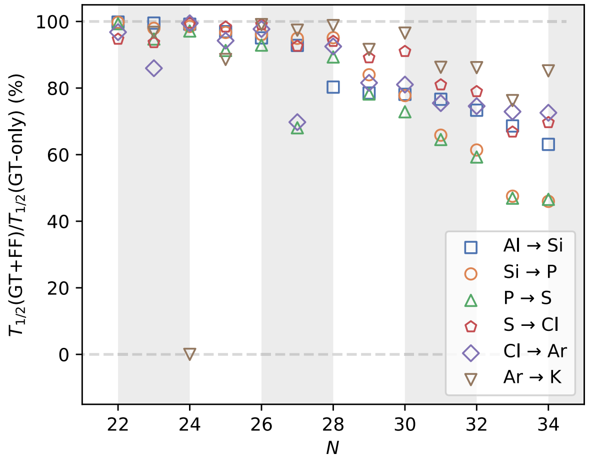

FIG. 3. This figure replaces Fig. 3. in the original paper. Ratio of the half-lives with and without FF transitions. Here, all the half-lives are evaluated with the theoretical $Q(\beta^-)$ values.

TABLE II. Half-lives $T_{1/2}$ and beta-delayed neutron emission rates $P_n(\%)$ of Al isotopes. Experimental data or evaluations for $T_{1/2}$ and P_n are from NUBASE2020 [1], and the $Q(\beta^-)$ and S_n used in calculations are from AME2020 [2]. The # symbols on experimental $T_{1/2}$ mean that the values are estimated from systematic trends [1]. In the columns "GT+FF, $Q_{\text{expt.}}$" and "GT, $Q_{\text{expt.}}$", the # symbols represent that the results are evaluated with the estimated $Q(\beta^-)$ values from AME2020.

	$T_{1/2}$						$P_n(\%)$				
Parent	Expt. [1]	Expt. err.	GT + FF,$Q_{\text{expt.}}$	GT,$Q_{\text{expt.}}$	GT + FF,$Q_{\text{theo.}}$	GT, $Q_{\text{theo.}}$	Expt. [1]	GT + FF,$Q_{\text{expt.}}$	GT,$Q_{\text{expt.}}$	GT + FF,$Q_{\text{theo.}}$	GT,$Q_{\text{theo.}}$
^{35}Al(5/2$^+$)	38.16 ms	0.21	23.5 ms	23.5 ms	15.5 ms	15.5 ms	35.8(17)	25.4	25.4	29.5	29.4
^{36}Al(5$^-$, Ex. = 0.33 MeV)	90 ms	40	16.7 ms	16.8 ms	11.6 ms	11.6 ms	<31	29.1	29.0	32.9	32.8
^{36}Al(1$^-$, Ex. = 0.22 MeV)	90 ms	40	18.5 ms	18.6 ms	13.0 ms	13.2 ms	<31	36.2	35.9	39.5	39.3
^{36}Al(2$^-$, Ex. = 0.08 MeV)	90 ms	40	18.7 ms	18.9 ms	14.0 ms	14.1 ms	<31	35.3	35.3	38.2	38.2
^{36}Al(4$^-$)	90 ms	40	15.8 ms	15.9 ms	12.3 ms	12.4 ms	<31	33.3	33.1	35.8	35.7
^{37}Al(5/2$^+$)	11.4 ms	0.3	12.4 ms	12.5 ms	9.90 ms	9.98 ms	52(5)	45.9	45.8	48.2	48.1
^{38}Al(0$^-$)	9.0 ms	0.7	8.63 ms#	8.90 ms#	8.47 ms	8.73 ms	84(19)	58.8#	60.1#	59.0	60.3
^{38}Al(5$^-$, Ex. = 0.39 MeV)	9.0 ms	0.7	8.42 ms#	8.48 ms#	7.19 ms	7.25 ms	84(19)	50.5#	50.7#	51.9	52.1
^{39}Al(5/2$^+$)	7.6 ms	1.6	5.78 ms#	6.08 ms#	5.55 ms	5.84 ms	97(22)	62.4#	64.5#	62.8	64.8
^{40}Al(0$^-$, Ex. = 0.36 MeV)	10 ms#	>260 ns	4.50 ms#	4.80 ms#	3.17 ms	3.37 ms		95.3#	99.6#	95.8	99.7
^{40}Al(1$^-$, Ex. = 0.45 MeV)	10 ms#	>260 ns	4.46 ms#	5.21 ms#	3.05 ms	3.55 ms		78.8#	90.4#	79.8	91.3
^{40}Al(2$^-$, Ex. = 0.18 MeV)	10 ms#	>260 ns	4.82 ms#	5.34 ms#	3.61 ms	3.99 ms		60.8#	65.6#	63.0	67.9
^{40}Al(3$^-$, Ex. = 0.30 MeV)	10 ms#	>260 ns	5.79 ms#	6.52 ms#	4.12 ms	4.63 ms		70.9#	78.0#	72.6	79.7
^{40}Al(4$^-$)	10 ms#	>260 ns	4.65 ms#	5.02 ms#	3.70 ms	3.99 ms		55.5#	59.2#	57.6	61.5
^{41}Al(5/2$^+$)	6 ms#	>260 ns	3.90 ms#	4.86 ms#	2.48 ms	3.09 ms		62.2#	71.8#	64.9	75.2
^{42}Al(0$^-$, Ex. = 0.34 MeV)	3 ms#	>170 ns	4.41 ms#	6.04 ms#	1.84 ms	2.48 ms		83.9#	98.1#	84.7	98.5
^{42}Al(1$^-$, Ex. = 0.25 MeV)	3 ms#	>170 ns	4.14 ms#	5.41 ms#	1.77 ms	2.31 ms		85.5#	96.5#	86.1	97.2
^{42}Al(2$^-$, Ex. = 0.10 MeV)	3 ms#	>170 ns	4.46 ms#	5.58 ms#	1.99 ms	2.48 ms		79.7#	86.0#	82.5	88.9
^{42}Al(3$^-$)	3 ms#	>170 ns	4.32 ms#	5.50 ms#	2.00 ms	2.54 ms		81.7#	95.2#	82.5	96.1
^{42}Al(4$^-$, Ex. = 0.34 MeV)	3 ms#	>170 ns	5.93 ms#	6.67 ms#	2.42 ms	2.72 ms		89.5#	90.5#	91.7	92.8
^{43}Al(5/2$^+$)	4 ms#	>170 ns	3.10 ms#	3.98 ms#	1.76 ms	2.26 ms		99.2#	100#	99.2	100
^{44}Al(1$^-$, Ex. = 0.18 MeV)					1.18 ms	1.80 ms				79.0	100
^{44}Al(2$^-$)					1.38 ms	1.80 ms				94.9	100
^{44}Al(3$^-$, Ex. = 0.27 MeV)					1.28 ms	1.67 ms				95.0	100
^{44}Al(4$^-$, Ex. = 0.08 MeV)					1.46 ms	1.85 ms				99.4	100
^{45}Al(5/2$^+$)					1.10 ms	1.50 ms				93.5	100
^{46}Al(2$^-$)					883 µs	1.29 ms					
^{46}Al(3$^-$, Ex. = 0.25 MeV)					584 µs	751 µs					
^{47}Al(5/2$^+$)					605 µs	960 µs					

TABLE III. Half-lives $T_{1/2}$ and beta-delayed neutron emission rates $P_n(\%)$ of Si isotopes. Experimental data or evaluations for $T_{1/2}$ and P_n are from NUBASE2020 [1], and the $Q(\beta^-)$ and S_n used in calculations are from AME2020 [2]. The # symbols on experimental $T_{1/2}$ mean that the values are estimated from systematic trends [1]. In the column, "GT + FF, $Q_{\text{expt.}}$" and "GT, $Q_{\text{expt.}}$", the # symbols represent that the results are evaluated with the estimated $Q(\beta^-)$ values from AME2020.

	$T_{1/2}$						$P_n(\%)$				
Parent	Expt. [1]	Expt. err.	GT + FF,$Q_{\text{expt.}}$	GT,$Q_{\text{expt.}}$	GT + FF,$Q_{\text{theo.}}$	GT,$Q_{\text{theo.}}$	Expt. [1]	GT + FF,$Q_{\text{expt.}}$	GT,$Q_{\text{expt.}}$	GT + FF,$Q_{\text{theo.}}$	GT,$Q_{\text{theo.}}$
^{36}Si(0^+)	503 ms	2	375 ms	376 ms	368 ms	369 ms	12(5)	3.64	3.62	3.69	3.67
^{37}Si($5/2^-$)	141.0 ms	3.5	126 ms	129 ms	118 ms	121 ms	17(13)	6.24	6.37	6.48	6.62
^{38}Si(0^+)	63 ms	8	90.2 ms	91.6 ms	72.2 ms	73.3 ms	25(10)	18.5	18.8	20.0	20.3
^{39}Si($3/2^-$, Ex. = 0.10 MeV)	41.2 ms	4.1	41.6 ms	46.0 ms	33.9 ms	37.2 ms	33(3)	30.9	34.2	32.7	35.9
^{39}Si($5/2^-$)	41.2 ms	4.1	36.4 ms	37.7 ms	31.4 ms	32.5 ms	33(3)	20.3	21.0	21.4	22.1
^{39}Si($7/2^-$, Ex. = 0.04 MeV)	41.2 ms	4.1	44.0 ms	45.2 ms	36.9 ms	37.9 ms	33(3)	23.2	23.9	24.5	25.2
^{40}Si(0^+)	31.2 ms	2.6	24.4 ms	25.4 ms	23.9 ms	24.9 ms	38(5)	30.6	31.4	30.8	31.6
^{41}Si($3/2^-$)	20.0 ms	2.5	10.9 ms#	11.5 ms#	14.0 ms	14.8 ms	>55	56.8#	59.6#	55.1	58.0
^{42}Si(0^+)	12.5 ms	3.5	8.88 ms#	9.33 ms#	10.6 ms	11.2 ms		76.8#	77.7#	76.2	77.0
^{43}Si($1/2^-$, Ex. = 0.05 MeV)	30 ms#	>260 ns	7.58 ms#	9.24 ms#	5.65 ms	6.83 ms		82.9#	99.9#	83.5	99.9
^{43}Si($3/2^-$)	30 ms#	>260 ns	9.46 ms#	11.3 ms#	7.11 ms	8.47 ms		83.2#	99.2#	83.8	99.3
^{44}Si(0^+)	4 ms#	>360 ns	8.14 ms#	10.6 ms#	5.59 ms	7.19 ms		80.6#	100#	81.3	100
^{45}Si($1/2^-$)	4 ms#		5.69 ms#	8.96 ms#	3.32 ms	5.04 ms		68.3#	100#	70.7	100
^{45}Si($3/2^-$, Ex. = 0.12 MeV)	4 ms#		7.23 ms#	11.4 ms#	3.96 ms	6.01 ms		68.1#	100#	70.4	100
^{46}Si(0^+)					2.85 ms	4.65 ms				79.0	100
^{47}Si($1/2^-$)					1.80 ms	3.79 ms				73.0	100
^{48}Si(0^+)					1.23 ms	2.67 ms					

TABLE IV. Half-lives $T_{1/2}$ and beta-delayed neutron emission rates $P_n(\%)$ of P isotopes. Experimental data or evaluations for $T_{1/2}$ and P_n are from NUBASE2020 [1], and the $Q(\beta^-)$ and S_n used in calculations are from AME2020 [2]. The # symbols on experimental $T_{1/2}$ mean that the values are estimated from systematic trends [1]. In the columns "GT + FF, $Q_{expt.}$" and "GT, $Q_{expt.}$", the # symbols represent that the results are evaluated with the estimated $Q(\beta^-)$ values from AME2020.

	$T_{1/2}$						$P_n(\%)$				
Parent	Expt. [1]	Expt. err.	GT + FF, $Q_{expt.}$	GT, $Q_{expt.}$	GT + FF, $Q_{theo.}$	GT, $Q_{theo.}$	Expt. [1]	GT + FF, $Q_{expt.}$	GT, $Q_{expt.}$	GT + FF, $Q_{theo.}$	GT, $Q_{theo.}$
^{37}P($1/2^+$)	2.31 s	0.13	1.85 s	1.86 s	2.13 s	2.15 s		6.22	6.19	5.44	5.41
^{38}P(1^-, Ex. = 0.16 MeV)	640 ms	140	389 ms	406 ms	451 ms	471 ms	12(5)	4.80	5.01	4.13	4.32
^{38}P(2^-)	640 ms	140	351 ms	369 ms	450 ms	476 ms	12(5)	3.88	4.08	2.93	3.09
^{38}P(3^-, Ex. = 0.28 MeV)	640 ms	140	530 ms	547 ms	566 ms	585 ms	12(5)	5.39	5.57	5.08	5.25
^{38}P(4^-, Ex. = 0.42 MeV)	640 ms	140	461 ms	473 ms	448 ms	460 ms	12(5)	5.82	5.96	5.98	6.13
^{39}P($1/2^+$)	282 ms	24	322 ms	332 ms	266 ms	274 ms	26(8)	21.8	22.3	24.1	24.7
^{40}P(2^-)	150 ms	8	134 ms	147 ms	115 ms	126 ms	15.8(21)	19.2	21.1	20.8	22.8
^{40}P(3^-, Ex. = 0.32 MeV)	150 ms	8	186 ms	195 ms	133 ms	139 ms	15.8(21)	22.4	23.5	26.0	27.3
^{41}P($1/2^+$)	101 ms	5	103 ms	111 ms	79.8 ms	85.9 ms	30(10)	38.5	40.7	41.8	44.2
^{42}P(0^-)	48.5 ms	1.5	37.0 ms	56.0 ms	31.7 ms	46.5 ms	50(20)	33.2	49.8	35.6	51.8
^{42}P(1^-, Ex. = 0.13 MeV)	48.5 ms	1.5	44.2 ms	56.1 ms	34.8 ms	43.7 ms	50(20)	43.4	54.7	45.8	57.2
^{42}P(2^-, Ex. = 0.19 MeV)	48.5 ms	1.5	53.3 ms	61.6 ms	40.7 ms	46.6 ms	50(20)	51.0	58.8	53.9	61.6
^{42}P(3^-, Ex. = 0.29 MeV)	48.5 ms	1.5	60.9 ms	64.1 ms	43.7 ms	46.0 ms	50(20)	64.9	68.3	67.4	70.8
^{42}P(4^-, Ex. = 0.41 MeV)	48.5 ms	1.5	66.2 ms	68.4 ms	44.8 ms	46.2 ms	50(20)	73.2	75.7	75.7	78.1
^{43}P($1/2^+$)	35.8 ms	1.3	28.3 ms#	31.7 ms#	28.9 ms	32.3 ms	100	94.3#	98.3#	94.3	98.3
^{44}P(0^-)	18.5 ms	2.5	16.6 ms#	21.6 ms#	14.7 ms	18.8 ms		78.4#	98.0#	79.5	98.0
^{44}P(1^-, Ex. = 0.27 MeV)	18.5 ms	2.5	18.0 ms#	23.9 ms#	14.1 ms	18.4 ms		74.7#	96.8#	75.8	97.1
^{44}P(2^-, Ex. = 0.35 MeV)	18.5 ms	2.5	24.7 ms#	29.1 ms#	18.6 ms	21.6 ms		79.5#	92.2#	81.4	92.8
^{45}P($1/2^+$)	10 ms#	>200 ns	13.6 ms#	18.9 ms#	11.9 ms	16.4 ms		78.2#	100#	78.8	100
^{46}P(0^-)	9 ms#	>200 ns	11.0 ms#	18.0 ms#	7.55 ms	11.7 ms		68.7#	100#	71.8	100
^{46}P(1^-, Ex. = 0.47 MeV)	9 ms#	>200 ns	12.3 ms#	19.8 ms#	6.97 ms	10.6 ms		72.8#	100#	75.0	100
^{46}P(2^-, Ex. = 0.15 MeV)	9 ms#	>200 ns	14.9 ms#	22.8 ms#	9.42 ms	13.7 ms		73.2#	100#	75.8	100
^{47}P($1/2^+$)	4 ms#	>400 ns	5.48 ms#	9.23 ms#	5.58 ms	9.41 ms		78.3#	100#	78.3	100
^{48}P(0^-)					4.08 ms	8.69 ms				69.3	100
^{48}P(1^-, Ex. = 0.39 MeV)					3.32 ms	6.89 ms				69.0	100
^{49}P($1/2^+$)					2.19 ms	4.71 ms				79.0	100

TABLE V. Half-lives $T_{1/2}$ and beta-delayed neutron emission rates $P_n(\%)$ of S isotopes. Experimental data or evaluations for $T_{1/2}$ and P_n are from NUBASE2020 [1], and the $Q(\beta^-)$ and S_n used in calculations are from AME2020 [2]. The # symbols on experimental $T_{1/2}$ mean that the values are estimated from systematic trends [1]. In the columns "GT + FF, $Q_{\text{expt.}}$" and "GT, $Q_{\text{expt.}}$", the # symbols represent that the results are evaluated with the estimated $Q(\beta^-)$ values from AME2020.

	$T_{1/2}$						$P_n(\%)$				
Parent	Expt. [1]	Expt. err.	GT + FF,$Q_{\text{expt.}}$	GT,$Q_{\text{expt.}}$	GT + FF,$Q_{\text{theo.}}$	GT,$Q_{\text{theo.}}$	Expt. [1]	GT + FF,$Q_{\text{expt.}}$	GT,$Q_{\text{expt.}}$	GT + FF,$Q_{\text{theo.}}$	GT,$Q_{\text{theo.}}$
^{38}S(0^+)	170.3 min	0.7	82.0 min	88.2 min	27.3 min	28.9 min		0.0	0.0	0.0	0.0
^{39}S($3/2^-$)	11.5 s	0.5	15.5 s	16.5 s	16.7 s	17.8 s		0.0	0.0	0.0	0.0
^{39}S($5/2^-$, Ex. = 0.14 MeV)	11.5 s	0.5	15.2 s	15.6 s	13.5 s	13.9 s		0.0	0.0	0.0	0.0
^{39}S($7/2^-$, Ex. = 0.19 MeV)	11.5 s	0.5	20.6 s	21.0 s	17.0 s	17.3 s		0.0	0.0	0.0	0.0
^{40}S(0^+)	8.8 s	2.2	15.0 s	15.1 s	7.22 s	7.26 s		0.0	0.0	0.0	0.0
^{41}S($5/2^-$)	1.99 s	0.05	2.09 s	2.13 s	1.71 s	1.74 s		0.0	0.0	0.0	0.0
^{42}S(0^+)	1.016 s	0.015	1.43 s	1.44 s	886 ms	894 ms	<1	0.15	0.15	0.37	0.37
^{43}S($1/2^-$, Ex. = 0.14 MeV)	265 ms	13	166 ms	172 ms	124 ms	129 ms	40(10)	2.57	2.66	3.54	3.66
^{43}S($3/2^-$)	265 ms	13	331 ms	360 ms	258 ms	279 ms	40(10)	7.93	8.62	9.31	10.1
^{44}S(0^+)	100 ms	1	121 ms	129 ms	91.6 ms	97.5 ms	18(3)	17.0	18.1	18.9	20.0
^{45}S($1/2^-$, Ex. = 0.24 MeV)	68 ms	2	59.9 ms#	68.2 ms#	37.8 ms	42.5 ms	54	42.0#	47.8#	45.6	51.2
^{45}S($3/2^-$)	68 ms	2	70.1 ms#	79.3 ms#	49.4 ms	55.5 ms	54	43.3#	49.0#	45.8	51.4
^{46}S(0^+)	50 ms	8	36.8 ms#	40.5 ms#	32.0 ms	35.1 ms		88.8#	97.3#	89.0	97.3
^{47}S($1/2^-$)	24 ms#	>200 ns	26.3 ms#	33.5 ms#	14.5 ms	17.9 ms		75.7#	94.1#	78.4	94.9
^{47}S($3/2^-$, Ex. = 0.07 MeV)	24 ms#	>200 ns	35.6 ms#	46.3 ms#	18.5 ms	23.1 ms		77.0#	99.5#	80.0	99.6
^{48}S(0^+)	10 ms#	>200 ns	14.0 ms#	17.7 ms#	13.0 ms	16.5 ms		80.7#	100#	80.9	100
^{49}S($1/2^-$)	4 ms#	>400 ns	11.0 ms#	16.7 ms#	9.25 ms	13.9 ms		75.9w#	100#	76.7	100
^{50}S(0^+)					5.64 ms	8.10 ms				89.0	100

TABLE VI. Half-lives $T_{1/2}$ and beta-delayed neutron emission rates $P_n(\%)$ of Cl isotopes. Experimental data or evaluations for $T_{1/2}$ and P_n are from NUBASE2020 [1], and the $Q(\beta^-)$ and S_n used in calculations are from AME2020 [2]. The # symbols on experimental $T_{1/2}$ mean that the values are estimated from systematic trends [1]. In the columns "GT + FF, $Q_{expt.}$" and "GT, $Q_{expt.}$", the # symbols represent that the results are evaluated with the estimated $Q(\beta^-)$ values from AME2020.

	$T_{1/2}$						$P_n(\%)$				
Parent	Expt. [1]	Expt. err.	GT + FF,$Q_{expt.}$	GT,$Q_{expt.}$	GT + FF,$Q_{theo.}$	GT,$Q_{theo.}$	Expt. [1]	GT + FF,$Q_{expt.}$	GT,$Q_{expt.}$	GT + FF,$Q_{theo.}$	GT,$Q_{theo.}$
^{39}Cl(3/2$^+$)	56.2 min	0.6	20.3 min	21.0 min	15.3 min	15.9 min		0.0	0.0	0.0	0.0
^{40}Cl(1$^-$, Ex. = 0.03 MeV)	1.35 min	0.03	38.9 s	42.0 s	57.7 s	1.04 min		0.0	0.0	0.0	0.0
^{40}Cl(2$^-$)	1.35 min	0.03	41.2 s	47.0 s	1.06 min	1.23 min		0.0	0.0	0.0	0.0
^{41}Cl(1/2$^+$)	38.4 s	0.8	34.8 s	35.0 s	18.2 s	18.3 s		0.0	0.0	0.0	0.0
^{42}Cl(2$^-$)	6.8 s	0.3	6.13 s	6.51 s	6.16 s	6.53 s		0.0	0.0	0.0	0.0
^{42}Cl(3$^-$, Ex. = 0.15 MeV)	6.8 s	0.3	5.20 s	5.28 s	4.52 s	4.59 s		0.0	0.0	0.0	0.0
^{43}Cl(1/2$^+$)	3.13 s	0.09	5.18 s	5.31 s	2.53 s	2.59 s		2.93	2.99	6.97	7.10
^{43}Cl(3/2$^+$, Ex. = 0.27 MeV)	3.13 s	0.09	7.22 s	7.41 s	2.58 s	2.64 s		3.20	3.29	9.45	9.68
^{44}Cl(2$^-$)	562 ms	106	711 ms	1.05 s	538 ms	771 ms	<8	2.19	3.25	3.39	4.86
^{45}Cl(1/2$^+$)	413 ms	25	340 ms	368 ms	205 ms	222 ms	24(4)	14.0	15.0	19.4	20.8
^{46}Cl(0$^-$)	232 ms	2	271 ms	346 ms	153 ms	188 ms	60(9)	34.7	43.3	42.1	50.8
^{46}Cl(1$^-$, Ex. = 0.31 MeV)	232 ms	2	222 ms	256 ms	108 ms	123 ms	60(9)	22.8	26.0	30.9	34.9
^{46}Cl(2$^-$, Ex. = 0.16 MeV)	232 ms	2	241 ms	288 ms	127 ms	149 ms	60(9)	23.1	27.6	30.7	35.9
^{46}Cl(3$^-$, Ex. = 0.37 MeV)	232 ms	2	334 ms	401 ms	151 ms	177 ms	60(9)	31.9	38.3	41.5	48.6
^{47}Cl(1/2$^+$)	101 ms	5	82.9 ms#	103 ms#	63.5 ms	78.4 ms	<3	80.2#	96.2#	81.2	96.5
^{47}Cl(3/2$^+$, Ex. = 0.03 MeV)	101 ms	5	110 ms#	129 ms#	81.5 ms	94.8 ms	<3	77.4#	87.0#	79.4	88.3
^{48}Cl(0$^-$, Ex. = 0.08 MeV)	30 ms#	>200 ns	42.0 ms#	88.8 ms#	24.5 ms	43.0 ms		49.1#	#	59.0	100
^{48}Cl(1$^-$, Ex. = 0.12 MeV)	30 ms#	>200 ns	59.3 ms#	98.4 ms#	29.9 ms	45.7 ms		63.8#	100#	68.7	100
^{48}Cl(2$^-$)	30 ms#	>200 ns	82.3 ms#	119 ms#	43.6 ms	57.7 ms		71.3#	98.4#	77.6	98.8
^{48}Cl(3$^-$, Ex. = 0.06 MeV)	30 ms#	>200 ns	103 ms#	141 ms#	50.5 ms	65.4 ms		76.1#	97.6#	80.5	98.2
^{49}Cl(3/2$^+$)	35 ms#	>200 ns	35.6 ms#	48.6 ms#	28.9 ms	38.8 ms		82.1#	100#	83.2	100
^{50}Cl(1$^-$, Ex. = 0.13 MeV)	10 ms#	>620 ns	19.5 ms#	32.3 ms#	15.2 ms	24.3 ms		74.7#	100#	75.7	100
^{50}Cl(2$^-$)	10 ms#	>620 ns	20.0 ms#	27.9 ms#	16.4 ms	22.5 ms		86.8#	100#	87.5	100
^{51}Cl(3/2$^+$)	5 ms#	>200 ns	8.69 ms#	12.0 ms#	8.63 ms	11.9 ms		93.9#	100#	93.9	100

TABLE VII. Half-lives $T_{1/2}$ and beta-delayed neutron emission rates $P_n(\%)$ of Ar isotopes. Experimental data or evaluations for $T_{1/2}$ and P_n are from NUBASE2020 [1], and the $Q(\beta^-)$ and S_n used in calculations are from AME2020 [2]. The # symbols on experimental $T_{1/2}$ mean that the values are estimated from systematic trends [1]. In the columns "GT + FF, $Q_{\rm expt.}$" and "GT, $Q_{\rm expt.}$", the # symbols represent that the results are evaluated with the estimated $Q(\beta^-)$ values from AME2020.

	$T_{1/2}$						$P_n(\%)$				
Parent	Expt. [1]	Expt. err.	GT + FF,$Q_{\rm expt.}$	GT,$Q_{\rm expt.}$	GT + FF,$Q_{\rm theo.}$	GT,$Q_{\rm theo.}$	Expt. [1]	GT + FF,$Q_{\rm expt.}$	GT,$Q_{\rm expt.}$	GT + FF,$Q_{\rm theo.}$	GT,$Q_{\rm theo.}$
^{41}Ar($5/2^-$)	109.61 min	0.04	109 min	110 min	1.94×10^3 min	2.01×10^3 min		0.0	0.0	0.0	0.0
^{41}Ar($7/2^-$, Ex. = 0.28 MeV)	109.61 min	0.04	238 min	241 min	867 min	888 min		0.0	0.0	0.0	0.0
^{42}Ar(0^+)	32.9 yr	1.1	61.4 yr		6.12 yr			0.0		0.0	
^{43}Ar($3/2^-$, Ex. = 0.34 MeV)	5.37 min	0.06	3.77 min	5.47 min	3.80 min	5.52 min		0.0	0.0	0.0	0.0
^{43}Ar($5/2^-$)	5.37 min	0.06	3.66 min	3.99 min	7.89 min	8.91 min		0.0	0.0	0.0	0.0
^{43}Ar($7/2^-$, Ex. = 0.12 MeV)	5.37 min	0.06	3.63 min	3.72 min	5.75 min	5.92 min		0.0	0.0	0.0	0.0
^{44}Ar(0^+)	11.87 min	0.05	9.25 min	9.37 min	3.82 min	3.86 min		0.0	0.0	0.0	0.0
^{45}Ar($3/2^-$, Ex. = 0.32 MeV)	21.48 s	0.15	15.3 s	22.8 s	12.8 s	18.4 s		0.0	0.0	0.0	0.0
^{45}Ar($7/2^-$)	21.48 s	0.15	11.2 s	11.5 s	13.9 s	14.3 s		0.0	0.0	0.0	0.0
^{46}Ar(0^+)	8.4 s	0.6	7.62 s	7.72 s	6.02 s	6.09 s		0.0	0.0	0.0	0.0
^{47}Ar($3/2^-$)	1.23 s	0.03	1.68 s	1.85 s	969 ms	1.06 s	<0.2	0.59	0.65	1.50	1.64
^{48}Ar(0^+)	415 ms	15	425 ms	441 ms	341 ms	353 ms	38(6)	19.6	20.3	21.5	22.2
^{49}Ar($3/2^-$)	236 ms	8	301 ms#	356 ms#	187 ms	217 ms	29(6)	50.1#	59.3#	54.7	63.3
^{50}Ar(0^+)	106 ms	6	132 ms#	156 ms#	94.7 ms	110 ms	37(7)	41.4#	48.5#	44.8	51.8
^{51}Ar($1/2^-$)	30 ms#	>200 ns	45.2 ms#	60.0 ms#	38.7 ms	50.8 ms		66.3#	87.1#	67.5	87.6
^{52}Ar(0^+)	40 ms#	>620 ns	20.7 ms#	24.4 ms#	16.9 ms	19.9 ms		85.7#	100#	86.2	100

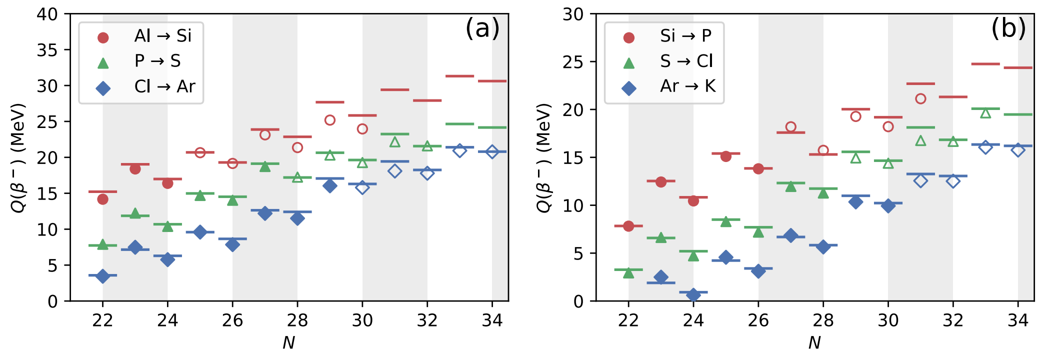

FIG. 4. This figure replaces Fig. 5. in the original paper. Comparison of the $Q(\beta^-)$values between theory and experiment. The filled and open symbols show the experimental and estimated $Q(\beta^-)$ values taken from the AME2020 [2] database, and the horizontal bars represent our calculated $Q(\beta^-)$ values.

Updates on experimental data

In addition to the above corrections, the experimental data used in the calculations are replaced from the then-current data in the ENSDF database with values from a database fixed at a specific time: The experimental data (or evaluations of) $Q(\beta^-)$, S_n, $T_{1/2}$, and P_n are updated to values from NUBASE2020 [1] and AME2020 [2]. This update provides a time stamp, such as experimental data at a certain point in time, which makes it easier to reproduce the whole results. Some figures and tables are affected by this update:

(a) In Table I, the experimental values used for error analyses are replaced with ones from NUBASE2020. Hence, the numbers are slightly modified from the original Table III in the paper.
(b) In the Fig. 4, corresponding to the original Fig. 5, experimental $Q(\beta^-)$ values (including estimations from the trend) are replaced with the values from AME2020.
(c) In Tables II–VII, $T_{1/2}$ and P_n data in the Exp. columns are replaced with those from NUBASE2020, and the $Q(\beta^-)$ value used in the calculations are replaced by ones from AME2020. Note that we added new columns in the tables, "GT, $Q_{\mathrm{exp.}}$", which were omitted in the original paper due to the lack of space.

Data availability

All the data, $T_{1/2}$ and P_n to reproduce tables and figures and ones relevant to GT and FF transition are available from the GitHub repository [4]. One can reproduce the results with open source softwares by the authors: wave functions and transition matrix elements can be obtained with a public shell model code, KSHELL [5], and the Fermi integrals, half-lives $T_{1/2}$, P_n, etc. can be evaluated with a Julia package, NuclearToolkit.jl [6].

[1] F. Kondev, M. Wang, W. Huang, S. Naimi, and G. Audi, Chin. Phys. C **45**, 030001 (2021).
[2] W. Huang, M. Wang, F. Kondev, G. Audi, and S. Naimi, Chin. Phys. C **45**, 030002 (2021); M. Wang, W. Huang, F. Kondev, G. Audi, and S. Naimi, *ibid.* **45**, 030003 (2021).
[3] P. Möller, A. Sierk, T. Ichikawa, and H. Sagawa, At. Data Nucl. Data Tables **109–110**, 1 (2016).
[4] S. Yoshida, GitHub repository, https://github.com/SotaYoshida/BetaDecayDataPRC97.054321.
[5] N. Shimizu, Nuclear shell-model code for massive parallel computation, "KSHELL", arXiv:1310.5431; N. Shimizu, T. Mizusaki, Y. Utsuno, and Y. Tsunoda, Comput. Phys. Commun. **244**, 372 (2019).
[6] S. Yoshida, J. Open Source Software **7**, 4694 (2022).