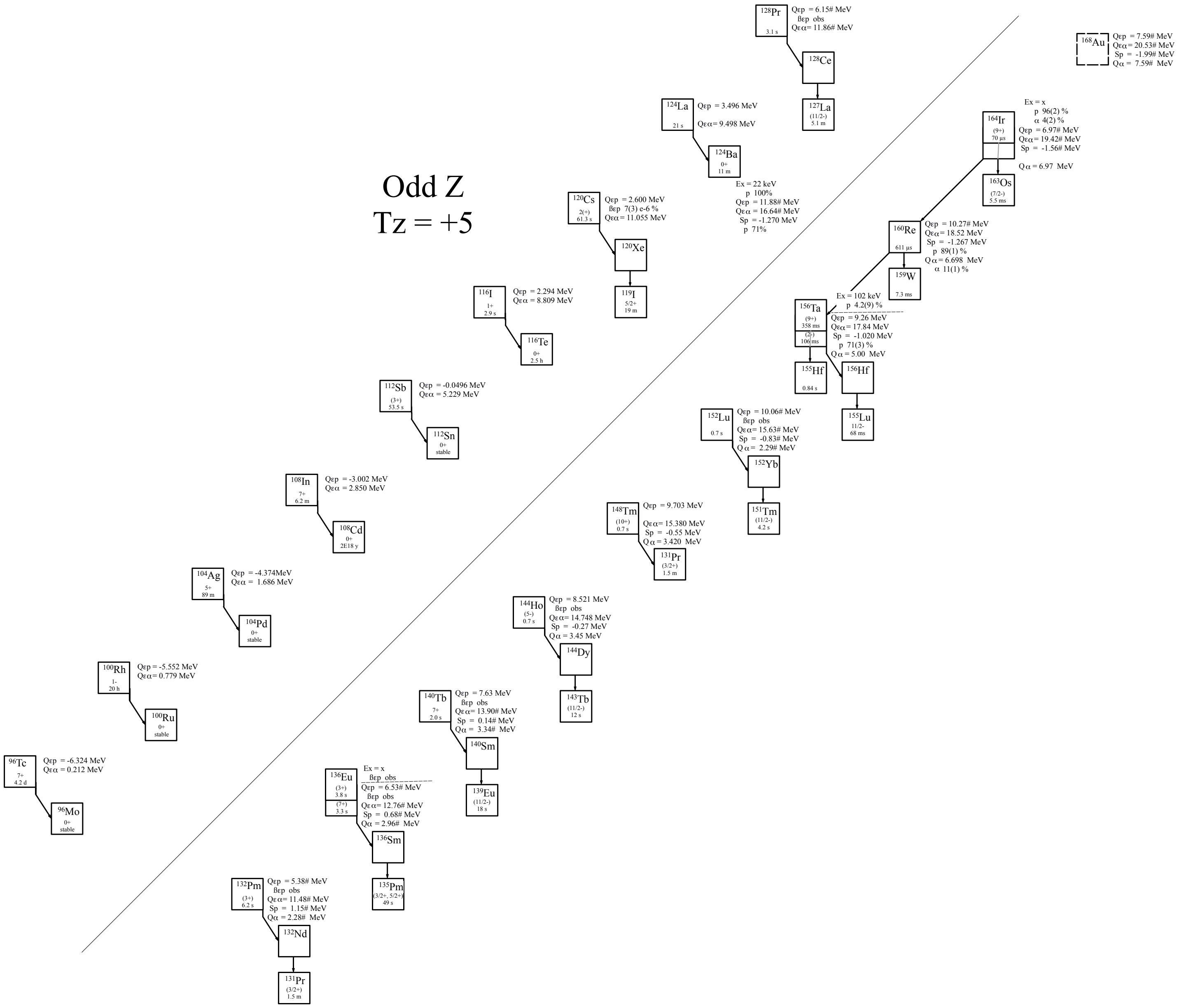

Fig. 1: Known experimental values for heavy particle emission of the odd-Z T_z= +5 nuclei.

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Table 1
Observed and predicted β-delayed particle emission from the odd-Z, T_z = +5 nuclei. Unless otherwise stated, all Q-values are taken from [2021Wa16] or deduced from values therein. All J^π values are taken from ENSDF.

Nuclide	Ex	J^π	$T_{1/2}$	Q_ε	$Q_{\varepsilon p}$	$BR_{\beta p}$	$Q_{\varepsilon 2p}$	$Q_{\varepsilon\alpha}$	$BR_{\varepsilon\alpha}$	Experimental
^{96}Tc		7^+	4.20(4) d	0.259(5)	-6.324(5)	—	-13.130(5)	0.212(5)		[**1950Co69**]
^{100}Rh		1^-	20.2(1) h	3.636(18)	-5.552(18)	—	-12.053(18)	0.779(18)		[**1995KeZZ**]
^{104}Ag		5^+	89.2(10) m	4.279(4)	-4.374(5)	—	-10.588(4)	1.686(4)		[**1971Mu22**]
^{108}In		7^+	58.0(12) m	5.133(9)	-3.002(9)	—	-8.790(9)	2.850(9)		[**1975Fl01**]
^{112}Sb		(3^+)	53.5(5) s	7.056(18)	-0.496(18)	—	-5.829(18)	5.229(18)		[**1972Si28**]
^{116}I		1^+	2.91(15) s	7.840(80)	2.294(77)		-1.439(75)	8.809(75)		[**1976Go02**]
^{120}Cs		$2(^+)$	61.3(14) s	8.284(15)	2.600(24)	$7(3)\times10^{-6}$%	-0.776(21)	8.950(26)	$2.0(4)\times10^{-5}$%	[**1975Ho09**, 1969Ch18]
^{124}La*			21(4) s	8.830(60)	3.496(58)		0.518(58)	9.489(58)		[**1997As05**]
^{128}Pr			3.1(3) s	9.200(40)	4.276(40)	obs	1.761(32)	10.334(32)		[**1985Wi07**]
^{132}Pm		(3^+)	6.2(6) s	9.8(150)#	5.38(156)#	obs	3.22(15)#	11.48(15)#		[**1988WiZN**]
^{136}Eu		(7^+)	3.3(3) s	10.57(20)#	6.53(21)#	obs	4.82(20)#	12.76(20)#		[**1989Vi04**]
^{136m}Eu	x	(3^+)	3.8(3) s	10.57(20)#+x	6.53(21)#+x	obs	4.82(20)#+x	12.76(20)#+x		[**1989Vi04**]
^{140}Tb		7^+	2.0(5) s	11.30(80)	7.63(80)	obs	6.44(80)	13.90(80)#	1986Wi15]	[**2006Xu03**, 1991Fi03,
^{144}Ho		(5^-)	0.7(1) s	11.961(11)	8.521(52)	obs	7.772(29)	14.748(29)		[**1986Wi15**]
^{148}Tm		(10^+)	0.7(2) s	12.714(14)	9.703(11)		9.212(12)	15.380(13)		[**1982No08**]
^{152}Lu			0.7(1)s	12.85(25)#	10.06(20)#	obs	9.83(20)#	15.63(20)#		[**1988Ni02**]
^{156}Ta		(2^-)	106(4) ms	11.82(34)#	9.26(30)#		9.35(30)#	17.84(34)		[**2011Da12**
^{156m}Ta	0.102(7)	(9^+)	333^{+25}_{-22} ms	11.92(34)#	9.36(30)#		9.45(30)#	17.94(34)		[**2023Br10**]
^{160}Re			611(7) μs	12.45(34)#	10.27(30)#		10.65(30)#	8.52(34)		[**2011Da12**]
^{164}Ir				12.94(35)#	11.23(32)#		11.94(32)#	19.42(35)#		
^{164m}Ir	x	(9^+)	70(10) μs	12.94(35)#+x	11.23(32)#+x		11.94(32)#+x	19.42(35)#+x		[**2014Dr02**]
^{168}Au				13.54(43)#	12.31(40)#		13.38(40)#	20.53(43)#		

* Possibly not the ground state

Table 2
Particle separation and emission from the odd-Z, T_z = +5 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
^{96}Tc	5.399(5)	—	14.031(5.)	-1.793(5)	—	
^{100}Rh	5.255(18)	—	13.737(18)	-2.194(19)	—	
^{104}Ag	4.948(4)	—	12.911(8)	-1.950(19)	—	
^{108}In	4.418(9)	—	11.755(9)	-1.428(10)	—	
^{112}Sb	2.949(19)	—	9.707(21)	0.096(20)		
^{116}I	2.647(80)	—	7.502(78)	1.753(77)		
^{120}Cs	2.383(14)	—	7.496(22)	1.107(76)		
^{124}La	1.893(58)	—	6.692(66)	1.205(58)		
^{128}Pr	1.640(42)	—	5.935(95)	1.503(64)		
^{132}Pm	1.15(15)#	—	5.03(16)#	2.28(15)#		
^{136}Eu	0.68(25)#	—	4.06(20)#	2.96(25)#		
^{136m}Eu	0.68(25)#-x	—	4.06(20)#-x	2.96(25)#+x		
^{140}Tb	0.14(82)#		3.31(80)#	3.34(82)#		
^{144}Ho	-0.27(16)		2.63(70)	3.45(80)		
^{148}Tm	-0.55(40)		2.105(12)	3.420(13)		
^{152}Lu	-0.83(36)#		1.51(28)#	2.92(20)#		
^{156}Ta	-1.020(4)	71(3) %	0.91(36)	5.00(36)		[**2011Da12**, 2023Br10, 1996Pa01, 1992Pa05, 1993Li34, 1993WoZY]
^{156m}Ta	-1.122(4)	4.2(9) %	0.90(36)	5.10(36)		[**1996Pa01, 1993Li34**, 2023Br10, 2011Da12, 1992Pa05]
^{160}Re	-1.267(7)	89(1) %	0.34(36)	6.698(4)	11(1) %	[**2011Da12**, 2001Ke05, 1996Pa01,1995PeZY, 1993WoZY, 1992Pa05]
^{164}Ir	-1.56(10)#		-0.39(38)#	6.97(10)#		
^{164m}Ir	-1.56(10)#-x*	96(2) %	-0.39(38)#-x	6.97(10)#+x**	4(2) %	[**2014Dr02**, 2002Ma61, 2001Ke05, 2001DaZU]
^{168}Au	-1.99(50)#		-1.26(45)#	7.59(51)#		

* Q_p from the isomer is 1.825(5) MeV, suggesting the the isomer excitation = 265(100) keV assuming decay to the ground state of ^{163}Os.
** Q_α from the isomer is 7.052(14) MeV, and assuming decay to the 184(1) keV (9^+) level of ^{160}Re would give an isomer excitation = -102(100) keV. This suggests that the value given for Q_α from [2021Wa19] is too small.

Table 3
direct p emission from ^{156}Ta*, J^{π} = (2$^-$), $T_{1/2}$= 106(4) ms, BR_p = 71(3)%.

E_p(c.m.)	E_p(lab)	I_p(absb)	J^{π}_f	$E_{daughter}$(^{155}Hf)	coincident γ-rays
1.018(5)	1.011(5)(14)	71(3) %	(7/2$^-$)	0.0	—–

* All values from [2011Da12].

Table 4
direct p emission from ^{156m}Ta*, Ex = 102(7) keV, J^{π} = (9$^+$), $T_{1/2}$= 358(45) ms**, BR_p = 4.2(9)%.

E_p(c.m.)	E_p(lab)	I_p(absb)	J^{π}_f	$E_{daughter}$(^{155}Hf)	coincident γ-rays
1.113(8)	1.106(8)***	4.2(9)%	(7/2$^-$)	0.0	—–

* All values from [1996Pa01], except where noted.
** Weighted average of 320(80) ms [1993Li34] and 375(54) ms [1996Pa01].
** Weighted average of 1.108(8) MeV [1996Pa01] and 1.103(12) MeV [1993Li34].

Table 5
direct p emission from ^{160}Re*, J^{π} = , $T_{1/2}$= 611(7) μs, BR_p = 89(1) %.

E_p(c.m.)	E_p(lab)	I_p(absb)	J^{π}_f	$E_{daughter}$(^{159}W)	coincident γ-rays
1.272(6)	1.264(6)	89(1) %		0.0	—–

* All values from [2011Da12].

Table 6
direct α emission from ^{160}Re*, J^{π} = , $T_{1/2}$= 611(7) μs, BR_α = 11(1) %.

E_α(c.m.)	E_α(lab)	J^{π}_f	I_p(absb)	$E_{daughter}$(^{156}Ta)	coincident γ-rays
6.697(4)	6.530(4)	100%	(2$^-$)	((1/2$^+$)0.0	—–

* All values from [2011Da12].

Table 7
direct p emission from ^{164m}Ir*, Ex = unk, J^{π} = (9$^+$), $T_{1/2}$= 70(10) μs, BR_α = 96(2) %.

E_p(c.m.)	E_p(lab)	I_p(absb)	J^{π}_f	$E_{daughter}$(^{163}Os)	coincident γ-rays
1.826(6)	1.814(6)	96(2) %	(7/2−)	0.0	—–

* All values from [2014Dr02].

Table 8
direct α emission from ^{164m}Ir*, Ex = unk, J^{π} = (9$^+$), $T_{1/2}$= 70(10) μs, BR_α = 4(2) %.

E_α(c.m.)	E_α(lab)	I_p(abs)	J^{π}_f	$E_{daughter}$(^{160}Re)	coincident γ-rays
7.052(10)	6.550(10)	100%		0.184**	0.096, 0.038, 0.050?***

* All values from [2014Dr02], except where noted.
** [2014Dr02] assign the α decay as L=0, populating the $\pi h_{11/2}$ state in ^{160}Re (from [2011Da01].
*** Existence of this γ is implied but not observed in [2011Da01]

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