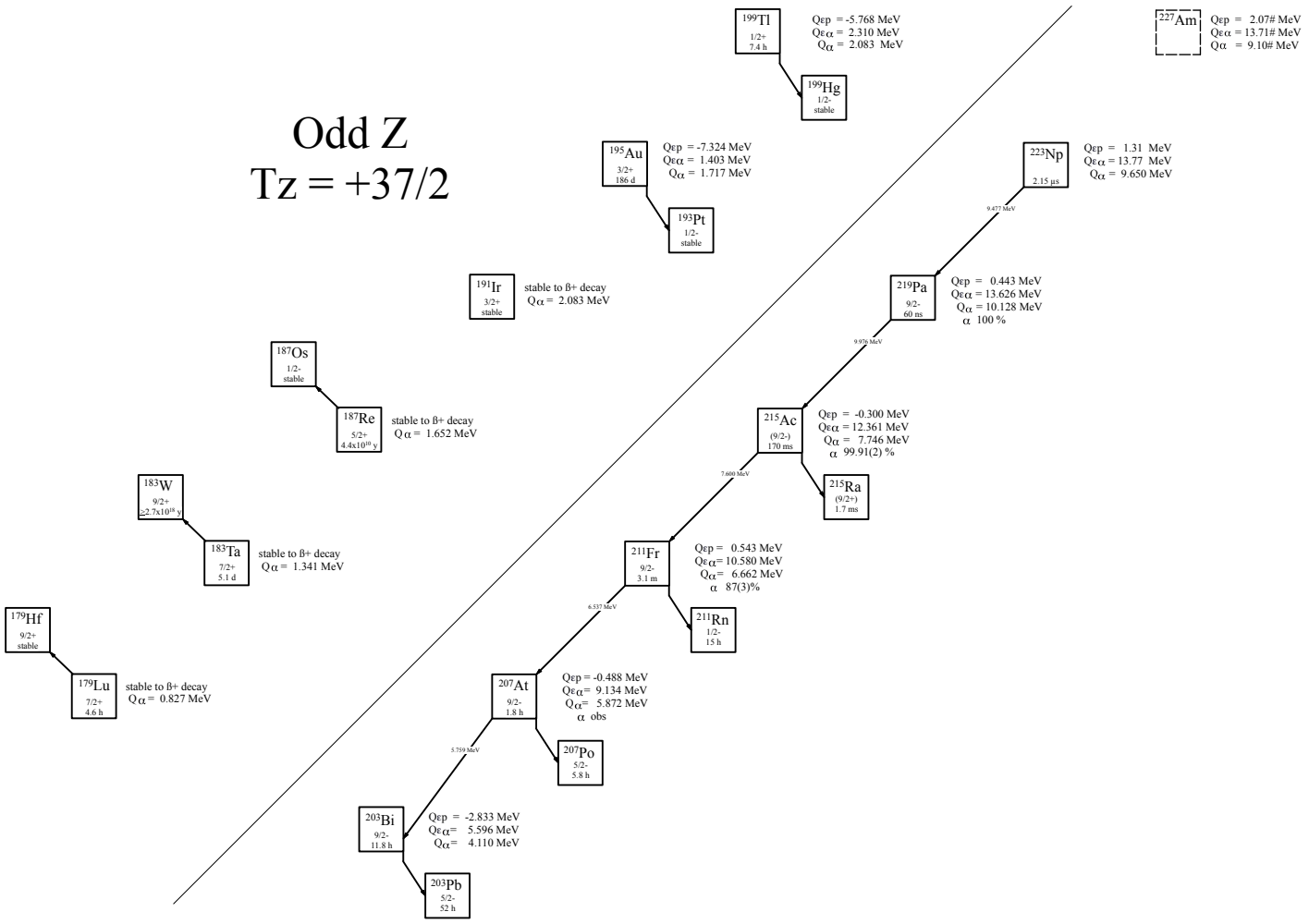

Fig. 1: Known experimental values for heavy particle emission of the odd-Z T_z= +37/2 nuclei.

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Table 1
Observed and predicted β-delayed particle emission from the odd-Z, T_z = +37/2 nuclei. J^π values for ^{179}Lu, ^{183}Ta, ^{187}Re, ^{187}Ir, ^{195}Au, ^{199}Tl and ^{203}Bi are taken from ENSDF. Unless otherwise stated, all Q-values are taken from [2021Wa16] or deduced from values therein.

Nuclide	J^π	$T_{1/2}$	Q_ε	$Q_{\varepsilon p}$	$Q_{\varepsilon\alpha}$	Experimental
^{179}Lu*	$7/2^+$	4.59(6) h	-2.42(20)#	——	——	[**1963St08**]
^{183}Ta*	$7/2^+$	5.1(1) d**	-2.010(30)	——	——	[**1953Du20, 1955Po26**]
^{187}Re*	$5/2^+$	$4.12(13) \times 10^{10}$ y	-1.313(1)	——	——	[**2001Ga01**]
^{191}Ir	$3/2^+$	stable	-0.314(1)	——	——	
^{195}Au	$3/2^+$	186.01(6) d	0.227(1)	-7.324(2)	1.403(1)	[**2012Fu06**]
^{199}Tl	$1/2^+$	7.42(8) h	1.487(28)	-5.768(28)	2.310(28)	[**1960Ju03**]
^{203}Bi	$9/2^-$	11.76(5) h	3.262(14)	-2.833(13)	5.596(13)	[**1960St01**]
^{207}At	$9/2^-$	1.80(3) h**	3.918(14)	-0.488(15)	9.134(14)	[**1962Th08, 1969Ba69, 1968GuZX**]
^{211}Fr	$9/2^-$	3.10(2) m	4.615(14)	0.543(14)	10.580(14)	[**1971ReZE**]
^{215}Ac	$(9/2^-)$	170(10) ms	3.499(14)	-0.300(15)	12.361(14)	[**1968Va04**]
^{219}Pa	$(9/2^-)$	60^{+28}_{-15} ns	4.120(90)	0.443(90)	13.626(70)	[**2017Su18**]
^{223}Np		$2.15^{+1.00}_{-0.52}$ μs	4.61(10)	1.31(12)	13.77(10)	[**2017Su18**]
^{227}Am			5.41(22)#	2.07(23)#	13.71(21)#	

* 100 β^- emitter
** Weighted average of 1.80(5) h [1962Th08], 1.82(4) h [1969Ba69] and 1.77(5) h [1968GuZX].

Table 2
Particle separation, Q-values, and measured values for direct particle emission of the odd-Z, T_z = +37/2 nuclei. Unless otherwise stated, all S and Q-values are taken from [2021Wa16] or deduced from values therein.

Nuclide	S_p	S_{2p}	Q_α	BR_α	Experimental
^{179}Lu	6.671(8)	16.07(20)#	0.827(50)		
^{183}Ta	6.533(6)	15.07(13)	1.341(5)		
^{187}Re	5.997(1)	14.400(14)	1.652(2)		
^{191}Ir	5.290(1)	13.308(8)	2.083(1)		
^{195}Au	5.096(1)	12.609(2)	1.717(2)		
^{199}Tl	4.394(28)	11.498(28)	2.083(28)		
^{203}Bi	2.873(13)	8.922(19)	4.110(31)		
^{207}At	2.328(13)	6.740(13)	5.872(3)	obs*	[**1969Go23, 1951Ba14**]
^{211}Fr	1.825(13)	5.834(13)	6.662(3)	87(3)%	[**2005Ku06**, 2022Ha06, 1971ReZE, 1969Gr04, 1967Va20, 1961Gr42]
^{215}Ac	1.351(13)	4.993(13)	7.746(3)	99.91(2)%	[**2004Ku24, 1968Va04**, 2017Su18, 2003KuZX, 2000He17]
^{219}Pa	1.072(70)	4.697(71)	10.128(69)	100%	[**2017Su18**, 1987FaZS]
^{223}Np	0.903(98)	4.29(10)	9.650(45)	100%	[**2017Su18**]
^{227}Am	0.74(28)#	4.02(22)#	9.10(22)#		

* [1951Ba14] reports the branching ratio as $\approx$ 10%.

Table 3
direct α emission from ^{207}At, $J^\pi = 9/2^-$, $T_{1/2}$ = 1.80(3) h*, BR_α = obs**.

E_α(c.m.)	E_α(lab)	I_α(abs)	J^π_f	$E_{daughter}$(^{203}Bi)	coincident γ-rays	R_0 (fm)	HF
5.872(3)	5.759(3)***	obs**	$9/2^-$	0.0	—-	1.4651(131)	$\approx$1.10

* Weighted average of 1.80(5) h [1962Th08], 1.82(4) h [1969Ba69] and 1.77(5) h [1968GuZX].
** "No serious attempt has been made to determine the degree of alpha-branching of At^{207}. The best estimate from the alpha-particles of At^{207} and the yield of Po^{207} is 10 percent alpha-branching." [1951Ba14]. $\approx$ 10% is used for the branching ratio in determining the HF value.
*** [1969GoZX].

Table 4
direct α emission from ^{211}Fr*, $J^{\pi} = 9/2^{-}$, $T_{1/2} = 3.10(2)$ m**, $BR_{\alpha} = 87(3)\%$.

E_{α}(c.m.)	E_{α}(lab)	I_{α}(rel)	I_{α}(abs)	J^{π}_{f}	$E_{daughter}$(^{207}At)	coincident γ-rays	R_0 (fm)	HF
5.979(6)	5.866 (6)	>0.009(5)%	>0.0078(44)%	(13/2−)	0.6867(6)	0.6867(6)	1.4643(27)	<16
6.019(7)	5.905(7)	>0.006(4)%	>0.0052(35)%	(11/2−)	0.6439(5)	0.6439(5)	1.4643(27)	<40
6.319(5)	6.199 (5)	>0.041(13)%	>0.036(11)%	(7/2−)	0.3445(2)	0.3445(2)	1.4643(27)	<120
6.663(4)	6.537 (4)	100%	>87(3)%	(9/2−)	0.0	——	1.4643(27)	1.33(10)

* All values from [2005Ku06], except where noted.
** [1971ReZE].

Table 5
direct α emission from ^{215}Ac*, $J^{\pi} = (9/2^{-})$, $T_{1/2} = 170(10)$ ms**, $BR_{\alpha} = 99.91(2)\%$**.

E_{α}(c.m.)	E_{α}(lab)	I_{α}(rel)	I_{α}(abs)	J^{π}_{f}	$E_{daughter}$(^{211}Fr)	coincident γ-rays	R_0 (fm)	HF
7.007(7)	6.877(7)	0.026(4)%	0.026(4)%	$(7/2^{-})$	0.7392(4)	0.3426(5), 0.7392(4)	1.4626(13)	$13.2^{+3.4}_{-2.5}$
7.091(5)	6.959(5)	0.07(1)%	0.07(1)%	$(13/2^{-})$	0.6526(2)	0.6526(2)	1.4626(13)	$10.3^{+2.54}_{-1.9}$
7.111(6)	6.979(6)	0.007(4)%	0.007(4)%	$(5/2^{-})$	0.6331(2)	0.2372(4), 0.6331(2)	1.4626(13)	120^{+180}_{-50}
7.162(5)	7.029(5)	0.12(1)%	0.12(1)%	$(11/2^{-})$	0.5832(1)	0.5832(1)	1.4626(13)	10.8(12)
7.243(7)	7.108(7)	0.007(4)%	0.007(4)%	$(5/2^{-})$	0.5059(2)	0.1101(4), 0.5059(2)	1.4626(13)	400^{+500}_{-200}
7.348(5)	7.211(5)	0.20(2)%	0.20(2)%	$(7/2^{-})$	0.3958(1)	0.3958(1))	1.4626(13)	130^{+6}_{-5}
7.744(4)	7.600(4)	100%	99.48(7)%	$(9/2^{-})$	0.0	——	1.4626(13)	1.26(9)

* All values from [2004Ku24], except where noted.
** [1968Va04].
*** Tentative assignment [2004Ku24].

Table 6
direct α emission from ^{219}Pa*, $J^{\pi} = (9/2^{-})$, $T_{1/2} = 60^{+28}_{-15}$ ns, $BR_{\alpha} = 100\%$.

E_{α}(c.m.)	E_{α}(lab)	I_{α}(abs)	J^{π}_{f}	$E_{daughter}$(^{215}Ac)	coincident γ-rays	R_0 (fm)	HF
10.162(37)	9.976(37)	100%	$(9/2^{-})$	0.0	——	1.5346(88)	$0.9^{+0.5}_{-0.3}$

* All values from [2017Su18].

Table 7
direct α emission from ^{223}Np*, $T_{1/2} = 2.15^{+1.00}_{-0.52}$ μs, $BR_{\alpha} = 100\%$.

E_{α}(c.m.)	E_{α}(lab)	I_{α}(abs)	J^{π}_{f}	$E_{daughter}$(^{219}Pa)	coincident γ-rays	R_0 (fm)	HF
9.650(44)	9.477(44)	100%	$(9/2^{-})$	0.0	——	1.507(32)	$0.3^{+0.4}_{-0.2}$

* All values from [2017Su18].

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