



**Fig. 1:** Known experimental values for heavy particle emission of the even-Z  $T_z = +17$  nuclei.

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**Table 1**

Observed and predicted  $\beta$ -delayed particle emission from the even- $Z$ ,  $T_z = +17$  nuclei. Unless otherwise stated, all Q-values are taken from [2021Wa16] or deduced from values therein.

Nuclide	$J^\pi$	Ex.	$T_{1/2}$	$Q_\epsilon$	$Q_{\epsilon p}$	$Q_{\epsilon\alpha}$	Experimental
$^{170}\text{Er}$		$0^+$	$\geq 4.1 \times 10^{+15}$ y	-3.870(50)	—	—	[2018Be25]
$^{174}\text{Yb}$		$0^+$	stable	-3.080(40)	—	—	
$^{178}\text{Hf}$		$0^+$	stable	-2.098(2)	—	—	
$^{182}\text{W}$		$0^+$	stable	-1.816(2)	—	—	
$^{186}\text{Os}$		$0^+$	$2.0(11) \times 10^{+15}$ y	-1.073(1)	—	—	[1975Vi01]
$^{190}\text{Pt}$		$0^+$	$6.65(28) \times 10^{+11}$ y	-0.553(1)	—	—	[2011Be08]
$^{194}\text{Hg}$		$0^+$	447(28) y	0.028(4)	-4.993(3)	2.145(3)	[2015Do01]
$^{198}\text{Pb}$		$0^+$	2.4(1) h	1.461(12)	-2.816(9)	3.720(9)	[1959Ju39]
$^{202}\text{Po}$		$0^+$	45.4(2) m	2.809(16)	0.040(16)	7.162(11)	[1970Ra14]
$^{206}\text{Rn}$		$0^+$	6.29(10) m*	3.306(16)	1.100(13)	9.193(16)	[1969Ha03, 1967Va17]
$^{210}\text{Ra}$		$0^+$	3.7(2) s**	3.786(16)	2.095(14)	10.457(16)	[1968Lo15, 1967Va22]
$^{214}\text{Th}$		$0^+$	$113_{-9}^{+11}$ ms	4.262(17)	3.060(14)	11.614(17)	[2022Zh45]
$^{218}\text{U}$		$0^+$	$650_{-70}^{+80}$ $\mu\text{s}$	3.245(23)	2.400(17)	13.036(19)	[2022Zh45]
$^{218m}\text{U}$	2.112(14)	$8^+$	$390_{-50}^{+60}$ $\mu\text{s}$	5.357(27)	4.512(22)	15.148(24)	[2022Zh45]
$^{222}\text{Pu}$		$0^+$		3.79(30)#	3.25(31)#	13.99(30)#	

\* Weighted average of 5.67(17) m [1969Ha03] and 6.5(1) m [1967Va17].

\*\* Weighted average of 3.8(2) s [1967Va22] and 3.6(2) s [1968Lo15].

**Table 2**

Particle separation, Q-values, and measured values for direct particle emission of the even- $Z$ ,  $T_z = +17$  nuclei. Unless otherwise stated, all S and Q-values are taken from [2021Wa16] or deduced from values therein.

Nuclide	$S_p$	$S_{2p}$	$Q_\alpha$	$\text{BR}_\alpha$	Experimental
$^{170}\text{Er}$	8.600(20)	16.13(14)	0.052(2)		
$^{174}\text{Yb}$	7.977(4)	15.040(4)	0.738(1)		
$^{178}\text{Hf}$	7.340(1)	13.522(1)	2.084(1)		
$^{182}\text{W}$	7.096(2)	13.045(2)	1.764(2)		
$^{186}\text{Os}$	6.470(1)	11.873(1)	2.821(1)	100%	[1975Vi01, 2020Be23, 1973ViZL]
$^{190}\text{Pt}$	6.146(13)	10.747(1)	3.269(1)	100%	[2011Be08, 1987Al28, 2017Br04, 1997Ta33, 1986AlZT, 1966Ka23, 1961Ma05, 1963Gr08, 1961Gr37, 1961Ma05, 1961Pe23, 1956Po16, 1954Po24, 1953Po01]
$^{194}\text{Hg}$	6.068(9)	10.473(4)	2.698(3)		
$^{198}\text{Pb}$	5.002(16)	8.819(9)	3.692(9)		
$^{202}\text{Po}$	3.802(15)	6.269(13)	5.701(2)	1.93(6)%*	[1993Wa04, 1970Jo26, 1970Ra14, 1968Go12, 1967Le08, 1967Ti10, 1967Tr06, 1992WaZV, 1971Ho01, 1969Ha03, 1967Le21, 1967Tr04, 1965Br17, 1965Br27, 1964Br23, 1963Ho10, 1962Ax02, 1961Ax02, 1961Be25, 1961Fo05, 1954Ro39, 1951Ka14]
$^{206}\text{Rn}$	3.437(15)	5.370(13)	6.384(2)	62(3)%	[1993Wa04, 1971Go35, 1971Ho01, 1969Ha03, 1967Va17, 2014Ma66, 1992WaZV, 1967Va07, 1965Nu04, 1957St10, 1954Bu67]
$^{210}\text{Ra}$	3.064(15)	4.480(14)	7.151(3)	$\approx 100\%^{**}$	[2003He06, 1967Va22, 2015Ma37, 2001HeZY, 1997Mi03, 1968Lo15]
$^{214}\text{Th}$	2.735(16)	3.684(15)	7.827(5)	100%	[2022Zh45, 1980Ve01, 1968Va18, 2005Li17, 1984Sc13, 1968Va10]
$^{218}\text{U}$	2.449(19)	2.982(18)	8.775(9)	100%	[2022Zh45, 2021Zh22, 2005Le42, 2015Ma37, 2007Le14, 2006LeZR, 1994AnZY, 1994Ye08]
$^{218m}\text{U}$	0.337(23)	0.870(24)	10.887(17)	100%	[2022Zh45, 2005Le42, 2021Zh22, 2015Ma37, 2007Le14, 2006LeZR]
$^{222}\text{Pu}$	2.14(36)#	2.53(32)#	10.74(30)#		

\* Weighted average of 1.92(7)% [1993Wa04] and 2.00(15)% [1967Le08].

\*\* Based half-life.

**Table 3**direct  $\alpha$  emission from  $^{186}\text{Os}^*$ ,  $J_i^\pi = 0^+$ ,  $T_{1/2} = 2.0(11) \times 10^{15}$  y,  $BR_\alpha = 100\%$ .

$E_\alpha$ (c.m.)	$E_\alpha$ (lab)	$I_\alpha$ (abs)	$J_f^\pi$	$E_{daughter}(^{182}\text{W})$	coincident $\gamma$ -rays	$R_0$ (fm)]	HF
$\approx 2.82$	$\approx 2.76$	100%	$0^+$	0.0	—	1.486(29)	1.0(5)

\* All values taken from [1975Vi01].

**Table 4**direct  $\alpha$  emission from  $^{190}\text{Pt}$ ,  $J_i^\pi = 0^+$ ,  $T_{1/2} = 6.5(3) \times 10^{11}$  y\*,  $BR_\alpha = 100\%$ .

$E_\alpha$ (c.m.)	$E_\alpha$ (lab)	$I_\alpha$ (rel)	$I_\alpha$ (abs)	$J_f^\pi$	$E_{daughter}(^{186}\text{Os})$	coincident $\gamma$ -rays	$R_0$ (fm)]	HF
3.122	3.053**	0.25(10)%	0.25(10)%**	$2^+$	0.137	0.137	1.486(29)	$13_{-4}^{+8}$
3.258	3.190(10)	100%	99.75(10)%**	$0^+$	0.0	—	1.486(29)	1.04(4)

\* [2017Br04].

\*\*  $\alpha$  was not observed, the decay branch was determined through the observation of 137-keV  $\gamma$  ray from  $^{190}\text{Pt}$  decay [2011Be08].**Table 5**direct  $\alpha$  emission from  $^{202}\text{Po}$ ,  $J_i^\pi = 0^+$ ,  $T_{1/2} = 45.4(2)$  m\*,  $BR_\alpha = 1.93(6)\%^{**}$ .

$E_\alpha$ (c.m.)	$E_\alpha$ (lab)	$I_\alpha$ (abs)	$J_f^\pi$	$E_{daughter}(^{198}\text{Pb})$	coincident $\gamma$ -rays	$R_0$ (fm)]	HF
5.701(1)	5.588(1)***	100%	$0^+$	0.0	—	1.4720(20)	1.013(32)

\* [1970Ra14].

\*\* Weighted average of 1.92(7)% [1993Wa04] and 2.00(15)% [1967Le08].

\*\*\* Weighted average of 5.589(3) MeV [1970Ra14] (adjusted to 5.588(3) MeV in [1991Ry01]), 5.590(5) MeV [1970Jo26], 5.588(2) MeV [1968Go12], 5.587(5) MeV [1967Ti10] and 5.578(3) MeV [1970Ra14] (adjusted to 5.579(5) MeV in [1991Ry01]).

**Table 6**direct  $\alpha$  emission from  $^{206}\text{Rn}$ ,  $J_i^\pi = 0^+$ ,  $T_{1/2} = 6.29(10)$  m\*,  $BR_\alpha = 62(3)\%^{**}$ .

$E_\alpha$ (c.m.)	$E_\alpha$ (lab)	$I_\alpha$ (abs)	$J_f^\pi$	$E_{daughter}(^{202}\text{Po})$	coincident $\gamma$ -rays	$R_0$ (fm)]	HF
6.3836(16)	6.2597(16)***	100%	$0^+$	0.0	—	1.4917(27)	1.11(6)

\* Weighted average of 5.67(17) m [1969Ha03] and 6.5(1) m [1967Va17].

\*\* [1971Ho01].

\*\*\* Weighted average of 6.2606(25) MeV [1993Wa04], 6.260(3) MeV [1971Go35] and 6.258(3) MeV [1967Va17].

**Table 7**direct  $\alpha$  emission from  $^{210}\text{Ra}$ ,  $J_i^\pi = 0^+$ ,  $T_{1/2} = 3.7(2)$  s\*,  $BR_\alpha \approx 100\%$ .

$E_\alpha$ (c.m.)	$E_\alpha$ (lab)	$I_\alpha$ (abs)	$J_f^\pi$	$E_{daughter}(^{206}\text{Rn})$	coincident $\gamma$ -rays	$R_0$ (fm)]	HF
7.151(5)	7.015(5)**	100%	$0^+$	0.0	—	1.4861(29)	0.90(5)

\* Weighted average of 3.8(2) s [1967Va22] and 3.6(2) s [1968Lo15].

\*\* Weighted average of 7.003(10) MeV [2003He06] and 7.018(5) MeV [1967Va22].

**Table 8**direct  $\alpha$  emission from  $^{214}\text{Th}$ ,  $J_i^\pi = 0^+$ ,  $T_{1/2} = 113_{-9}^{+11}$  ms\*,  $BR_\alpha = 100\%$ .

$E_\alpha$ (c.m.)	$E_\alpha$ (lab)	$I_\alpha$ (abs)	$J_f^\pi$	$E_{daughter}(^{210}\text{Ra})$	coincident $\gamma$ -rays	$R_0$ (fm)]	HF
7.824(6)	7.678(6)**	100%	$0^+$	0.0	—	1.4986(56)	1.26(12)

\* [2022Zh45].

\*\* Weighted average of 7.674(14) MeV [2022Zh45], 7.677(10) MeV [1980Ve01] and 7.680(10) MeV [1968Va18].

**Table 9**direct  $\alpha$  emission from  $^{218}\text{U}$ ,  $J_f^\pi = 0^+$ ,  $T_{1/2} = 650_{-70}^{+80} \mu\text{s}^*$ ,  $BR_\alpha = 100\%$ .

$E_\alpha$ (c.m.)	$E_\alpha$ (lab)	$I_\alpha$ (abs)	$J_f^\pi$	$E_{daughter}(^{214}\text{Th})$	coincident $\gamma$ -rays	$R_0$ (fm)]	HF
8.773(8)	8.612(8)**	100%	$0^+$	0.0	—	1.512(14)	1.26(16)

\* [2022Zh45].

\*\* Weighted average of 8.612(14) MeV [2022Zh45] and 8.612(9) MeV [2005Le42].

**Table 10**direct  $\alpha$  emission from  $^{218m}\text{U}$ , ex. = 2.112(14) MeV,  $J_i^\pi = 8^+$ ,  $T_{1/2} = 390_{-50}^{+60} \mu\text{s}^*$ ,  $BR_\alpha = 100\%$ .

$E_\alpha$ (c.m.)	$E_\alpha$ (lab)	$I_\alpha$ (rel)	$I_\alpha$ (abs)	$J_f^\pi$	$E_{daughter}(^{214}\text{Th})$	coincident $\gamma$ -rays	$R_0$ (fm)]	HF
10.261(16)	10.073(16)*	28(5)%*	22(5)%*		0.629		1.512(14)	$1.2_{-0.4}^{+0.6} \times 10^4$
10.885(11)	10.685(11)**	100(5)%*	78(5)%*	$0^+$	0.0	—	1.512(14)	$5.8(10) \times 10^4$

\* [2022Zh45].

\*\* Weighted average of 20.690(14) MeV [2022Zh45] and 10.678(17) MeV [2005Le42].

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