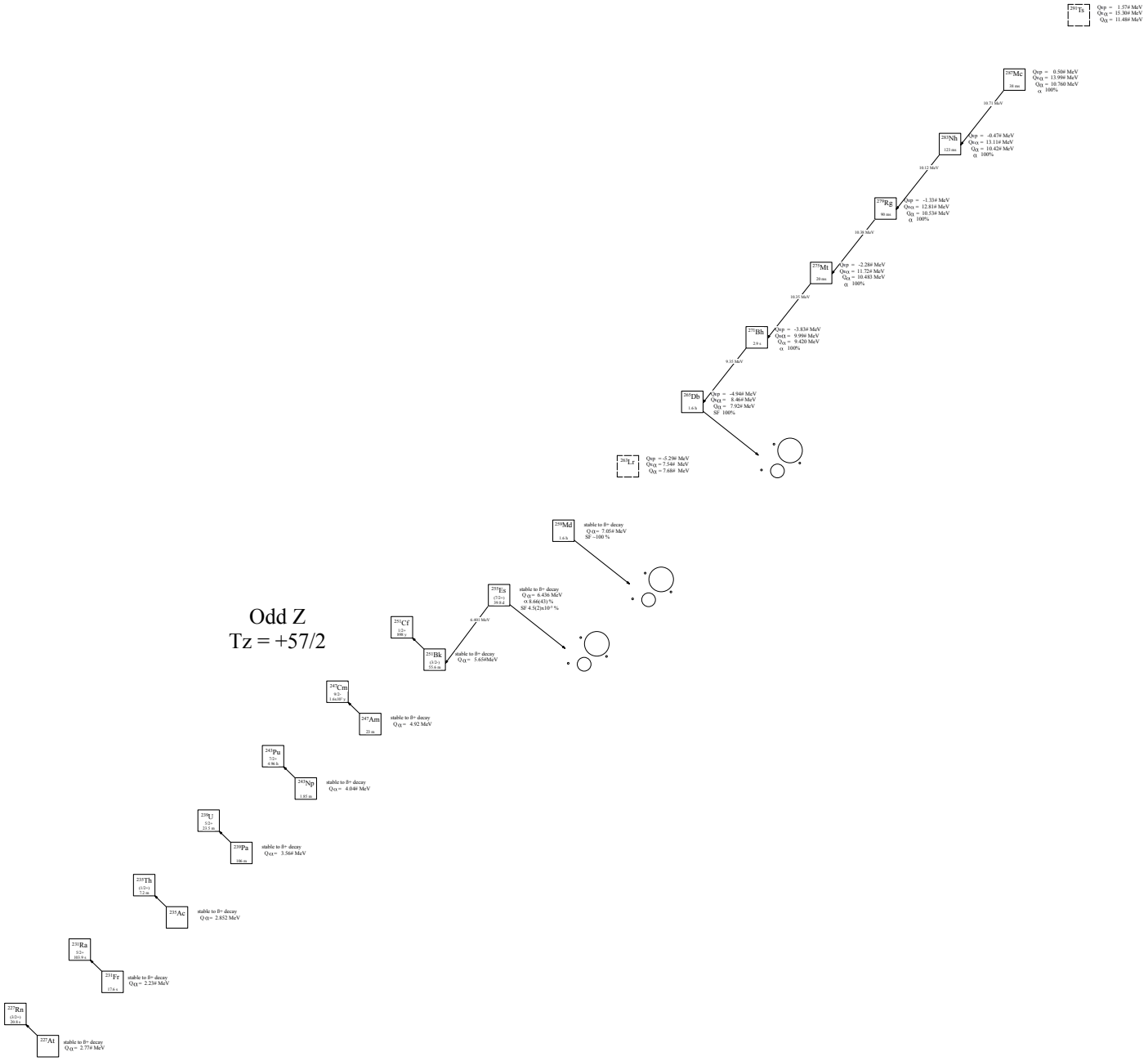

Fig. 1: Known experimental values for heavy particle emission of the odd-Z T_z= +57/2 nuclei.

Last updated 5/5/25

Table 1
Observed and predicted β-delayed particle emission from the odd-Z, T_z = +57/2 nuclei. Unless otherwise stated, all Q-values are taken from [2021Wa16] or deduced from values therein. J^π values for ^{251}Bk and ^{255}Es are taken from ENSDF.

Nuclide	J^π	$T_{1/2}$	Q_ε	Q$_{\beta^-}$	Q$_{\beta^-\alpha}$	Experimental
^{227}At*		obs	-4.85(50)#	4.54(30)#	8.11(36)#	[**2010Al24**]
^{231}Fr*		17.6(5) s**	-4.47(30#	3.864(14)	6.950(16)	[**2001Fr05, 1985Hi02**]
^{235}Ac*		obs	-3.77(30)#	3.339(19)	6.896(18)	[**2006Bo41**]
^{239}Pa*		106(30) m	-3.16(45)#	2.77(2)#	7.08(20)#	[**1996Yu06**]
^{243}Np*		1.85(15) m	-2.67(30)#	2.050(30)#	6.992(30)#	[**1987Mo29**]
^{247}Am*		23.0(13) m	-2.06(22)#	1.62(10)#	7.15(10)#	[**1983Po14**]
^{251}Bk*	(3/2$^-$)	55.6(1) m	-1.420(20)	1.093(10)	7.450(12)	[**1984Li05**]
^{255}Es	(7/2$^+$)	39.8(12) d	-0.72(20)#	0.289(10)	7.709(12)	[**1966Rg01**]
				$Q_{\varepsilon p}$	$Q_{\varepsilon\alpha}$	
^{259}Md		1.60(6) h	-0.14(30)#	—-	—-	[**1993Mo18**]
^{263}Lr			0.54(54)#	-5.29(54)#	7.54(54)#	
^{267}Db		$1.8^{+3.3}_{-0.7}$ h	0.57(60)#	-4.94(66)#	8.46(62)#	[**2013Og01**]
^{271}Bh		$2.9^{+2.2}_{-0.9}$ s	1.24(71)#	-3.83(69)#	9.99(69)#	[**2022Og08**]
^{275}Mt		20^{+13}_{-6} ms	2.28(71)#	-2.28(71)#	11.72(71)#	[**2022Og08**]
^{279}Rg		90^{+60}_{-25} ms	2.70(74)#	-1.33(74)#	12.81(74)#	[**2022Og08**]
^{283}Nh		123^{+80}_{-35} ms	3.23(75)#	-0.47(75)#	13.11(75)#	[**2022Og08**]
^{287}Mc		38^{+22}_{-10} ms	3.82(76)#	0.50(76)#	13.99(76)#	[**2022Og08**]
^{291}Ts			4.41(86)#	1.57(86)#	15.30(86)#	

* 100% β^--emitter.
** Weighted average of 17.7(6) s [2001Fr05] and 17.5(8) s [1985Hi02].

Table 2
Particle separation, Q-values, and measured values for direct particle emission of the odd-Z, T_z = +57/2 nuclei. Unless otherwise stated, all S and Q-values are taken from [2021Wa16] or deduced from values therein.

Nuclide	S$_p$	Q$_\alpha$	BR$_\alpha$	BR$_{SF}$	Experimental
^{227}At	7.41(50)#	2.77(50)#			
^{231}Fr	7.38(20)#	2.23(30)#			
^{235}Ac	6.862(16)	2.852(16)			
^{239}Pa	6.48(34)#	3.56(20)#			
^{243}Np	6.10(20)#	4.04(20)#			
^{247}Am	5.53(10)#	4.92(11)#			
^{251}Bk	5.051(15)	5.65(10)#			
^{255}Es	4.541(16)	6.436(1)	8.66(43)%	$4.5(2)\times10^{-3}$%	[**1971Bb10, 1967Fi03**, 1966Rg01]
^{259}Md	4.15(22)#	7.05(10)#	$\leq$1.3%	$\approx$100%	[**1993Mo18**, 1989Hu09, 1987HuZW, 1986Hu01, 1986Lo16, 1982Wi08, 1980HuZY, 1978WiZT]
^{263}Lr	3.72(43)#	7.68(20)#			
^{267}Db	3.41(56)#	7.92(30)#		100%	[**2013Og01**,2014Ru04, 2013Ru11, 2012OgZZ, 2007Og05, 2005Og02, 2004Og03, 2004Og10, 2003OgZY]
^{271}Bh	2.86(60)#	9.420(86)	100%*		[**2022Og08, 2013Og01**, 2023Ko22, 2014Ru04, 2013Ru11, 2012OgZZ, 2011Og07, 2007Og05, 2006TsZZ, 2005Og02, 2004Og03, 2004Og10, 2003OgZY]
^{275}Mt	1.923(61)#	10.483(51)	100%*		[**2022Og08, 2013Og01**, 2023Ko22, 2014Ru04, 2013Ru11, 2012OgZZ, 2011Og07, 2007Og05, 2006TsZZ, 2005Og02, 2004Og03, 2004Og10, 2003OgZY]
^{279}Rg	1.82(66)#	10.53(17)	100%*		[**2022Og08, 2013Og01**, 2023Ko22, 2014Ru04, 2013Ru11, 2012OgZZ, 2011Og07, 2007Og05, 2006TsZZ, 2005Og02, 2004Og03, 2004Og10, 2003OgZY]
^{283}Nh	1.55(70)#	10.42(11)#	100%*		[**2022Og08, 2013Og01**, 2023Ko22, 2014Ru04, 2013Ru11, 2012OgZZ, 2011Og07, 2007Og05, 2006TsZZ, 2005Og02, 2004Og03, 2004Og10, 2003OgZY]
^{287}Mc	1.15(71)#	10.760(71)	100%*		[**2022Og08, 2013Og01**, 2023Ko22, 2014Ru04, 2013Ru11, 2012OgZZ, 2011Og07, 2007Og05, 2005Og02, 2004Og03, 2004Og10, 2003OgZY]
^{291}Ts	0.66(81)#	11.48(40)#			

* Only α-decay has been observed.

Table 3
direct α emission from ^{255}Es*, J^{π} = (7/2^{+}), $T_{1/2}$ = 39.8(12) d**, BR_{α} = 8.66(43)%.

E_{α}(c.m.)	E_{α}(lab)	I_{α}(rel)	I_{α}(abs)	J^{π}_{f}	$E_{daughter}$(^{251}Bk)	coincident γ-rays (keV)	HF
6.318	6.219	2.9%	0.22%			1.508(14)	22
6.366	6.267	11.2%	0.85%			1.508(14)	10
6.4014(17)	6.3010(17)***	100%	7.6%			1.508(14)	1.7

* All values from [1967Fi03], except where noted. They report α/β ratio = 0.0866(43) and a β/SF ratio = 2.22(10)$\times 10^{4}$. E_{α} values are adjusted by -0.5 krV as recommnded in [1991Ry01].
** [1966Rg01].
*** Value recommended by [1991Ry01] based on adjusted values from [1967Fi03] and [1971Bb10].

Table 4
direct α emission from ^{271}Bh*, $T_{1/2} = 2.9^{+2.2}_{-0.9}$ s, BR_{α} = 100%***.

E_{α}(c.m.)	E_{α}(lab)	I_{α}(abs)	J^{π}_{f}	$E_{daughter}$(^{267}Db)	coincident γ-rays (keV)	HF
9.49(16)	9.35(16)	100%***				

* All values from [2013Og01], except where noted.
** [2022Og08].
*** Only α-decay has been observed.

Table 5
direct α emission from ^{275}Mt*, $T_{1/2} = 20^{+13}_{-6}$ ms, BR_{α} = 100%***.

E_{α}(c.m.)	E_{α}(lab)	I_{α}(abs)	J^{π}_{f}	$E_{daughter}$(^{271}Bh)	coincident γ-rays (keV)	HF
10.50(16)	10.35(16)	100%***				

* All values from [2013Og01], except where noted.
** [2022Og08].
*** Only α-decay has been observed.

Table 6
direct α emission from ^{279}Rg*, $T_{1/2} = 90^{+60}_{-25}$ ms, BR_{α} = 100%***.

E_{α}(c.m.)	E_{α}(lab)	I_{α}(abs)	J^{π}_{f}	$E_{daughter}$(^{275}Mt)	coincident γ-rays (keV)	HF
10.53(16)	10.38(16)	100%***				

* All values from [2013Og01], except where noted.
** [2022Og08].
*** Only α-decay has been observed.

Table 7
direct α emission from ^{283}Nh*, $T_{1/2} = 123^{+80}_{-35}$ ms, BR_{α} = 100%***.

E_{α}(c.m.)	E_{α}(lab)	I_{α}(abs)	J^{π}_{f}	$E_{daughter}$(^{279}Rg)	coincident γ-rays (keV)	HF
10.27(9)	10.12(9)	100%***				

* All values from [2013Og01], except where noted.
** [2022Og08].
*** Only α-decay has been observed.

Table 8
direct α emission from ^{287}Mc*, $T_{1/2} = 123^{+80}_{-35}$ ms, BR_α = 100%***.

E_α(c.m.)	E_α(lab)	I_α(abs)	J^π_f	$E_{daughter}$(^{283}Nh)	coincident γ-rays (keV)	HF
10.86(2)	10.71(2)	100%***				

* All values from [2022Og08].
** Only α-decay has been observed.

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