

^{90}Br β^- decay [1981Ho17](#)

Type	Author	History	Citation	Literature Cutoff Date
Full Evaluation	S. K. Basu, E. A. Mccutchan		NDS 165, 1 (2020)	1-Mar-2020

Parent: ^{90}Br : $E=0$; $T_{1/2}=1.91$ s I ; $Q(\beta^-)=10959$ 4; $\% \beta^-$ decay=100.0

[1981Ho17](#): Activity from $^{235}\text{U}(n,F)$. Measured $E\gamma$, $I\gamma$, $\gamma\gamma$, and $\beta\gamma$ coin. Mass and chemical separation. Ge(Li), x-ray and Si(Li) detectors.

[1980Al15](#): Measured $I\beta(t)$, delayed neutrons. Plastic scintillator, ^3He tubes.

Others: [1971Ch38](#), [1974Kr21](#), [1974Cr06](#), [1975As04](#), [1975Ba36](#), [1976Ru01](#), [1978Be51](#), [1984Ew01](#), [1987PfZX](#).

For spectra of delayed neutrons, see [1977Sh01](#).

The decay scheme of ^{89}Kr via delayed neutrons following the ^{90}Br decay is given by [1981Ho17](#).

All data are from [1981Ho17](#), except as noted.

 ^{90}Kr Levels

E(level)	J^π [†]	$T_{1/2}$ [†]	Comments
0.0	0 ⁺	32.32 s 9	
707.13 5	2 ⁺		
1362.25 6	2 ⁺		
1830.50 16	4 ⁺		
1940.33 8			
2103.13 9			
2147.81 10			
2193.1 4			
2249.34 14			
2318.09 8			
2536.05 21			
2543.70 10			
2595.94 14			
2685.83 14			
2687.31 13			
2730.76 17			
2747.94 15			
2780.60 10			
2828.26 22			
2864.15 20			
2987.31 12			
3140.25 16			
3231.44 18			
3285.10 17			
3318.4 3			
3372.6 3			
3508.2 3			
4291.0 3			
4546.6 5			
4785.78 22			
5004.4 3			
5080.0 5			
5385.4 6			
5683.3 5			
5730.1 4			
6494.8+x			

E(level): $x < 4464$ keV from $Q(\beta^-)(^{90}\text{Br}) - S(n)(^{90}\text{Kr})$, where $Q(\beta^-) = 10959$ 4 and $S(n) = 6495$ 3 ([2017Wa10](#)).

[†] From the Adopted Levels.

^{90}Br β^- decay **1981Ho17** (continued) β^- radiations

1981Ho17 measured $Q(\beta^-)$ value = 9800 keV 400 for ^{90}Br . This value deviates significantly from the evaluated value of 10959 4 (2017Wa10).

1986Ke10 measured $Q(\beta^-)$ = 10300 120 from $\beta\gamma$ coin with mass separation, compared to the evaluated value of 10959 4 (2017Wa10).

E(decay)	E(level)	$I\beta^-^{\dagger\ddagger}$	Log ft	Comments
(2.2×10 ³ # 22)	6494.8+x	25.3 15		$I\beta^-$: from % β^- -n = 25.3 15 for ^{90}Br decay.
(5229 4)	5730.1	1.04 13	6.45 6	av $E\beta$ =2342.4 20
(5276 4)	5683.3	0.35 6	6.94 8	av $E\beta$ =2365.0 20
(5574 4)	5385.4	0.25 7	7.20 13	av $E\beta$ =2508.9 20
(5879 4)	5080.0	0.54 9	6.97 8	av $E\beta$ =2656.6 20
(5955 4)	5004.4	0.63 9	6.93 7	av $E\beta$ =2693.1 20
(6173 4)	4785.78	0.46 7	7.13 7	av $E\beta$ =2798.8 20
(6412 4)	4546.6	0.25 6	7.47 11	av $E\beta$ =2914.5 20
(6668 4)	4291.0	0.65 9	7.14 6	av $E\beta$ =3038.1 20
(7451 4)	3508.2	0.35 8	7.62 10	av $E\beta$ =3416.7 20
(7586 4)	3372.6	0.34 6	7.67 8	av $E\beta$ =3482.2 20
(7641 4)	3318.4	0.74 19	7.35 12	av $E\beta$ =3508.4 20
(7674 4)	3285.10	0.51 7	7.52 6	av $E\beta$ =3524.5 20
(7728 4)	3231.44	3.6 5	6.69 6	av $E\beta$ =3550.4 20
(7819 4)	3140.25	0.99 11	7.27 5	av $E\beta$ =3594.5 20
(7972 4)	2987.31	2.8 3	6.86 5	av $E\beta$ =3668.4 20
(8095 4)	2864.15	1.18 17	7.26 7	av $E\beta$ =3727.9 20
(8131 4)	2828.26	0.74 8	7.47 5	av $E\beta$ =3745.3 20
(8178 4)	2780.60	1.90 17	7.08 4	av $E\beta$ =3768.3 20
(8211 4)	2747.94	0.80 11	7.46 6	av $E\beta$ =3784.1 20
(8228 4)	2730.76	2.11 22	7.04 5	av $E\beta$ =3792.4 20
(8272 4)	2687.31	0.66 10	7.56 7	av $E\beta$ =3813.4 20
(8273 4)	2685.83	0.80 11	7.47 6	av $E\beta$ =3814.1 20
(8363 4)	2595.94	0.56 7	7.65 6	av $E\beta$ =3857.5 20
(8415 4)	2543.70	1.48 19	7.24 6	av $E\beta$ =3882.7 20
(8423 4)	2536.05	0.41 6	7.80 7	av $E\beta$ =3886.4 20
(8641 4)	2318.09	5.3 6	6.74 5	av $E\beta$ =3991.7 20
(8710 4)	2249.34	1.33 18	7.36 6	av $E\beta$ =4024.8 20
(8766 4)	2193.1	0.56 10	7.75 8	av $E\beta$ =4052.0 20
(8811 4)	2147.81	1.26 23	7.40 8	av $E\beta$ =4073.9 20
(8856 4)	2103.13	3.3 4	7.00 6	av $E\beta$ =4095.4 20
(9019 4)	1940.33	3.3 5	7.03 7	av $E\beta$ =4174.0 20
(9129 4)	1830.50	0.50 7	7.88 6	av $E\beta$ =4227.0 20
(9597 4)	1362.25	6.8 18	6.84 12	av $E\beta$ =4452.8 20
(10252 4)	707.13	13 4	6.69 14	av $E\beta$ =4768.3 20
(10959 4)	0.0	15 7	6.77 21	av $E\beta$ =5108.5 20

[†] β^- branches are obtained by $I(\gamma+\text{ce})$ imbalance at each level.

[‡] Absolute intensity per 100 decays.

Estimated for a range of levels.

$^{90}\text{Br} \beta^-$ decay **1981Ho17 (continued)** $\gamma(^{90}\text{Kr})$ I γ normalization: From known absolute intensity I γ (1119 γ)=39% 3 in $^{90}\text{Kr} \beta^-$ decay (**1981Ho17**).

E_γ [†]	I γ [#]	$E_i(\text{level})$	J_i^π	E_f	J_f^π	Mult. [‡]
539.50 8	17.3 20	2687.31		2147.81		
578.06 18	15.9 18	1940.33		1362.25	2 ⁺	
655.17 6	202 12	1362.25	2 ⁺	707.13	2 ⁺	D
707.05 6	1000 40	707.13	2 ⁺	0.0	0 ⁺	E2
740.82 8	75 4	2103.13		1362.25	2 ⁺	
786.02 12	42 3	2147.81		1362.25	2 ⁺	
840.29 10	25 2	2780.60		1940.33		
913.38 20	6.8 9	3231.44		2318.09		
^x 939.9 2	11.2 13					
955.84 8	58 3	2318.09		1362.25	2 ⁺	
1123.37 15	13.1 11	1830.50	4 ⁺	707.13	2 ⁺	E2
^x 1133.5 4	4.9 10					
1233.21 8	110 4	1940.33		707.13	2 ⁺	
1323.57 12	21 2	2685.83		1362.25	2 ⁺	
1344.76 15	13.5 12	3285.10		1940.33		
1362.32 10	295 23	1362.25	2 ⁺	0.0	0 ⁺	E2
1396.16 13	25 2	2103.13		707.13	2 ⁺	
1418.34 11	21 2	2780.60		1362.25	2 ⁺	
1440.21 12	8.5 8	2147.81		707.13	2 ⁺	
1465.9 3	9.6 11	2828.26		1362.25	2 ⁺	
1486.0 4	14.7 21	2193.1		707.13	2 ⁺	
1542.20 13	35 3	2249.34		707.13	2 ⁺	
1610.80 11	59 3	2318.09		707.13	2 ⁺	
1625.11 13	44 3	2987.31		1362.25	2 ⁺	
1828.90 20	10.7 11	2536.05		707.13	2 ⁺	
1836.49 10	38 2	2543.70		707.13	2 ⁺	
1888.79 13	14.7 12	2595.94		707.13	2 ⁺	
2002.9 5	6.7 13	4546.6		2543.70		
2024.1 3	11.6 16	2730.76		707.13	2 ⁺	
2040.79 14	21 2	2747.94		707.13	2 ⁺	
2073.0 5	4.0 10	2780.60		707.13	2 ⁺	
^x 2105.7 2	15.0 12					
2121.2 3	9.8 10	2828.26		707.13	2 ⁺	
^x 2172.9 4	3.4 12					
^x 2297.1 3	7.4 13					
2318.6 2	28 2	2318.09		0.0	0 ⁺	
2411.8 3	11.4 19	5730.1		3318.4		
2433.09 15	26 1	3140.25		707.13	2 ⁺	
2543.93 20	7.7 10	2543.70		0.0	0 ⁺	
^x 2612.2 2	14.6 14					
2665.4 3	8.9 13	3372.6		707.13	2 ⁺	
2682.6 2	12.2 14	4785.78		2103.13		
2730.5 2	44 3	2730.76		0.0	0 ⁺	
^x 2763.9 4	5.0 4					
2801.0 3	9.1 18	3508.2		707.13	2 ⁺	
2864.1 2	31 3	2864.15		0.0	0 ⁺	
2987.1 2	29 2	2987.31		0.0	0 ⁺	
^x 3022.3 4	6.2 15					
^x 3116.7 4	9.9 13					
3231.3 3	89 9	3231.44		0.0	0 ⁺	
3318.5 3	31 3	3318.4		0.0	0 ⁺	
^x 3505.8 4	6.5 12					

Continued on next page (footnotes at end of table)

^{90}Br β^- decay [1981Ho17](#) (continued) $\gamma(^{90}\text{Kr})$ (continued)

$E_\gamma^\dagger$	$I_\gamma^\#$	$E_i(\text{level})$	E_f	J_f^π	$E_\gamma^\dagger$	$I_\gamma^\#$	$E_i(\text{level})$	J_i^π	E_f	J_f^π
^x 3669.1 4	7.3 11				4367.3 5	16.1 20	5730.1		1362.25	2 ⁺
^x 3949.0 3	9.4 11				4372.8 5	14.1 20	5080.0		707.13	2 ⁺
^x 3955.0 3	8.4 9				^x 4495.1 4	8.8 14				
4023.1 6	6.7 18	5385.4	1362.25	2 ⁺	^x 4762.3 5	6.8 11				
4290.9 3	17.0 15	4291.0	0.0	0 ⁺	^x 4787.4 4	5.7 11				
4297.2 3	16.7 15	5004.4	707.13	2 ⁺	^x 5154.0 5	2.8 10				
4320.9 5	9.1 14	5683.3	1362.25	2 ⁺	^x 5221.6 5	7.9 13				

[†] For several γ 's not seen by [1981Ho17](#), see [1975Kr17](#).

[‡] From the Adopted Gammas.

[#] For absolute intensity per 100 decays, multiply by 0.038 4.

^x γ ray not placed in level scheme.

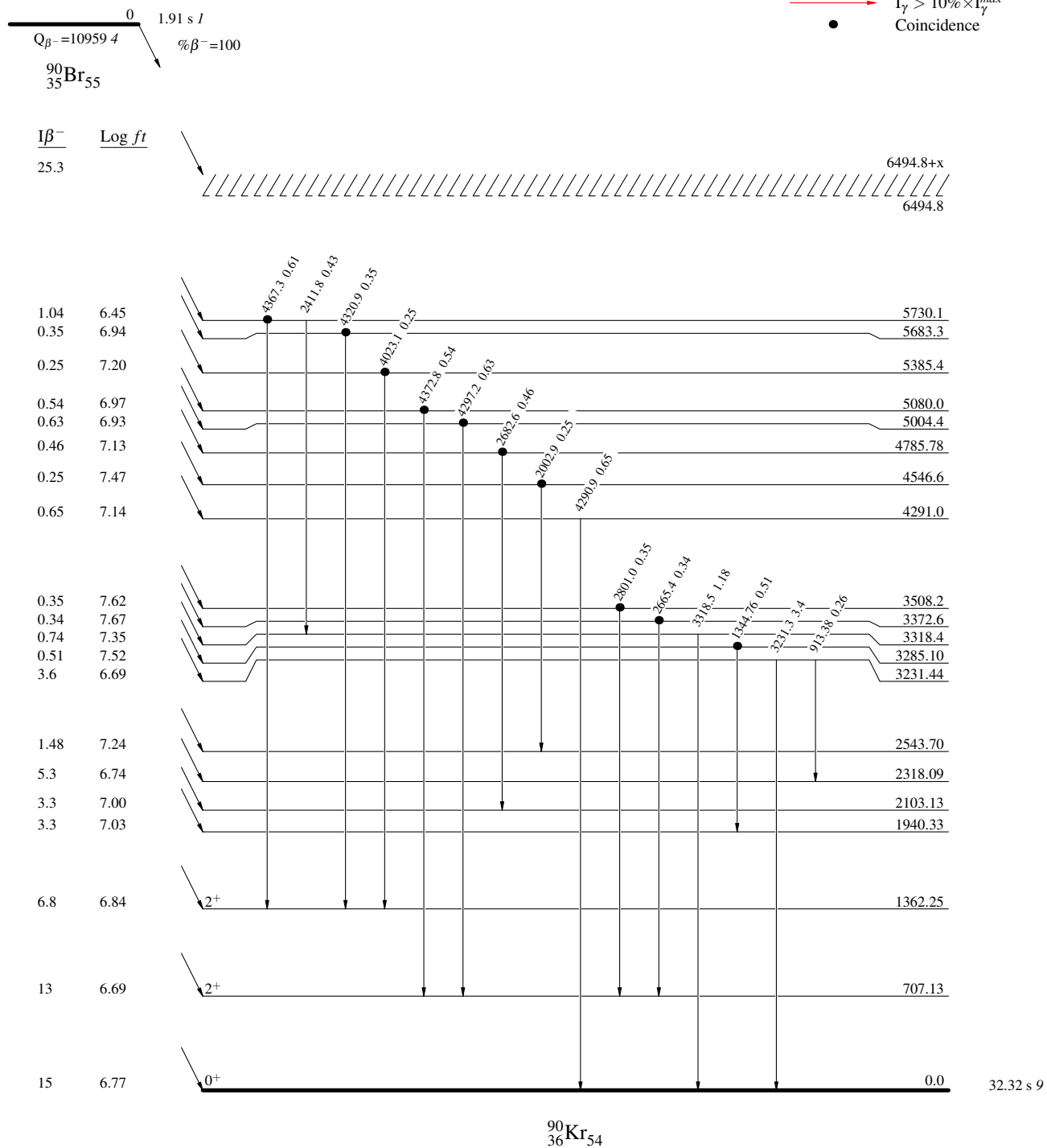
$^{90}\text{Br} \beta^- \text{ decay}$ 1981Ho17

Decay Scheme

Intensities: $I_{(\gamma+ce)}$ per 100 parent decays

Legend

- $I_{\gamma} < 2\% \times I_{\gamma}^{max}$
- $I_{\gamma} < 10\% \times I_{\gamma}^{max}$
- $I_{\gamma} > 10\% \times I_{\gamma}^{max}$
- Coincidence



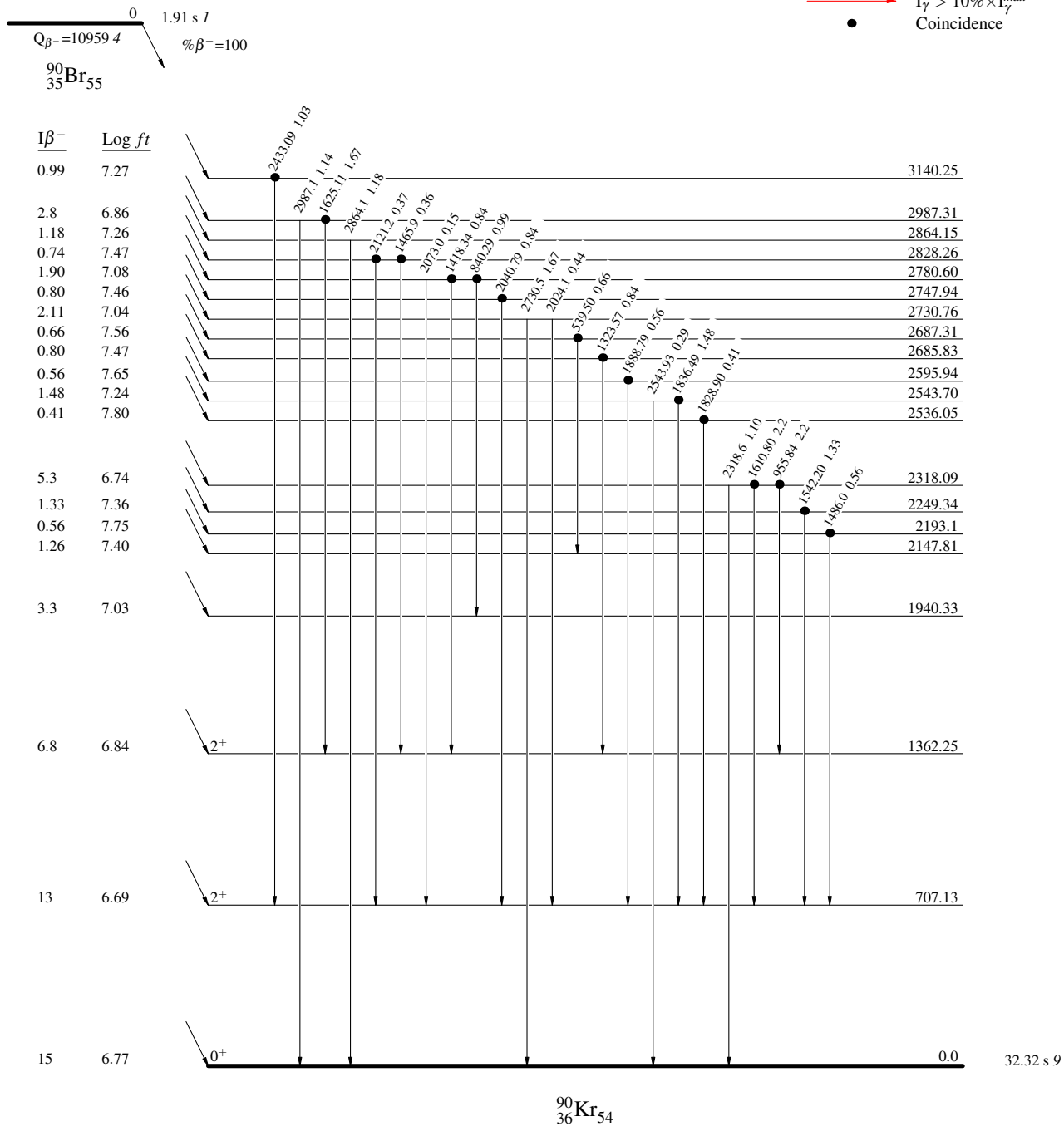
$^{90}\text{Br} \beta^-$ decay 1981Ho17

Decay Scheme (continued)

Intensities: $I_{(\gamma+ce)}$ per 100 parent decays

Legend

- $\rightarrow$ $I_{\gamma} < 2\% \times I_{\gamma}^{max}$
 $\rightarrow$ $I_{\gamma} < 10\% \times I_{\gamma}^{max}$
 $\rightarrow$ $I_{\gamma} > 10\% \times I_{\gamma}^{max}$
 $\bullet$ Coincidence



$^{90}\text{Br} \beta^- \text{ decay}$ 1981Ho17

Decay Scheme (continued)

Intensities: $I_{(\gamma+ce)}$ per 100 parent decays

Legend

