



Fig. 1: Known experimental values for heavy particle emission of the even-Z $T_z = +7$ nuclei.

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Table 1

Observed and predicted β -delayed particle emission from the even- Z , $T_z = +7$ nuclei. Unless otherwise stated, all Q-values and separation energies values are taken from [2021Wa16] or deduced from values therein.

Nuclide	J^π	$T_{1/2}$	Q_ϵ	$Q_{\epsilon p}$	$BR_{\beta p}$	$Q_{\epsilon 2p}$	$Q_{\epsilon \alpha}$	Experimental
^{122}Xe	0^+	20.1(1) h	0.724(12)	-4.101(28)	—	-11.516(13)	0.216(12)	[1965An05]
^{126}Ba	0^+	100(2) m	1.681(16)	-2.760(13)	—	-9.883(13)	0.984(14)	[1976Pa11]
^{130}Ce	0^+	22.9(5) m	2.200(40)	-1.651(30)	—	-8.069(28)	2.503(30)	[1996Xu04]
^{134}Nd	0^+	8.5(15) m	2.882(24)	-0.517(20)	—	-6.501(38)	3.556(29)	[1970Ab07]
^{138}Sm	0^+	3.1(2) m	3.417(17)	0.797(17)	—	-4.735(16)	4.605(24)	[1983GaZT]
^{142}Gd	0^+	70.2(6) s	4.350(40)	1.685(29)	—	-3.325(37)	5.530(30)	[1991Fi03]
^{146}Dy	0^+	33.2(7) s	5.210(50)	3.083(21)	—	-1.514(13)	6.329(31)	[1993Al03]
^{150}Er	0^+	18.5(7) s	4.115(14)	2.574(19)	—	-1.872(21)	7.507(48)	[1981NoZY]
^{154}Yb	0^+	409(2) ms	4.495(14)	3.246(20)	—	-0.905(21)	9.589(22)	[1996Pa01]
^{158}Hf	0^+	2.85(7) s	5.110(15)	4.029(21)	—	0.154(23)	9.900(23)	[1996Pa01]
^{162}W	0^+	1.13(3) s*	5.780(60)	5.028(29)	—	1.693(60)	10.788(23)	[1981Ho10, 2015Li24]
^{166}Os	0^+	214(6) ms**	6.410(90)	6.141(31)	—	3.273(33)	11.925(66)	[1996Pa01, 2015Li24]
^{170}Pt	0^+	13.9(2) ms***	6.88(10)#	7.135(32)#	—	4.918(36)#	13.113(90)#	[2004Ke06, 1998Ki20, 1996Bi07]
^{174}Hg	0^+	$1.9^{+0.4}_{-0.3}$ ms	7.42(10)#	8.007(66)#	—	6.160(38)#	14.12(10)#	[1999Se14, 1997Uu01]
^{178}Pb	0^+	180^{+130}_{-50} μs @	8.19(10)#	9.060(88)#	—	7.516(40)#	15.21(10)#	[2016Ba60, 2003BaZO]

* Weighted average of 1.39(4) s [1981Ho10] and 0.99(3) s [2015Li24].

** Weighted average of 220(7) ms [1996Pa01] and 210(6) ms [2015Li24].

*** Weighted average of 14.0(2) ms [2004Ke06], 13.5(3) ms [1998Ki20], 14.7(5) ms [1996Bi07].

@ Value from maximum likelihood method combining 2 events (147, 202 μs) from [2003BaZO] and 4 events (127, 166, 365, 588 μs) from [2016Ba60].

Table 2

Particle emission from the even- Z , $T_z = +7$ nuclei. Unless otherwise stated, all Q-values and separation energies values are taken from [2021Wa16] or deduced from values therein.

Nuclide	S_p	S_{2p}	Q_α	BR_α	Experimental
^{122}Xe	6.398(12)	10.571(11)	-0.089(21)	—	
^{126}Ba	5.869(15)	9.580(13)	0.260(17)		
^{130}Ce	5.388(35)	8.632(28)	0.822(31)		
^{134}Nd	4.998(17)	7.756(24)	1.352(30)		
^{138}Sm	4.714(18)	6.876(17)	1.724(17)		
^{142}Gd	4.323(31)	6.082(31)	2.113(30)		
^{146}Dy	3.44(11)	5.373(29)	1.980(29)		
^{150}Er	3.474(21)	4.550(19)	2.299(18)		
^{154}Yb	3.248(21)	4.010(19)	5.474(2)	92.6(20)%*	[1996Pa01, 1988Vi02, 1979Ho10, 1989Wo02, 1988KaZK, 1981HoZM, 1978AfZZ, 1977Ha48, 1964Ma45]
^{158}Hf	2.952(21)	3.415(20)	5.405(3)	45(3)%	[1996Pa01, 1979Ho10, 2000Di18, 1996HiZX, 1989Wo02, 1981HoZM, 1965Ma14]
^{162}W	2.510(30)	2.638(20)	5.678(2)	44(2)%	[1996Pa01, 1981Ho10, 2015Li24, 1989Wo02, 1982De11, 1981HoZM, 1979Ho10, 1975To05, 1974Sc35]
^{166}Os	2.061(30)	1.774(20)	6.143(3)	84(4)%**	[2015Li24, 2008Bi15, 1996Pa01, 1981Ho10, 1991Se01, 1978Ca11, 1978ReZZ, 1977Ca23]
^{170}Pt	1.495(30)	0.882(21)	6.707(3)	$\approx 100\%$	[2004Ke06, 1998Ki20, 1996Bi07, 2004GoZZ, 1997Uu01, 1993ToZY, 1982En03, 1981Ho10]
^{174}Hg	1.098(30)	0.112(22)	7.233(6)	100%***	[1999Se14, 1997Uu01, 2016Ba60, 2004GoZZ, 1998NiZW]
^{178}Pb	0.375(32)	-0.780(26)	7.789(13)	100%***	[2016Ba60, 2003BaZO]

* Weighted average of 92(2)% [1996Pa01], 92.8(20)% [1988Vi02], and 93(2)% [1979Ho10].

** [2008Bi15].

*** Not measured, inferred from $T_{1/2}$.

Table 3

direct α emission from ^{154}Yb , $J^\pi = 0^+$, $T_{1/2} = 409(2)$ ms*, $BR_\alpha = 90(3)$ %***.

$E_\alpha(\text{c.m.})$	$E_\alpha(\text{lab})$	$I_\alpha(\text{abs})$	J_f^π	$E_{\text{daughter}}(^{150}\text{Er})$	coincident γ -rays	R_0 (fm)	HF
5.474.4(21)**	5.332.2(21)	92.6(20)%***	0^+	0.0	—	1.5559(33)	1.0

* [1996Pa01].

** [1988Vi02].

*** Weighted average of 92(2)% [1996Pa01], 92.8(20)% [1988Vi02], and 93(2)% [1979Ho10].

Table 4
direct α emission from $^{158}\text{Hf}^*$, $J^\pi = 0^+$, $T_{1/2} = 2.85(7)$ s, $BR_\alpha = 45(3)$ %.

E_α (c.m.)	E_α (lab)	I_α (abs)	J_f^π	$E_{daughter}(^{154}\text{Yb})$	coincident γ -rays	R_0 (fm)	HF
5.406(4)	5.269(4)	45(3)%	0^+	0.0	—	1.5615(46)	1.0

* All values from [1996Pa01].

Table 5
direct α emission from ^{162}W , $J^\pi = 0^+$, $T_{1/2} = 1.13(3)$ s*, $BR_\alpha = 44(2)$ %**.

E_α (c.m.)	E_α (lab)	I_α (abs)	J_f^π	$E_{daughter}(^{158}\text{Hf})$	coincident γ -rays	R_0 (fm)	HF
5.679(5)	5.539(5)***	44(2)%**	0^+	0.0	—	1.5712(39)	1.0

* Weighted average of 1.39(4) s [1981Ho10] and 0.99(3) s [2015Li24].

** [1996Pa01].

*** Weighted average of 5.541(5) MeV [1996Pa01] and 5.538(5) MeV [1981Ho10] adjusted to 5.537(5) MeV in [1991Ry01].

Table 6
direct α emission from ^{166}Os , $J^\pi = 0^+$, $T_{1/2} = 214(6)$ ms*, $BR_\alpha = 84(4)$ %**.

E_α (c.m.)	E_α (lab)	I_α (abs)	J_f^π	$E_{daughter}(^{162}\text{W})$	coincident γ -rays	R_0 (fm)	HF
6.138(6)	5.991(6)***	44(2)%**	0^+	0.0	—	1.5690(43)	1.0

* Weighted average of 220(7) ms [1996Pa01] and 210(6) ms [2015Li24].

** [2008Bi15].

*** Weighted average of 6.000(6) MeV [1996Pa01] and 5.981(6) MeV [1981Ho10].

Table 7
direct α emission from ^{170}Pt , $J^\pi = 0^+$, $T_{1/2} = 13.9(2)$ ms*, $BR_\alpha = \approx 100\%$ **.

E_α (c.m.)	E_α (lab)	I_α (abs)	J_f^π	$E_{daughter}(^{166}\text{Os})$	coincident γ -rays	R_0 (fm)	HF
6.707(2)	6.549(2)***	$\approx 100\%$ **	0^+	0.0	—	1.5648(11)	1.0

* Weighted average of 14.0(2) ms [2004Ke06], 13.5(3) ms [1998Ki20], 14.7(5) ms [1996Bi07].

** Not measured, inferred from $T_{1/2}$.

*** [2004Ke06].

Table 8
direct α emission from ^{174}Hg , $J^\pi = 0^+$, $T_{1/2} = 1.9^{+0.4}_{-0.3}$ ms*, $BR_\alpha = 100\%$ **.

E_α (c.m.)	E_α (lab)	I_α (abs)	J_f^π	$E_{daughter}(^{170}\text{Pt})$	coincident γ -rays	R_0 (fm)	HF
7.233(6)	7.067(6)***	100%**	0^+	0.0	—	$1.549^{+0.013}_{-0.010}$	1.0

* [1999Se14].

** Not measured, inferred from $T_{1/2}$.

*** Weighted average of 7.066(8) MeV [1999Se14], 7.069(11) MeV [1997Uu01].

Table 9
direct α emission from ^{178}Pb , $J^\pi = 0^+$, $T_{1/2} = 180^{+130}_{-50}$ μs *, $BR_\alpha = 100\%$ **.

E_α (c.m.)	E_α (lab)	I_α (abs)	J_f^π	$E_{daughter}(^{174}\text{Hg})$	coincident γ -rays	R_0 (fm)	HF
7.788(30)	7.613(30)***	100%**	0^+	0.0	—	$1.557^{+0.068}_{-0.030}$	1.0

* Value from maximum likelihood method combining 2 events (147, 202 μs) from [2003BaZO] and 4 events (127, 166, 365, 588 μs) from [2016Ba60].

** Not measured, inferred from $T_{1/2}$.

*** Weighted average of 7.615(30) MeV [2003BaZO], and 7.610(30) MeV [2016Ba60].

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