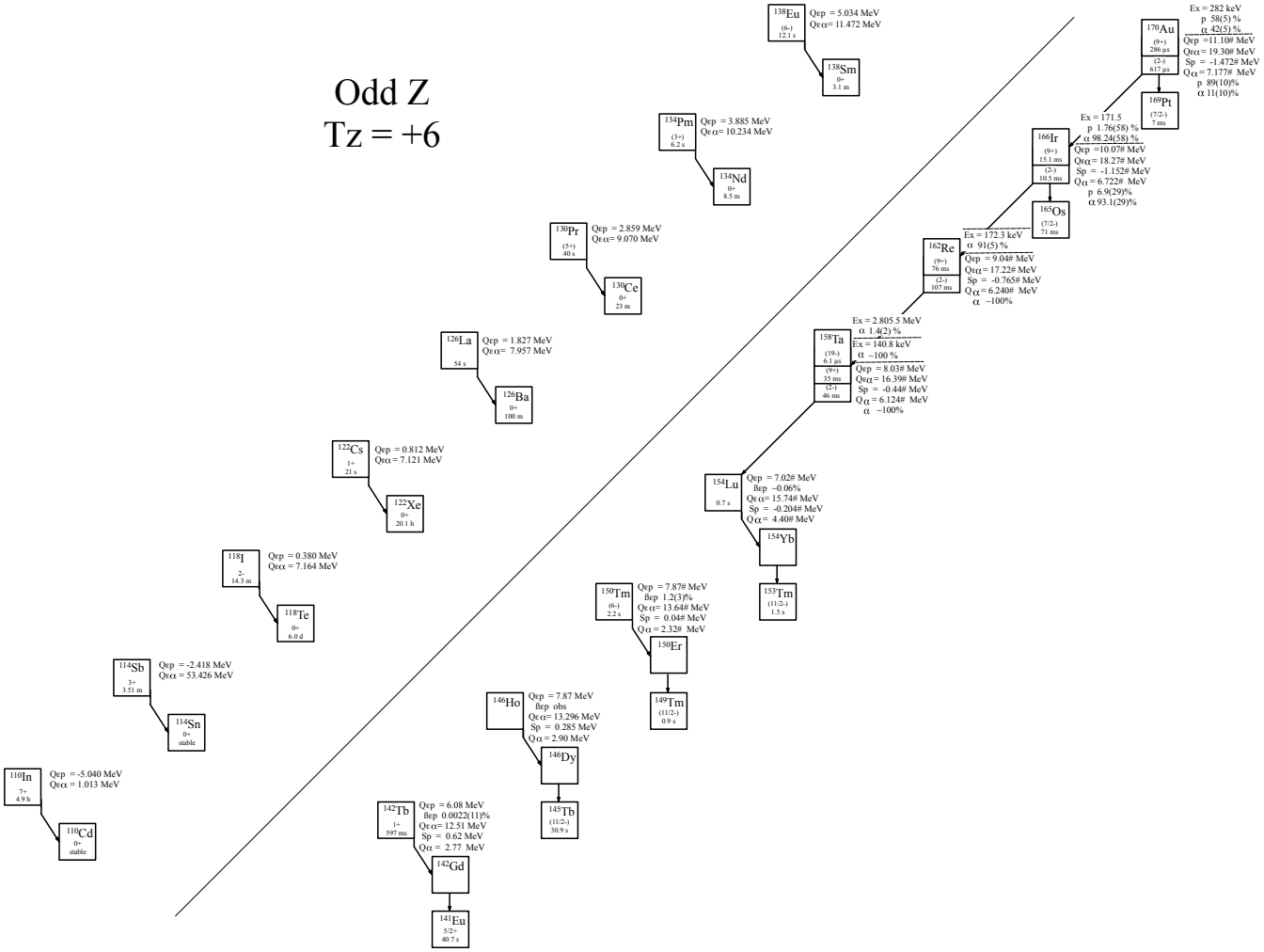

Fig. 1: Known experimental values for heavy particle emission of the odd-Z T_z= +6 nuclei.

Last updated 3/22/23

Table 1
Observed and predicted β-delayed particle emission from the odd-Z, T_z = +6 nuclei. Unless otherwise stated, all Q-values are taken from [2021Wa16] or deduced from values therein. $J^{|pi}$ values for ^{110}In, ^{114}Sb, ^{118}I, ^{122}Cs, ^{126}La, ^{130}Pr, ^{134}Pm, ^{138}Eu are taken from ENSDF.

Nuclide	Ex	J^π	$T_{1/2}$	Q_ε	$Q_{\varepsilon p}$	$BR_{\beta p}$	$Q_{\varepsilon 2p}$	$Q_{\varepsilon\alpha}$	Experimental
^{110}In		7^+	4.9(1) h	3.878(12)	-5.040(12)	——	-11.524(12)	1.013(12)	[**1975Bu24**]
^{114}Sb		3^+	3.51(4) m	6.063(20)	-2.418(20)	——	-8.500(20)	3.426(20)	[**1976Wi10**]
^{118}I		2^-	14.3(1) m	6.720(27)	0.380(21)		-4.023(20)	7.164(20)	[**1969Ha03**]
^{122}Cs		1^+	21.18(19) s	7.210(40)	0.812(34)		-3.361(34)	7.121(38)	[**1993Al03**]
^{126}La			54(2) s	7.700(90)	1.827(91)		-1.884(91)	7.957(91)	[**2002Ko02**]
^{130}Pr		(5^+)	40.0(4) s	8.250(70)	2.859(68)		-0.384(64)	9.070(65)	[**1988Ba42**]
^{134}Pm		(2^+)	≈5 s	8.880(40)	3.885(44)		1.127(47)	10.234(50)	[**1988KeZX**]
^{138}Eu		(6-)	12.1(6) s	9.750(30)	5.034(31)		2.872(30)	11.472(30)	[**1985Ch25**]
^{142}Tb		1^+	597(17) ms	10.40(70)	6.08(70)	0.0022(11)%	4.32(70)	12.51(70)	[**1991Fi03**]
^{146}Ho		(6-)	2.8(5) s	11.317(9)	7.87(11)	obs	5.943(29)	13.296(29)	[**2010Ma37**, 2011MaZL, 1986Wi05, 1988ToZW, 1988WiZN, 1986Wi15, 1987WiZM]
^{150}Tm		(6^-)	2.20(7) s	11.34(20)#	7.87(20)#	1.2(3)%	6.79(20)#	13.64(20)#	[**1988Ni02**]
^{154}Lu		(2^-)		10.27(20)#	7.02(20)#		6.26(20)#	15.74(20)#	
^{154m}Lu	x	(9^+)	1.16(5) s	10.27(20)#+x	7.02(20)#+x	≈0.06%	6.26(20)#+x	15.74(20)#+x	[**1988Vi02**]
^{158}Ta		(2^-)	46(4) ms	10.98(20)#	8.03(20)#		7.57(20)#	16.39(20)#	[**2014Ca03**]
^{158m1}Ta	0.1408(87)	(9^+)	35(1) ms	11.12(20)#	8.17(20)#		7.74(20)#	16.53(22)#	[**1996Pa01**]
^{158m2}Ta	2.8055(4)	(19^-)	6.1(1) μs	13.79(20)#	10.84(20)#		10.38(20)#	19.20(20)#	[**2014Ca04**]
^{162}Re		(2^-)	107(13) ms	11.55(20)#	9.04(20)#		8.91(20)#	17.22(20)	[**1997Da07**]
^{162m}Re	0.1723(80)	(9^+)	76(6) ms*	11.72(20)#	9.21(20)#		9.08(20)#	17.39(22)	[**2016Ca15**]
^{166}Ir		(2^-)	10.5(22) ms	12.13(20)#	10.07(20)#		10.35(20)#	18.27(20)	[**1997Da07**]
^{166m}Ir	0.1715(61)	(9^+)	15.1(9) ms	12.30(20)#	10.24(20)#		10.52(20)#	18.44(20)	[**1997Da07**]
^{170}Au		(2^-)	286^{+50}_{-40} μs	12.60(20)#	11.10(20)#		11.71(20)#	19.30(20)	[**2004Ke06**]
^{170m}Au	0.282(10)	(9^+)	617^{+50}_{-40} μs	12.82(20)#	11.38(20)#		11.99(20)#	19.58(20)	[**2004Ke06**]

* Weighted average of 66(7) ms [1996Pa01] and 84.6(62) ms [1997Da07].

Table 2
Particle emission from the odd-Z, T_z = +6 nuclei. Unless otherwise stated, all Q-values and separation energies are taken from [2021Wa16] or deduced from values therein.

Nuclide	S_p	BR_p	S_{2p}	Q_α	BR_α	Experimental
^{110}In	5.255(12)	——	13.44(11)	-1.952(12)	——	
^{114}Sb	3.457(20)	——	11.084(20)	-0.452(23)	——	
^{118}I	3.165(24)	——	8.727(20)	1.101(28)		
^{122}Cs	2.953(35)	——	8.976(37)	0.401(39)		
^{126}La	2.593(91)	——	7.810(91)	0.746(97)		
^{130}Pr	2.177(70)	——	7.128(84)	1.37(11)		
^{134}Pm	1.720(63)	——	6.114(51)	1.987(77)		
^{138}Eu	1.047(40)	——	5.158(75)	2.589(50)		
^{142}Tb	0.62(70)	——	4.15(70)	2.77(70)		
^{146}Ho	0.285(9)	——	3.448(29)	2.90(70)		
^{150}Tm	0.04(20)#		3.08(21)#	2.32(20)#		
^{154}Lu	-0.204(14)#		2.52(21)#	4.40(28)#		
^{154m}Lu	-0.204(14)#-x		2.52(21)#-x	4.40(28)#+x		
^{158}Ta	-0.448(13)		2.00(21)#	6.124(4)	≈ 100%	[**2014Ca03**, 1997Da07, 1996Pa01, 1981HoZM, 1978ReZZ]
^{158m1}Ta*	-0.4589(16)		2.14(23)#	6.265(10)	≈ 100%	[**2019Pa27, 1996Pa01**, 2014Ca03, 1997Da07, 2015Ca04, 2016Ca15, 1981HoZM]
^{158m2}Ta**	-3.254(13)		-0.67(21)#	8.930(4)	1.4(2)%	**2016Ca15, 2014Ca03**, 1997Da07, 1996Pa01, 1979Ho10, 1981HoZM, 1978ReZZ]
^{162}Re	-0.765(11)		1.21(21)#	6.240(5)	≈100%*	[**1997Da07**]
^{162m}Re***	-0.937(19)		1.04(22)#	6.412(9)	91(5)%**	[**2016Ca15, 1997Da07, 1996Pa01**, 1979Ho10, 1981HoZM, 1978ReZZ]
^{166}Ir	-1.152(8)	6.9(29)%	0.41(21)#	6.722(6)	93.1(29)%	[**1997Da07**, 1996Pa01, 2004Ke06, 1981Ho10, 1995DaZX, 1981HoZM]
^{166m}Ir[a]	-1.324(10)	1.76(58)%	0.24(21)#	6.894(8)	98.24(58)%	[**1997Da07**, 1996Pa01, 2004Ke06, 1981Ho10, 1995DaZX, 1981HoZM]
^{170}Au	-1.472(12)	89(10)%	-0.39(21)#	7.177(15)	11(10)%	[**2004Ke06**, 2002LeZZ]
^{170m}Au[b]	-1.754(16)	58(5)%	-0.67(21)#	7.459(18)	42(5)%	[**2004Ke06**, 2002Ma61, 2002LeZZ, 2003SeZZ, 2001DaZU]

* No evidence for α-decay from ^{162}W (arising from the β-decay of ^{162}Re were observed [1997Da07].
** Weighted average of 85(9)% [1996Pa01] and 94(6)% [1997Da07].

Table 3
direct α emission from ^{158}Ta*, $J^\pi = (2^-)$, $T_{1/2}$ = 46(4) ms, $BR_\alpha \approx 100\%$.

E_α(c.m.)	E_α(lab)	I_α(absb)	J^π_f	$E_{daughter}$(^{154}Lu)	coincident γ-rays	R_0 (fm)**	HF
6.123(5)	5.968(5)	100%	(2^-)	0.0	——	1.5534(83)	1.76(34)

* All values from [2014Ca03]
** Interpolated between 1.5535(31) fm ^{156}Hf and 1.5533(77) fm ^{160}W.

Table 4
direct α emission from ^{158m1}Ta*, Ex = 140.8(87) keV, J^π = , $T_{1/2}$ = 35(1) ms**, $BR_\alpha \approx 100\%$.

E_α(c.m.)	E_α(lab)	I_α(rel)	I_α(abs)	J^π_f	$E_{daughter}$(^{154}Lu)	coincident γ-rays	R_0 (fm)$^@$	HF
6.136(4)	5.981(4)	0.1031(25)%	0.099(24)%	$(8,9,10^+)$	0.126(11)***	0.060	1.5534(83)	$1.5^{+0.7}_{-0.5}\times10^3$
6.177(4)	6.021(4)	2.8(5)%	2.7(5)%	(8^+)	0.088(11)***	0.022	1.5534(83)	78^{+27}_{-21}
6.198(4)	6.041(4)	100%	96^{+2}_{-13}%	(9^+)	0.066(11)***		1.5534(83)	$2.7^{+0.8}_{-0.6}$

* All values from [2019Pa27], except where noted.
** [1996Pa01].
*** Deduced from α energy.
$^@$ Interpolated between 1.5535(31) fm ^{156}Hf and 1.5533(77) fm ^{160}W.

Table 5
direct α emission from ^{158m2}Ta*, Ex = 2805.5(4) keV, $J^\pi = (19^-)$, $T_{1/2}$ = 6.1(1) μs, BR_α = 1.4(2)%.

E_α(c.m.)	E_α(lab)	I_α(abs)	J^π_f	$E_{daughter}$(^{154}Lu)	coincident γ-rays	R_0 (fm)***	HF
8.869(11)	8.644(11)	1.4(2)%	(9^+)	0.066(11)**		1.5534(83)	$6.5(11)\times10^3$

* All values from [2014Ca03].
** Deduced from α energy.
*** Interpolated between 1.5535(31) fm ^{156}Hf and 1.5533(77) fm ^{160}W.

Table 6
direct α emission from ^{162}Re*, $J^\pi = (2^-)$, $T_{1/2}$ = 107(13) ms, BR_α = $\approx 100\%$.

E_α(c.m.)	E_α(lab)	I_α(abs)	J^π_f	$E_{daughter}$(^{158}Ta)	coincident γ-rays	R_0 (fm)**	HF
6.239(5)	6.086(5)	100%	(2^-)	0.0	——	1.5519(83)	$1.7^{+0.4}_{-0.3}$

* All values from [1997Da07].
** Interpolated between 1.5533(77) fm ^{160}W and 1.5504(56) ^{164}Os.

Table 7
direct α emission from ^{162m}Re*, Ex = 172.3(80) keV***, J^π = , $T_{1/2}$ = 76(6) ms**, BR_α = 91(5) %$^@$.

E_α(c.m.)	E_α(lab)	I_α(rel)	I_α(abs)	J^π_f	$E_{daughter}$(^{158}Ta)	coincident γ-rays	R_0 (fm)$^{@@@}$	HF
6.190(16)	6.037(16)	$\approx 0.3\%$	$\approx 0.3\%^{@@}$	(10^+)	0.207(18)	0.066	1.5519(83)	$\approx$240
6.271(5)	6.116(5)	100%	100%	(9^+)	0.141(9)	——	1.5519(83)	1.7(4)

* All values from [2016Ca15], except where noted.
** Weighted average of 66(7) ms [1996Pa01] and 84.6(62) ms [1997Da07].
*** Deduced by evaluator from Fig 2 in [2016Ca15].
$^@$ Weighted average of 85(9)% [1996Pa01] and 94(6)% [1997Da07].
$^{@@}$ [1997Da07]
$^{@@@}$ Interpolated between 1.5533(77) fm ^{160}W and 1.5504(56) ^{164}Os.

Table 8
direct p emission from ^{166}Ir*, J^{π} = (2^{-}), $T_{1/2}$ = 10.5(22) ms, BR_p = 6.9(29)%.

E_p(c.m.)	E_p(lab)	I_p(abs)	J^{π}_f	$E_{daughter}$(^{165}Os)	coincident γ-rays
1.152(8)	1.145(8)	6.9(29)%	$(7/2^{-})$	0.0	——

* All values from [1997Da07].

Table 9
direct α emission from ^{166}Ir*, J^{π} = , $T_{1/2}$ = 10.5(22) ms, BR_α = 93.1(29)%.

E_α(c.m.)	E_α(lab)	I_α(abs)	J^{π}_f	$E_{daughter}$(^{162}Re)	coincident γ-rays	R_0 (fm)**	HF
6.724(6)	6.562(6)	93.1(29)%	(2^{-})	0.0	——	1.5541(72)	1.6(4)

* All values from [1997Da07].
** Interpolated between 1.5504(56) ^{164}Os and 1.5578(45) ^{168}Pt.

Table 10
direct p emission from ^{166m}Ir*, Ex = 171.5(61) keV, J^{π} = (9^{+}), $T_{1/2}$ = 15.1(9) ms, BR_p = 1.76(58)%.

E_p(c.m.)	E_p(lab)	I_p(abs)	$E_{daughter}$(^{165}Os)	coincident γ-rays
1.340(8)	1.316(8)	1.76(58)%	(2^{-})	0.0	——

* All values from [1997Da07].

Table 11
direct α emission from ^{166m}Ir*, Ex = 171.5(61) keV, J^{π} = (9^{+}), $T_{1/2}$ = 15.1(9) ms, BR_α = 98.24(58)%.

E_α(c.m.)	E_α(lab)	I_α(abs)	J^{π}_f	$E_{daughter}$(^{162}Re)	coincident γ-rays	R_0 (fm)**	HF
6.723(5)	6.561(5)	98.24(58)%	(9^{+})	0.172(8)		1.5541(72)	2.2(4)

* All values from [1997Da07].
** Interpolated between 1.5504(56) ^{164}Os and 1.5578(45) ^{168}Pt.

Table 12
direct p emission from ^{170}Au*, J^{π} = (2^{-}), $T_{1/2}$ = 286^{+50}_{-40} μs, BR_p = 89(10)%.

E_p(c.m.)	E_p(lab)	I_p(abs)	J^{π}_f	$E_{daughter}$(^{169}Pt)	coincident γ-rays
1.472(12)	1.463(12)	89(10)%	$(7/2^{-})$	0.0	——

* All values from [2004Ke06].

Table 13
direct α emission from ^{170}Au*, J^{π} = (2^{-}), $T_{1/2}$ = 286^{+50}_{-40} μs, BR_α = 11(10)%.

E_α(c.m.)	E_α(lab)	I_α(abs)	J^{π}_f	$E_{daughter}$(^{166}Ir)	coincident γ-rays	R_0 (fm)**	HF
7.170(10)	7.001(10)	89(10)%	(2^{-})	0.0	——	1.5576(55)	2^{+25}_{-1}

* All values from [2004Ke06].
** Interpolated between 1.5578(45) ^{168}Pt and 1.5574(32) ^{172}Hg.

Table 14
direct p emission from ^{170m}Au*, Ex = 282(10) keV, J^{π} = (9^{+}), $T_{1/2}$ = 617^{+50}_{-40} μs, BR_p = 58(5)%.

E_p(c.m.)	E_p(lab)	I_p(abs)	J^{π}_f	$E_{daughter}$(^{169}Pt)	coincident γ-rays
1.753(6)	1.743(6)	58(5)%	$(7/2^{-})$	0.0	——

* All values from [2004Ke06].

Table 15
direct α emission from ^{170m}Au*, Ex = 282(10) keV, J^{π} = (9^+) , $T_{1/2} = 617^{+50}_{-40}$ μs, BR_{α} = 42(5)%.

E_{α}(c.m.)	E_{α}(lab)	I_{α}(abs)	J^{π}_f	$E_{daughter}$(^{166}Ir)	coincident γ-rays	R_0 (fm)**	HF
7.278(6)	7.107(6)	42(5)%	(9^+)	0.172(6)		1.5576(55)	1.2(4)

* All values from [2004Ke06].
** Interpolated between 1.5578(45) ^{168}Pt and 1.5574(32) ^{172}Hg.

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