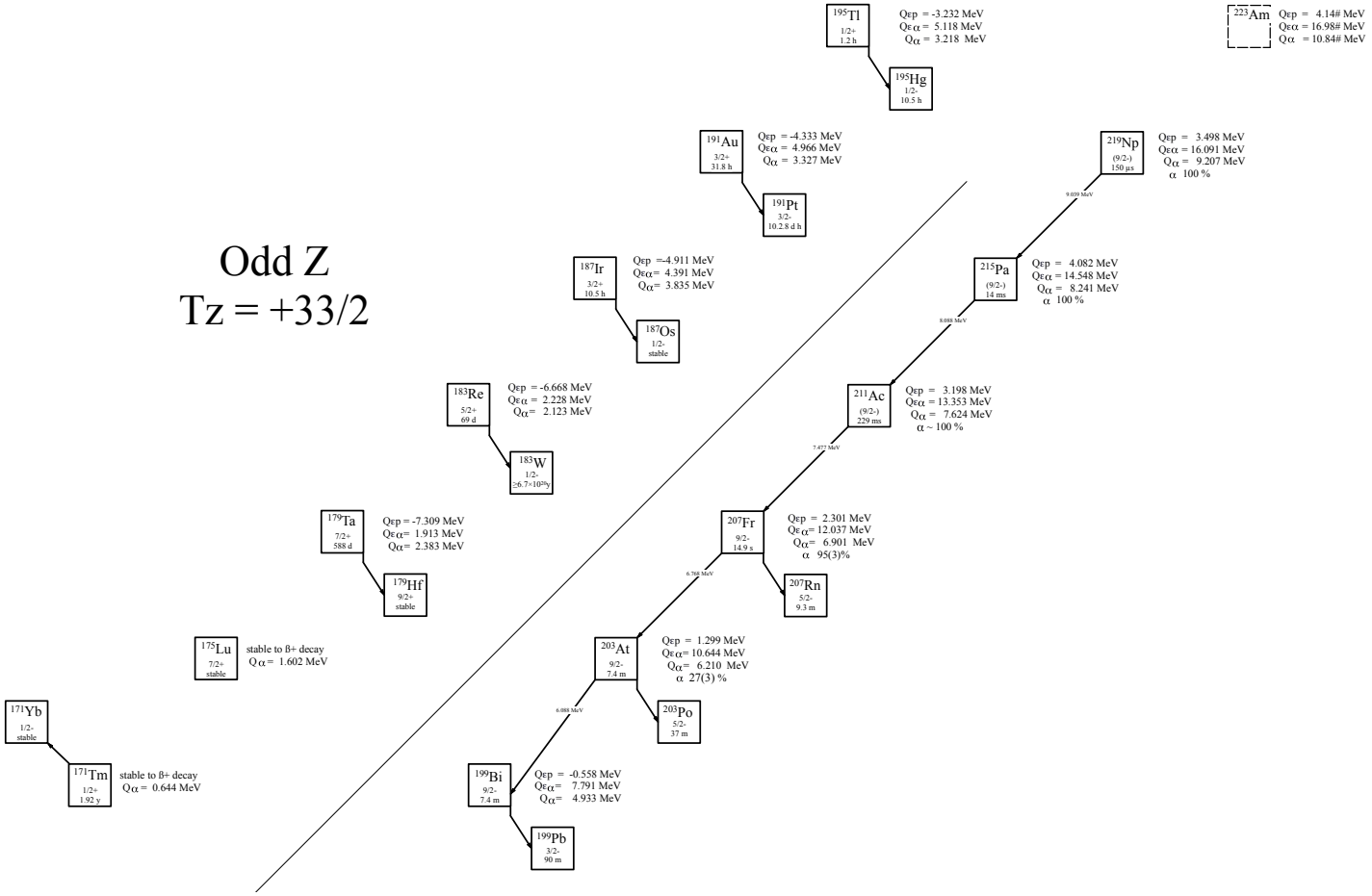

Fig. 1: Known experimental values for heavy particle emission of the odd-Z T_z= +33/2 nuclei.

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Table 1
Observed and predicted β-delayed particle emission from the odd-Z, T_z = +33/2 nuclei. J^π values for ^{171}Tm, ^{175}Lu, ^{179}Ta, ^{183}Re, ^{187}Ir, ^{191}Au, ^{195}Tl and ^{199}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
^{171}Tm*	$1/2^+$	1.92(1) y	-1.492(1)	——	——	[**1965Fl02**]
^{175}Lu	$7/2^+$	stable	-0.470(1)	——	——	
^{179}Ta	$7/2^+$	588(10) d	0.106(1)	-7.309(2)	1.913(1)	[**1974Ch53**]
^{183}Re	$5/2^+$	69.0(19) d**	0.556(8)	-6.668(8)	2.228(8)	[**1958Fo47, 1958Ga17**]
^{187}Ir	$3/2^+$	10.5(3) h	1.670(28)	-4.911(28)	4.391(28)	[**1963Em02**]
^{191}Au	$3/2^+$	31.8(8) h	1.900(6)	-4.333(5)	4.996(5)	[**1967Jo06**]
^{195}Tl	$1/2^+$	1.16(5) h	2.858(26)	-3.232(11)	5.118(12)	[**1961Ju06**]
^{199}Bi	$9/2^-$	27(1) m	4.434(13)	-0.558(13)	7.791(25)	[**1964Si11**]
^{203}At	$9/2^-$	7.4(3) m	5.148(12)	1.299(18)	10.644(13)	[**1961La02**]
^{207}Fr	$9/2^-$	14.9(1) s	5.786(18)	2.301(22)	12.037(18)	[**1981Ri04**]
^{211}Ac	$(9/2^-)$	229(25) ms***	6.310(50)	3.198(55)	13.353(54)	[**2000He17, 1968Va04**]
^{215}Pa	$(9/2^-)$	14(2) ms	6.880(80)	4.082(84)	14.548(83)	[**2000He17**]
^{219}Np	$(9/2^-)$	150^{+720}_{-70} μs	6.140(90)	3.498(94)	16.091(92)	[**2018Ya01**]
^{223}Am		$5.2^{+12.0}_{-4.4}$ms	6.58(42)#	4.14(30)#	16.98(30)#	[**2105De22**]

* 100% β^- emitter.
** Weighted average of 67.6(25) d [1958Fo47] and 71(3) d [1958Ga17].
*** Weighted average of 200(29) ms [2000He17], and 250(25) ms [1968Va04].

Table 2
Particle separation, Q-values, and measured values for direct particle emission of the odd-Z, T_z = +33/2 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
^{171}Tm	6.392(1)	14.992(20)	0.644(5)		
^{175}Lu	5.510(1)	13.488(5)	1.620(2)		
^{179}Ta	5.211(0)	12.551(1)	2.383(1)		
^{183}Re	4.852(8)	11.949(8)	2.123(8)		
^{187}Ir	3.838(28)	10.308(28)	3.835(29)		
^{191}Au	3.780(5)	9.926(14)	3.327(28)		
^{195}Tl	3.260(11)	9.328(14)	3.218(12)		
^{199}Bi	2.019(14)	7.021(17)	4.933(7)		
^{203}At	1.510(14)	5.312(16)	6.210(1)	27(3)%*	[**1998Bo14, 1996Ta18, 1975BaYJ, 1974Ho27, 1968Go12, 1967Tr06, 1963Ho18**, 1986Wo03, 1983SeZQ, 1970DaZM, 1967Tr04, 1961Fo04, 1956Bu12, 1951Ba04]
^{207}Fr	1.005(20)	4.442(21)	6.901(3)**	95(3)%***	[**1981Ri04, 1974Ho27, 1967Va20**, 1964Gr04, 1961Gr42]
^{211}Ac	0.588(55)	3.652(55)	7.624(6)@	$\approx$ 100%@@	[**2000He17, 1968Va04**, 2014Ya19]
^{215}Pa	0.180(80)	2.910(80)	8.241(7)@@@	100%	[**2000He17, 1996An21, 1979Sc09**, 2018Ya01, 1997Mi03,] 1995NiZS]
^{219}Np	-0.253(93)	2.196(93)	9.207(41)	100%	[**2018Ya01**, 2015De22]
^{223}Am	-0.35(42)#	1.79(36)#	10.84(31)#		[**2015De22**]

* Weighted average of 22(3)% [1998Bo14] and 31(3)% [1974Ho27].
** Deduced from α energy, 6.889(20) MeV in [2021Wa16].
*** Weighted average of 97^{+2}_{-3}% [1981Ri04] and 93(3)% [1974Ho27].
@ Deduced from α energy, 7.568(52) MeV in [2021Wa16].
@@ Based on half-life.
@@@ Deduced from α energy, 8.240(60) MeV in [2021Wa16].

Table 3
direct α emission from ^{203}At, J_i^π = $(9/2^-)$, $T_{1/2}$ = 7.4(3) m*, BR_α = 27(3)%**.

E_α(c.m.)	E_α(lab)	I_α(abs)	J_f^π	$E_{daughter}$(^{199}Bi)	coincident γ-rays	R_0 (fm)@	HF
6.210(1)	6.088(1)***	27(3)%**	$(9/2^-)$	0.0	——	1.4873(17)	$1.24^{+0.22}_{-0.18}$

* [1961La02].
** Weighted average of 22(3)% [1998Bo14] and 31(3)% [1974Ho27].
*** Weighted average of 6.088(2) MeV [1996Ta18], 6.089(3) MeV [1975BaYJ], 6.087(2) MeV [1968Go128], 6.086(3) MeV [19Tr06], and 6.085(1) MeV [1963Ho18] (adjusted to 6.088(1) in [1991Ry01].

Table 4
direct α emission from ^{207}Fr, $J_i^\pi = 9/2^-$, $T_{1/2}$ = 14.9(1) s*, BR_α = 95(3)%**.

E_α(c.m.)	E_α(lab)	I_α(abs)	J_f^π	$E_{daughter}$(^{203}At)	coincident γ-rays	R_0 (fm)[@]	HF
6.901(3)	6.768(3)***	95(3)%**	$9/2^-$	0.0	——	1.4973(32)	1.36(11)

* [1981Ri04].
** Weighted average of 97^{+2}_{-3}% [1981Ri04] and 93(3)% [1974Ho27].
*** Weighted average of 6.773(5) MeV [1967Va20] (adjusted to 6.774(5) in [1991Ry01], 6.761(5) MeV [1967Va20] (adjusted to 6.762(5) in [1991Ry01], and 6.766(5) MeV [1967Va20] (adjusted to 6.767(5) in [1991Ry01],

Table 5
direct α emission from ^{211}Ac, $J_i^\pi = (9/2^-)$, $T_{1/2}$ = 229(25) ms*, $BR_\alpha = \approx 100\%$.

E_α(c.m.)	E_α(lab)	I_α(abs)	J_f^π	$E_{daughter}$(^{207}Fr)	coincident γ-rays	R_0 (fm)[@]	HF
7.624(6)	7.477(6)**	$\approx 100\%$	$(9/2^-)$	0.0	——	1.4960(28)	1.18(16)

* Weighted average of 200(29) ms [2000He17], and 250(25) ms [1968Va04].
** Weighted average of 7.472(10) MeV [2000He17] and 7.480(8) MeV [1968Va04].

Table 6
direct α emission from ^{215}Pa, $J_i^\pi = (9/2^-)$, $T_{1/2}$ = 14(2) ms*, BR_α = 100%.

E_α(c.m.)	E_α(lab)	I_α(abs)	J_f^π	$E_{daughter}$(^{211}Ac)	coincident γ-rays	R_0 (fm)[@]	HF
8.241(7)	8.088(7)**	27(3)%**	$(9/2^-)$	0.0	——	1.557(16)	$1.1^{+0.6}_{-0.4}$

* [2000He17].
** Weighted average of 8.091(15) MeV [2000He17], 8.088(10) MeV [1996An21], and 8.085(15) MeV [1979Sc09].

Table 7
direct α emission from ^{219}Np*, $J_i^\pi = (9/2^-)$, $T_{1/2} = 150^{+720}_{-70}$ μs, BR_α = 100%.

E_α(c.m.)	E_α(lab)	I_α(abs)	J_f^π	$E_{daughter}$(^{215}Pa)	coincident γ-rays	R_0 (fm)[@]	HF
9.207(40)	9.039(40)	100%	$(9/2^-)$	0.0	——	1.492(19)	$4.9^{+23.1}_{-2.9}$

* All values from [2018Ya01].

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