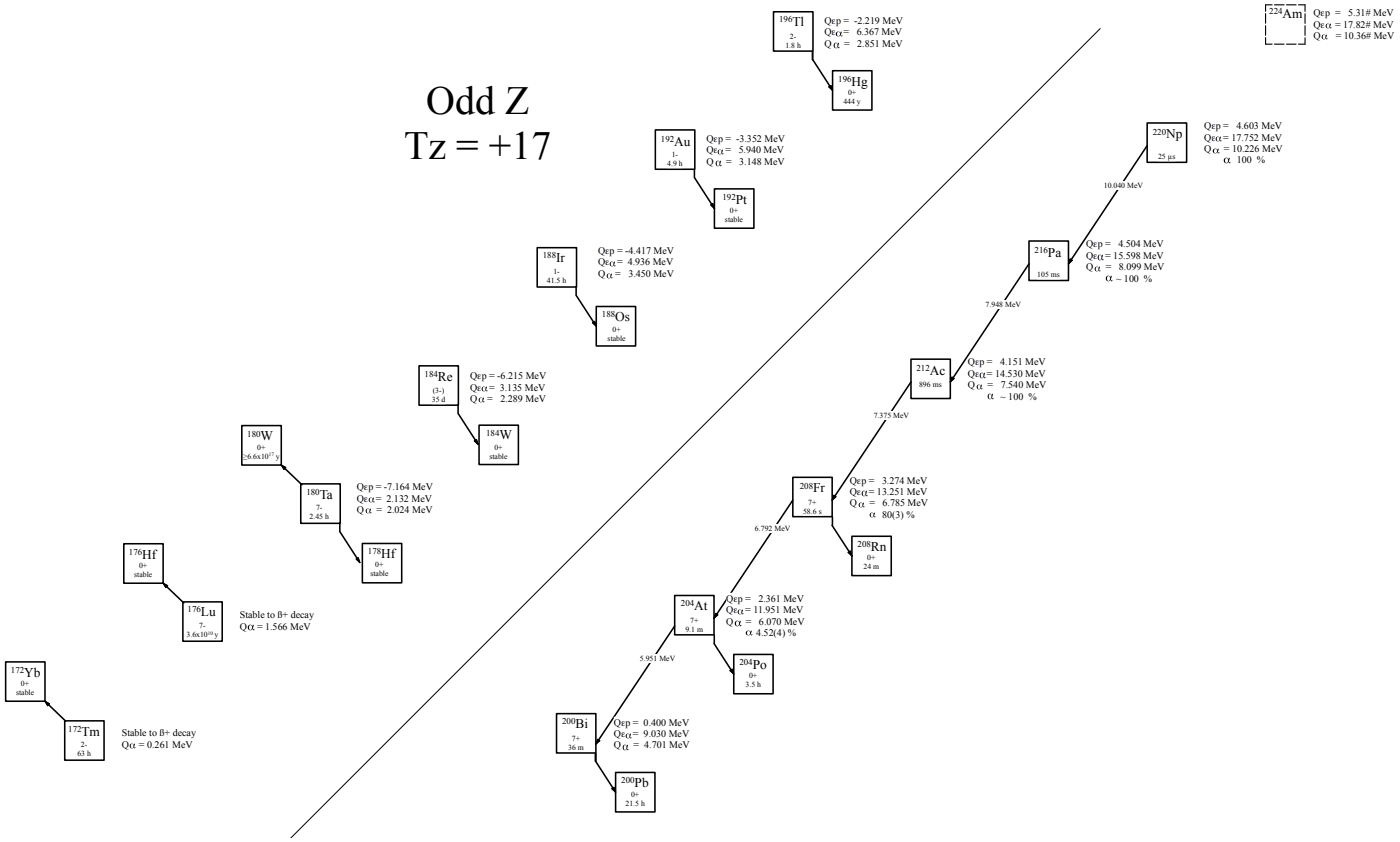

Fig. 1: Known experimental values for heavy particle emission of the odd-Z T_z= +17 nuclei.

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Table 1
Observed and predicted β-delayed particle emission from the odd-Z, T_z = +17 nuclei. J^π values for ^{172}Tm, ^{176}Lu, ^{180}Ta, ^{184}Re, ^{188}Ir, ^{192}Au, ^{196}Tl and ^{200}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
^{172}Tm*	2^-	63.6(3) h	-0.891(5)	——	——	[**1956Ne08**]
^{176}Lu*	7^-	3.640(35) $\times 10^{10}$ y	0.109(1)	-8.361(50)	0.676(4)	[**2013Ko20**]
^{180}Ta**	1^+	8.152(6) h	0.846(2)	-7.164(5)	2.132(2)	[**1980Ry01**]
^{184}Re	(3^-)	35.43(16) d	1.486(4)	-6.215(4)	3.135(4)	[**2022La12**]
^{188}Ir	1^-	41.5(5) h	2.792(9)	-4.417(9)	4.936(9)	[**1950Ch11**]
^{192}Au	1^-	4.94(10) h***	3.516(16)	-3.352(16)	5.940(16)	[**1966Ny01, 1962Ma18**]
^{196}Tl	2^-	1.84(3) h	4.329(12)	-2.219(12)	6.367(12)	[**1960Ju01**]
^{200}Bi	7^+	36.4(5) m	5.880(25)	0.400(36)	9.030(23)	[**1970DaZM**]
^{204}At	7^+	9.1(1) m[@]	6.466(25)	2.361(26)	11.951(25)	[**1963Ho18, 1970DaZM, 1964Th07**]
^{208}Fr	7^+	58.6(3) s[@@]	6.990(15)	3.274(17)	13.251(15)	[**1974Ho27, 1981Ri04**]
^{212}Ac	(7^+)	896(35) ms[@@@]	7.498(24)	4.151(25)	14.530(24)	[**1968Va04, 2014Ya19**]
^{216}Pa		105(12) ms	7.525(27)	4.504(28)	15.598(27)	[**1996An21**]
^{220}Np		25^{+14}_{-7} μs	7.46(11)#	4.603(76)	17.752(33)#	[**2019Zh23**]
^{224}Am			7.98(50)#	5.31(41)#	17.82(41)#	

* 100% β^- emitter.
** Decays by 22.1(14)% β^+, 77.9(14)% β^- emitter [2013Ko20].
*** Weighted average of 4.85(10) h [1966Ny01] and 5.03(10) h [1962Ma18].
[@] Weighted average of 9.3(2) m [1963Ho18], 9.1(2) m [1970DaZM], and 8.9(2) m [1964Th07].
[@@] Weighted average of 58.0(3) s [1974Ho27] and 59.1(3) s [1981Ri04].
[@@@] Weighted average of 880(35) ms [2014Ya19] and 930(50) ms [1968Va04].

Table 2
Particle separation, Q-values, and measured values for direct particle emission of the odd-Z, T_z = +17 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
^{172}Tm	6.945(5)	15.714(50)	0.261(30)		
^{176}Lu	5.976(1)	14.096(45)	1.566(6)		
^{180}Ta	5.760(2)	13.174(3)	2.024(2)		
^{184}Re	5.143(4)	12.367(4)	2.289(5)		
^{188}Ir	4.415(9)	10.996(9)	3.450(10)		
^{192}Au	4.363(16)	10.597(16)	3.148(18)		
^{196}Tl	3.772(26)	9.863(12)	2.851(20)		
^{200}Bi	2.428(24)	7.420(24)	4.701(26)		
^{204}At	1.853(23)	5.702(27)	6.070(1)	4.52(4)%	[**1981Va27, 1968Go12, 1967Tr06, 1963Ho18, 1961La02**, 2014Ma66, 1981Va29, 1981VaZT, 1975BaYJ, 1974Ho27, 1970DaZM, 1967Tr04, 1964Th07]
^{208}Fr	1.319(13)	4.803(18)	6.785(25)	80(3)%*	[**1981Ri04, 1974Ho27, 1967Va20**, 2019Zh23, 2003At01, 1971ReZE, 1964Gr04, 1961Gr42]
^{212}Ac	0.821(22)	3.935(26)	7.540(24)	$\approx$ 100%**	[**2014Ya19, 2000He17,1968Va04**, 2019Zh23, 2015Ma63]
^{216}Pa	0.387(25)	3.187(28)	8.099(11)	$\approx$ 100%**	[**2000He17**, 2019Zh23, 1998Ik01, 1998MiZW, 1996An21, 1979Sc09, 1971Su14]
^{220}Np	0.110(33)	2.752(36)	10.226(18)	100%	[**2019Zh23**]
^{224}Am	0.15(50)#	2.59(40)#	10.36(40)#		

* Weighted average of 90(4)% [1981Ri04] and 74(3)% [1974Ho27].
** Not measured, based on half-life.

Table 3
direct α emission from ^{204}At, $J_i^\pi = 7^+$, $T_{1/2}$ = 9.1(1) m*, BR_α = 4.52(4)%**.

E_α(c.m.)	E_α(lab)	I_α(abs)	J_f^π	$E_{daughter}$(^{200}Bi)	coincident γ-rays	R_0 (fm)]	HF
6.070(1)	5.951(1)***	4.52(4)%**	7^+	0.0	——	1.4809(34)[@]	2.02(16)

* Weighted average of 9.3(2) m [1963Ho18], 9.1(2) m [1970DaZM], and 8.9(2) m [1964Th07].
** [1961La02].
*** Weighted average of 5.952(2) MeV [1968Go12], 5.948(3) MeV (adjusted to 5.951(3) MeV in [1991Ry01]) [1963Ho18], 5.947(3) MeV [1967Tr06] and 5.953(3) MeV [1981Va27].
[@] Interpolated between 1.4720(20) fm (^{202}Po) and 1.4917(27) fm (^{206}Rn).

Table 4
direct α emission from ^{208}Fr, $J_i^\pi = (7^+)$, $T_{1/2}$ = 58.6(3) s*, BR_α = 80(3)%**.

E_α(c.m.)	E_α(lab)	I_α(abs)	J_f^π	$E_{daughter}$(^{204}At)	coincident γ-rays	R_0 (fm)]	HF
6.771(5)	6.641(5)***	80(3)%**	7^+	0.0	——	1.4889(40)[@]	$1.78^{+0.20}_{-0.18}$

* Weighted average of 9.3(2) m [1963Ho18], 9.1(2) m [1970DaZM], 9.3(2) m [19631La02] and 8.9(2) m [1964Th07].
** Weighted average of 90(4)% [1981Ri04] and 74(3)% [1974Ho27].
*** Weighted average of 6.647(5) MeV (adjusted to 6.647(5) MeV in [1991Ry01]) [1967Va20], 6.636(5) MeV (adjusted to 6.637(5) MeV in [1991Ry01]) [1974Ho27] and 6.636(5) MeV (adjusted to 6.637(5) MeV in [1991Ry01]) [1981Ri04].
[@] Interpolated between 1.4917(27) fm (^{206}Rn) and 1.4861(29) fm (^{210}Ra).

Table 5
direct α emission from ^{212}Ac, $J_i^\pi = (7^+)$, $T_{1/2}$ = 896(35) ms*, $BR_\alpha = \approx 100\%$.

E_α(c.m.)	E_α(lab)	I_α(abs)	J_f^π	$E_{daughter}$(^{208}Fr)	coincident γ-rays	R_0 (fm)]	HF
7.517(6)	7.375(6)**	100%	(7^+)	0.0	——	1.4924(63)***	$1.98^{+0.32}_{-0.28}$

* Weighted average of 880(35) ms [2014Ya19] and 930(50) ms [1968Va04].
** Weighted average of 7.373(10) MeV [2000He17] and 7.377(8) MeV [1968Va04].
*** Interpolated between 1.4861(29) fm (^{210}Ra) and 1.4986(56) fm (^{214}Th).

Table 6
direct α emission from ^{216}Pa*, $T_{1/2}$ = 105(12) ms**, $BR_\alpha = \approx 100\%$.

E_α(c.m.)	E_α(lab)	I_α(rel)	I_α(abs)	J_f^π	$E_{daughter}$(^{212}Ac)	coincident γ-rays	R_0 (fm)]	HF
7.940(15)	7.793(15)	8(2)%	4(1)%		0.158	0.158	1.505(15)***	35^{+22}_{-14}
7.962(15)	7.815(15)	88(12)%	45(5)%		0.1336(3)	0.1336(3)	1.505(15)***	$3.7^{+1.8}_{-1.4}$
8.098(15)	7.948(15)	100(8)%	51(4)%	(7^+)	0.0	——	1.505(15)***	9^{+4}_{-3}

* All values from [2000He25], except where noted.
** [1996An21].
*** Interpolated between 1.4986(56) fm (^{214}Th) and 1.512(14) fm(^{218}U).

Table 7
direct α emission from ^{220}Np*, $T_{1/2} = 25^{+14}_{-7}$ μs, BR_α = 100%.

E_α(c.m.)	E_α(lab)	I_α(abs)	J_f^π	$E_{daughter}$(^{216}Pa)	coincident γ-rays	R_0 (fm)]	HF
10.226(18)	10.040(18)	100%		0.0**	——	1.512(39)***	80^{+100}_{-50}

* All values from [219Zh23].
** α is assumed to feed the ground state of ^{216}Pa.
*** Interpolated between 1.512(14) fm (^{218}U) and 1.511(36) fm (^{222}Pu).

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