

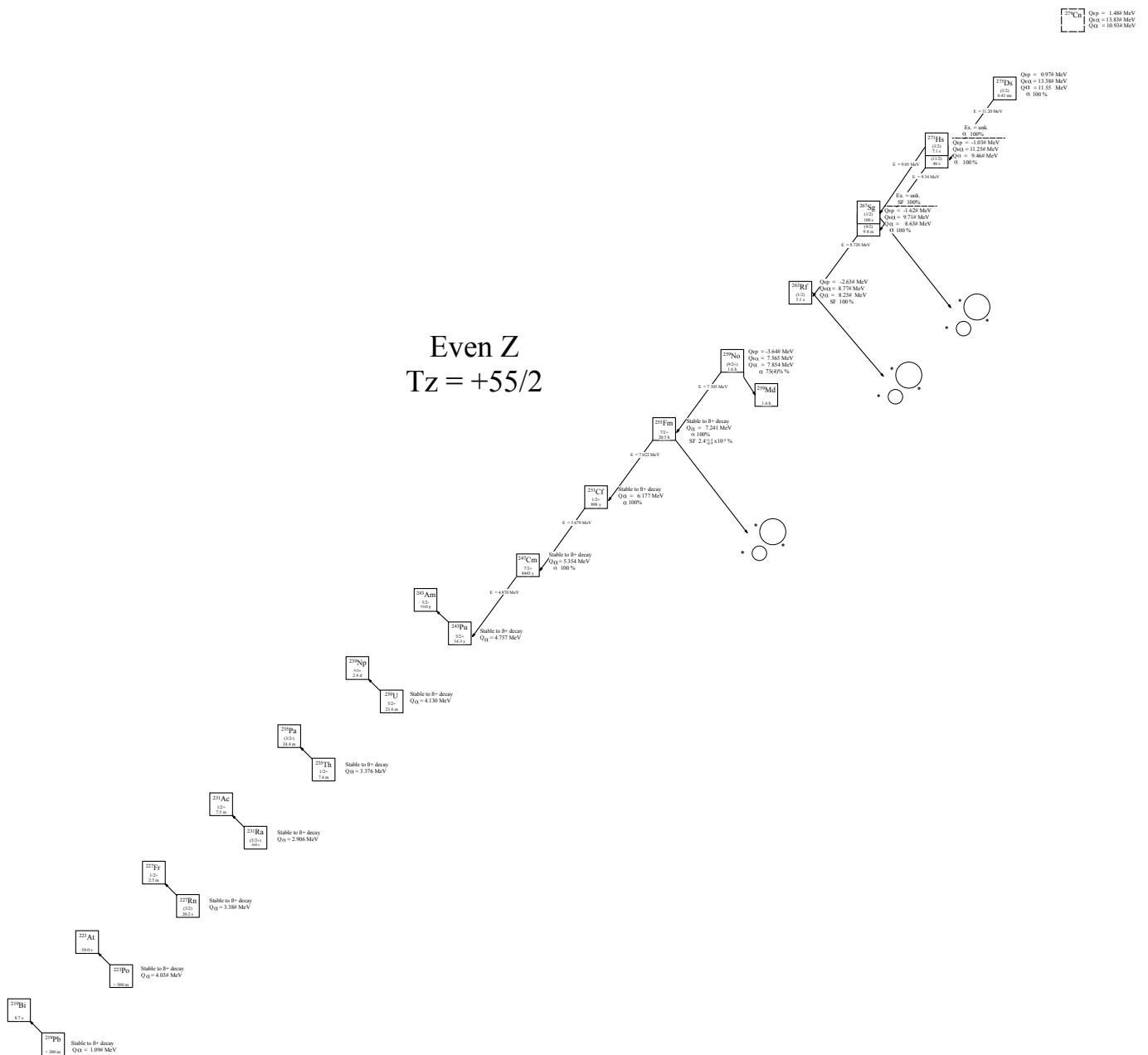


Fig. 1: Known experimental values for heavy particle emission of the even-Z $T_z = +55/2$ nuclei.

Table 1

Observed and predicted β -delayed particle emission from the even- Z , $T_z = +55/2$ nuclei. Unless otherwise stated, all Q-values are taken from [2021Wa16] or deduced from values therein. J^π values for ^{219}Pb , ^{223}Po , ^{227}Rn , ^{231}Ra , ^{235}Th , ^{239}U and ^{243}Pu are taken from ENSDF.

Nuclide	Ex.	J^π	$T_{1/2}$	Q_ϵ	Q_{β^-}	$Q_{\beta^- \alpha}$	Experimental
^{219}Pb			obs		4.30(45)#	8.35(50)#	[2010Al24]
^{223}Po			obs	-5.16(45)#	3.65(20)#	8.52(28)#	[2010Al24]
^{227}Rn		(5/2)	20.2(4) s	-4.54(30)#	3.203(0)	7.213(20)	[1997Ku20]
^{231}Ra		(5/2 ⁺)	104.1(8) s	-3.864(14)	2.454(17)	6.289(13)	[2008Bo29]
^{235}Th		(1/2 ⁺)	7.3(1) m	-3.339(19)	1.729(19)	6.010(18)	[1986Mi10]
^{239}U		5/2 ⁺	23.44(2) m	-2.77(20)#	1.262(2)	6.039(14)	[1989Ab05]
^{243}Pu		7/2 ⁺	4.955(3) h	-2.050(30)#	0.580(3)	6.199(3)	[1968Di09]
^{247}Cm		9/2 ⁻	$1.56(5) \times 10^7$ y	-1.62(10)#	0.044(6)	6.113(4)	[1971Fi01]
^{251}Cf		1/2 ⁺	898(43) y*	-1.093(10)	$Q_{\epsilon p}$	$Q_{\epsilon \alpha}$	[1969Me01, 1968Ch03]
^{255}Fm		7/2 ⁺	20.54(7) h**	-0.289(10)	—	—	[1964As01, 1956Jo09]
^{259}No		(9/2 ⁺)	1.6(8) h	0.52(10)#	-3.64(20)#	7.565(13)#	[2013As02]
^{263}Rf		(1/2)	$5.1^{+4.6}_{-1.7}$ s	1.09(27)#	-2.63(39)#	8.77(18)#	[2024Og02]
^{267}Sg		(9/2)	$9.8^{+11.3}_{-4.5}$ m	1.79(46)#	-1.62(49)#	9.71(34)#	[2024Og02]
^{267m}Sg	x	(1/2)	100^{+92}_{-39} s	1.79(46)#+x	-1.62(49)#+x	9.71(34)#+x	[2024Og02]
^{271}Hs		(11/2)	46^{+56}_{-16} s	1.83(47)#	-1.03(54)#	11.25(47)#	[2024Og02]
^{271m}Hs	x	(3/2)	$7.1^{+8.4}_{-2.5}$ s	1.83(47)#+x	-1.03(54)#+x	11.25(47)#+x	[2024Og02]
^{275}Ds		(3/2)	$0.43^{+0.29}_{-0.12}$ ms	2.90(52)#	0.97(58)#	13.38(51)#	[2024Og02]
^{279}Cn				3.30(58)#	1.48(65)#	13.83(55)#	

* Weighted average of 900(50) y [1969Me01] and 892(88) y [1968Ch03].

** Weighted average of 20.07(7) h [1964As01] and 21.5(1) h [1956Jo09].

Table 2

Particle separation, Q-values, and measured values for direct particle emission of the even- Z , $T_z = +55/2$ nuclei. Unless otherwise stated, all S and Q-values are taken from [2021Wa16] or deduced from values therein.

Nuclide	S_p	Q_α	BR_α	BR_{SF}	Experimental
^{219}Pb	10.38(57)#	1.09(57)#			
^{223}Po	9.16(36)#	4.03(45)#			
^{227}Rn	9.06(30)#	3.38(20)#			
^{231}Ra	8.559(13)	2.906(18)			
^{235}Th	8.112(19)	3.376(17)			
^{239}U	7.610(16)	4.130(13)			
^{243}Pu	6.95(20)	4.757(3)			
^{247}Cm	6.750(18)	5.354(3)	100%		[2022Ah03, 1971Fi01, 1963Fi08, 1954St33]
^{251}Cf	6.106(5)	6.177(1)	100%		[2003Ah07, 2003AhZZ, 1975BrZP, 1971Bb10, 1970BaZZ, 1970BrZN, 1969Ba57, 1969Me01, 1968Ch03, 1966Rg01]
^{255}Fm	5.483(5)	7.241(1)	100%	$2.4^{+1.2}_{-0.9} \times 10^{-5}\%$	[2005Ah09, 1975Ah01, 1963Ph01, 2000Ah09, 1999AhZY, 1991Po17, 1990Po14, 1971Ah01, 1971Bb10, 1964As01, 1963Ph01, 1962Br45, 1961Br40, 1956Jo09, 1955Gh01]
^{259}No	4.900(7)	7.854(5)	75(4)%		[2013As02, 1982Wi08, 1978WiZT, 1973Si40, 1972SiZF, 1971SiYZ]
^{263}Rf	4.64(25)#	8.25(15)#		100%	[2024Og02, 2008Dv02, 2012Tu01, 2010Gr04, 2003Kr20, 2002KrZV, 2002KrZY, 1995GrZV]
^{267}Sg	4.22(39)#	8.63(21)#	100%		[2024Og02, 2008Dv02, 2012Tu01]
^{267m}Sg	4.22(39)#-x	8.63(21)#+x		100%	[2024Og02, 2008Dv02, 2012Tu01, 2010Gr04]
^{271}Hs	3.828(406)#	9.460(87)#	100%		[2024Og02, 2008Dv02, 2012Tu01, 2010Gr04]
^{271m}Hs	3.828(406)#-x	9.460(87)#+x	100%		[2024Og02, 2008Dv02, 2012Tu01, 2010Gr04]
^{275}Ds	2.87(51)#	11.55(20)#	100%		[2024Og02]
^{279}Cn	2.79(55)#	10.93(20)#			

Table 3direct α emission from $^{247}\text{Cm}^*$, $J^\pi = 9/2^-$, $T_{1/2} = 1.56(5) \times 10^7$ y, $BR_\alpha = 100\%$.

E_α (c.m.)	E_α (lab)	I_α (rel)	I_α (abs)	J_f^π ***	$E_{daughter}(^{243}\text{Pu})^{***}$	coincident γ -rays (keV)***	R_0 (fm)	HF
4.789(4)**	4.712(4)	0.10(2)%	0.071(13)%**	$(9/2^+)$	0.565(2)	564.5**	1.4993(79)	78^{+27}_{-21}
4.899(4)	4.820(4)	6.6(4)%	4.7(3)%	$11/2^-$	0.455(5)	397.6**	1.4993(79)	$2.3^{+1.8}_{-1.6}$
4.950(4)	4.870(4)	100%	71.0(10)%	$9/2^-$	0.4026(3)	125, 278.0, 344.5, 402.6	1.4993(79)	
5.024(4)	4.943(4)	2.3(3)%	1.6(2)%	$7/2^+$	0.3332(2)	275.1, 333.0	1.4993(79)	1.1(3)
5.067(4)	4.985(4)	2.8(3)%	2.0(2)%	$5/2^+$	0.2875(2)	229.3, 287.4	1.4993(79)	250(70)
5.232(4)	5.147(4)	1.7(3)%	1.2(2)%	$11/2^+$	0.1248(7)	125	1.4993(79)	$4.8^{+1.6}_{-1.2} \times 10^3$
5.298(4)	5.212(4)	8.0(7)%	5.7(5)%	$9/2^+$	0.0581(2)		1.4993(79)	$2.7(7) \times 10^3$
5.354(4)	5.267(4)	19.4(10)%	13.8(7)%	$7/2^+$	0.0	—	1.4993(79)	$2.6(6) \times 10^3$

* All values from [1971Fi01], except where noted. E_α values are adjusted by +2.3 keV as recommended in [1991Ry01].** [2022Ah03]. E_α deduced from α - γ coincidence.

*** [2014Ne14].

Table 4direct α emission from $^{251}\text{Cf}^*$, $J^\pi = 1/2^-$, $T_{1/2} = 898(43)$ y**, $BR_\alpha = 100\%$.

E_α (c.m.)	E_α (lab)	I_α (rel)	I_α (abs)	J_f^π	$E_{daughter}(^{247}\text{Cm})$	coincident γ -rays (keV)	R_0 (fm)	HF
5.594(2)	5.505(2)	0.76(14)%	0.27(5)%	$5/2^+$	0.5817	38.5, 61.7, 165.7, 227.4, 265.9 315.8, 354.3	1.49187(17)	32^{+9}_{-6}
5.658(2)	5.568(2)	5.4(3)%	1.9(1)%	$3/2^+$	0.5186	61.7, 113.7, 165.7, 177.5, 227.4, 354.3	1.49187(17)	10.7(8)
5.726(2)	5.635(2)	13.8(6)%	4.9(2)%	$5/2^+$	0.450		1.49187(17)	10.3(7)
5.743(2)	5.651(2)	9.3(6)%	3.3(2)%	$3/2^+$	0.434		1.49187(17)	18.8(15)
5.771(2)	5.679(2)	100.0(20)%	35.4(5)%	$1/2^+$	0.4049	61.7, 165.7, 177.5, 227.4	1.49187(17)	2.56(13)
5.831(2)	5.738(2)	2.3(3)%	0.8(1)%	$9/2^+$	0.3459	58.0, 60.5, 61.7, 165.7, 227.4, 284.2, 285.4, 345.9	1.49187(17)	240^{+50}_{-40}
5.859(2)	5.766(2)	10.2(6)%	3.6(2)%	$9/2^+$	0.3183	38.5, 52.5, 61.7, 165.7, 227.4, 265.9, 285.9	1.49187(17)	76(6)
5.892(2)	5.798(2)	7.1(6)%	2.5(2)%	$7/2^+$	0.2854	58.0, 61.7, 165.7, 227.4 285.4	1.49187(17)	166(16)
5.911(2)	5.817(2)	11.3(6)%	4.0(2)%	$7/2^+$	0.2659	38.5, 61.7, 165.7, 227.4, 265.9	1.49187(17)	132(9)
5.949(2)	5.854(2)	78.0(18)%	27.6(5)%	$5/2^+$	0.2274	61.7, 165.7, 227.4	1.49187(17)	30.9(16)
6.042(2)	5.946(2)	1.69(17)%	0.60(6)%	$13/2^-$	0.1347	61.7, 73.0, 134.6	1.49187(17)	$4.4(7) \times 10^3$
6.114(2)	6.017(2)	35.3(10)%	12.5(3)%	$11/2^-$	0.0617	61.7	1.49187(17)	506(27)
6.176(2)	6.078(2)	7.3(3)%	2.6(1)%	$9/2^-$	0.0	—	1.49187(17)	$5.0(3) \times 10^3$

* All values from [2003Ah07], except where noted.

** Weighted average of 900(50) y [1969Me01] and 892(88) y [1968Ch03].

Table 5direct α emission from $^{255}\text{Fm}^*$, $J^\pi = 7/2^-$, $T_{1/2} = 20.54(7)$ h^{**}, $BR_\alpha = 100\%$. (1 of 2)

E_α (c.m.)	E_α (lab)	I_α (rel)	I_α (abs)	$\pi_f^\oplus$	$E_{\text{daughter}}(^{251}\text{Cf})^{***}$	coincident γ -rays (keV) ^{***}	HF ^{@@}
5.991(2)	5.897(2) ^{***}	$1.9(1) \times 10^{-5}\%$	$1.8(1) \times 10^{-5}\%$ ^{***}	(1/2 ⁻)	1.250	41.0, 45.2, 47.8, 57.9, 60.0, 63.4, 73.1, 80.9, 86.0, 98.9, 111.8, 131.1, 133.0, 152.8, 159.0, 163.7, 177.6, 186.7, 194.6, 204.1, 210.7, 211.6, 233.7, 264.2, 816.1, 991.6, 1038.3, 1072.3, 1083.9, 1144.0	28.1(22)
6.056(2)	5.961(2) ^{***}	$6.2(6) \times 10^{-6}\%$	$5.8(6) \times 10^{-6}\%$ ^{***}		1.185	41.0, 47.8, 57.9, 80.9, 98.9, 111.8, 152.8, 163.7, 177.6, 186.7, 210.7, 211.6, 233.7, 285.5, 332.4, 366.4, 397.5, 437.7, 496.2, 519.2, 543.9, 641.6, 1019.2, 1079.1	195^{+26}_{-22}
6.084(2)	5.989(2) ^{***}	$\approx 4.3 \times 10^{-6}\%$	$\approx 4.0 \times 10^{-6}\%$ ^{***}	(11/2 ⁻)	1.156	41.0, 47.8, 57.9, 60.0, 73.1, 80.9, 8.9, 9133.0, 149.2, 245.7, 286.7, 763.5, 859.8, 918.1	≈ 400
6.145(2)	6.049(2) ^{***}	$6.7(6) \times 10^{-6}\%$	$6.3(7) \times 10^{-6}\%$ ^{***}	(9/2 ⁻)	1.095	41.0, 47.8, 57.9, 80.9, 98.9, 245.7, 286.7, 702.3, 947.8, 988.8	530^{+80}_{-60}
6.154(2)	6.057(2) ^{***}	$1.10(8) \times 10^{-5}\%$	$1.00(7) \times 10^{-5}\%$ ^{***}	(9/2 ⁻)	1.087	45.2, 47.8, 57.9, 60.0, 63.4, 73.1, 80.9, 86.0, 131.1, 133.0, 159.0, 194.6, 204.1, 264.2, 652.5, 715.8, 847.0, 920.5	370(30)
6.163(2)	6.066(2) ^{***}	$5.0(2) \times 10^{-5}\%$	$4.7(2) \times 10^{-5}\%$ ^{***}		1.078	45.2, 47.8, 57.9, 60.0, 63.4, 73.1, 80.9, 86.0, 131.1, 133.0, 159.0, 194.6, 204.1, 264.2, 643.6, 707.0, 838.4, 911.3, 971.2	88(6)
6.196(2)	6.099(2) ^{***}	$2.4(1) \times 10^{-5}\%$	$2.2(1) \times 10^{-5}\%$ ^{***}	(7/2 ⁻)	1.044	41.0, 47.8, 57.9, 80.9, 98.9, 111.8, 152.8, 163.7, 172.9, 186.7, 210.7, 211.6, 213.9, 233.7, 271.9, 724.1, 785.4, 831.9, 938.1, 996.1	281(20)
6.232(2)	6.134(2) ^{***}	$4.0(2) \times 10^{-5}\%$	$3.7(2) \times 10^{-5}\%$ ^{***}	(5/2 ⁻)	1.009	41.0, 47.8, 57.9, 80.9, 98.9, 111.8, 152.8, 163.7, 177.6, 186.7, 210.7, 211.6, 233.7, 301.0, 408.2, 530.4, 553.0, 577.5, 601.0, 660.2, 683.2, 750.5, 797.6, 831.9, 903.1, 961.2, 984.2	252(19)
6.259(2)	6.161(2) ^{***}	$4.4(2) \times 10^{-5}\%$	$4.1(2) \times 10^{-5}\%$ ^{***}	(3/2 ⁻)	0.981	47.8, 152.8, 163.7, 177.6, 186.7, 211.6, 349.6, 381.0, 454.4, 553.0, 577.5, 601.0, 607.1, 632.1, 770.0, 803.8, 956.6, 981.4	516(23)
6.266(2)	6.168(2) ^{***}	$2.5(1) \times 10^{-5}\%$	$2.30(1) \times 10^{-5}\%$ ^{***}	(9/2 ⁺)	0.974	47.8, 57.9, 60.0, 73.1, 80.9, 133.0, 734.5, 807.7, 967.8	611^{+34}_{-32}
6.298(2)	6.199(2) ^{***}	$3.9(2) \times 10^{-5}\%$	$3.60(2) \times 10^{-5}\%$ ^{***}	(5/2 ⁻)	0.943	47.8, 57.9, 80.9, 152.8, 163.7, 177.6, 186.7, 211.6, 731.0, 764.7, 836.2	559^{+31}_{-29}
6.466(2)	6.365(2) ^{***}	$4.1(3) \times 10^{-5}\%$	$3.8(3) \times 10^{-5}\%$ ^{***}	(3/2 ⁺)	0.774	774	$3.6(3) \times 10^3$
6.502(2)	6.400(2) ^{***}	$\approx 6.4 \times 10^{-6}\%$	$\approx 6.0 \times 10^{-6}\%$ ^{***}	5/2 ⁻	0.708	47.8, 152.8, 177.6, 530.4, 660.2, 683.2	$\approx 5 \times 10^4$
6.591(3)	6.488(3)	$3.2(5) \times 10^{-3}\%$	$3.0(5) \times 10^{-3}\%$	(9/2 ⁺)	0.649	41.0, 47.8, 57.9, 60.0, 73.1, 80.9, 98.9, 111.8, 133.0, 152.8, 172.9, 210.7, 213.9, 233.7, 245.7, 256.7, 271.9, 286.7, 329.3, 390.4, 409.6, 482.5, 502.1, 601.0	180^{+40}_{-30}
6.609(2)	6.505(2) ^{***}	$\approx 3.2 \times 10^{-6}\%$	$\approx 3.0 \times 10^{-6}\%$ ^{***}	1/2 ⁻	0.632	152.8, 177.6, 454.4, 607.1, 632.1	$\approx 3 \times 10^5$
6.616(2)	6.512(2) ^{***}	$\approx 4.3 \times 10^{-6}\%$	$\approx 4.0 \times 10^{-6}\%$ ^{***}	7/2 ⁻	0.625	41.0, 47.8, 57.9, 80.9, 98.9, 378.3, 577.5	$\approx 1.7 \times 10^5$
6.639(2)	6.535(2) ^{***}	$\approx 4.3 \times 10^{-6}\%$	$\approx 4.0 \times 10^{-6}\%$ ^{***}	3/2 ⁻	0.601	47.8, 553.0, 577.5, 601.0	$\approx 2.2 \times 10^5$
6.650(2)	6.546(2)	0.0150(2)%	0.014(2)%	(7/2 ⁺)	0.590	41.0, 47.8, 57.9, 60.0, 73.1, 80.9, 98.9, 98.9, 111.8, 133.0, 152.8, 163.7, 172.9, 177.6, 186.7, 197.4, 210.7, 211.6, 213.9, 233.7, 245.7, 270.4, 271.9, 286.7, 331.5, 350.6, 378.5, 412.2, 423.7, 443.2, 483.7, 542.2, 565.2	71^{+13}_{-10}
6.697(2)	6.592(2)	0.018(2)%	0.017(2)%	5/2 ⁺	0.544	41.0, 47.8, 57.9, 80.9, 98.9, 111.8, 152.8, 163.7, 177.6, 186.7, 210.7, 211.6, 233.7, 285.5, 332.4, 366.4, 397.5, 437.7, 496.2, 519.2, 543.9	93^{+14}_{-12}
6.727(3)	6.621(3)	$2.4(5) \times 10^{-3}\%$	$2.2(5) \times 10^{-3}\%$		0.514		$1.0(2) \times 10^3$
6.799(3)	6.692(3)	$5(2) \times 10^{-3}\%$	$5(2) \times 10^{-3}\%$		0.442		900^{+600}_{-300}

* All values from [1975Ah01], except where noted.

** Weighted average of 20.07(7) h [1964As01] and 21.5(1) h [1956Jo09].

*** [2005Ah09].

@ [2023Mo11].

@@ $R_0 = 1.4928(21)$ fm.

Table 6direct α emission from $^{255}\text{Fm}^*$, $J^\pi = 7/2^-$, $T_{1/2} = 20.54(7)$ h ** , $BR_\alpha = 100\%$. (2 of 2)

E_α (c.m.)	E_α (lab)	I_α (rel)	I_α (abs)	$\pi_f^\oplus$	$E_{\text{daughter}}(^{251}\text{Cf})^{***}$	coincident γ -rays (keV) ***	HF $^\oplus$
6.806(2)	6.699(2)	0.039(2)%	0.036(2)%	9/2 ⁻	0.435	45.2, 47.8, 57.9, 60.0, 63.4, 73.1, 80.9, 86.0, 131.1, 133.0, 159.0, 194.6, 204.1, 264.2	139(11)
6.817(2)	6.710(2)	0.014(1)%	0.013(1)%	(15/2 ⁺)	0.424	47.8, 57.9, 60.0, 73.1, 80.9, 133.0, 184.6	430(40)
6.848(3)	6.741(3)	0.013(4)%	0.012(4)%	(11/2 ⁺)	0.392	41.0, 47.8, 57.9, 80.9, 98.9, 245.7, 286.7	650 $^{+440}_{-170}$
6.871(2)	6.763(2)	0.017(2)%	0.016(2)%	11/2 ⁻	0.370	45.2, 47.8, 57.9, 60.0, 73.1, 80.9, 86.0, 131.1, 133.0, 159.0, 204.1, 264.2	610 $^{+100}_{-80}$
6.915(2)	6.807(2)	1.20(6)%	0.110(6)%	(13/2 ⁺)	0.325	47.8, 57.9, 60.0, 73.1, 80.9, 86.0, 133.0, 159.0	139(11)
6.923(3)	6.814(3)	2.1(5) $\times 10^{-3}\%$	2.0(5) $\times 10^{-3}\%$	9/2 ⁺	0.318	41.0, 47.8, 57.9, 80.9, 98.9, 172.9, 213.9, 271.9	8.2 $^{+2.8}_{-1.7}\times 10^3$
6.945(2)	6.836(2)	8.6(11) $\times 10^{-3}\%$	8.0(10) $\times 10^{-3}\%$	(13/2 ⁺)	0.296	41.0, 47.8, 57.9, 80.9, 98.9, 149.2	2.5 $^{+0.4}_{-0.3}\times 10^3$
6.983(2)	6.873(2)	8.6(11) $\times 10^{-3}\%$	8.0(10) $\times 10^{-3}\%$	7/2 ⁺	0.258	41.0, 47.8, 57.9, 80.9, 98.9, 111.8, 152.8, 210.7, 233.7	3.7 $^{+0.6}_{-0.5}\times 10^3$
7.002(2)	6.892(2)	0.66(1)%	0.62(1)%	11/2 ⁺	0.239	47.8, 57.9, 60.0, 73.1, 80.9, 133.0	57.4(32)
7.028(2)	6.918(2)	0.018(2)%	0.017(2)%	5/2 ⁺	0.212	47.8, 163.7, 186.7, 211.6	2.73(22) $\times 10^3$
7.064(3)	6.953(3)	0.024(4)%	0.022(4)%	3/2 ⁺	0.177	152.8, 177.6	3.0 $^{+0.7}_{-0.5}\times 10^3$
7.074(2)	6.963(2)	5.40(7)%	5.04(6)%	9/2 ⁺	0.167	47.8, 57.9, 60.0, 80.9	14.2(8)
7.094(2)	6.983(2)	0.14(1)%	0.13(1)%	9/2 ⁺	0.146	41.0, 47.8, 57.9, 80.9, 98.9	670(60)
7.134(2)	7.022(2)	100.0(5)%	93.4(3)%	7/2 ⁺	0.107	47.8, 57.9, 80.9	1.36(7)
7.193(2)	7.080(2)	0.43(1)%	0.40(3)%	7/2 ⁺	0.048	47.8	2.2 $^{+0.3}_{-0.2}\times 10^3$
7.216(2)	7.103(2)	0.10(1)%	0.090(9)%	5/2 ⁺	0.024	—	3.1 $^{+0.4}_{-0.3}\times 10^3$
7.241(2)	7.127(2)	0.07(1)%	0.070(7)%	1/2 ⁺	0.0	—	5.0 $^{+0.6}_{-0.5}\times 10^3$

* All values from [1975Ah01], except where noted.

** Weighted average of 20.07(7) h [1964As01] and 21.5(1) h [1956Jo09].

*** [2005Ah09].

@ [2023Mo11].

@@ $R_0 = 1.4928(21)$ fm.**Table 7**direct α emission from $^{259}\text{No}^*$, $J^\pi = (9/2^+)$, $T_{1/2} = 1.6(8)$ h, $BR_\alpha = 75(4)\%^{**}$.

E_α (c.m.)	E_α (lab)	I_α (abs)	$\pi_f^\oplus$	$E_{\text{daughter}}(^{255}\text{Fm})^\oplus$	coincident γ -rays (keV) $^\oplus$	R_0 (fm)	HF
7.623(5)	7.505(5) ***	75(4)%	(9/2 ⁺)	0.2314	61.7, 169.6, 231.4	1.481(15)	1.4 $^{+1.0}_{-0.9}$

* All values from [2013Ah02], except where noted.

** [1982Wi08].

*** [1973Si40] reported α 's of 7.455 MeV (13%), 7.500 MeV (39%), 7.533 MeV (23%), 7.605 MeV (14%), and 7.685 MeV (11%) with a $T_{1/2} = 58(5)$ m. [2013Ah02] determined that the excess peaks were either due to contaminants or summing with conversion electrons.

@ [2008AsZY].

Table 8direct α emission from $^{267}\text{Sg}^*$, $J^\pi = (9/2)$, $T_{1/2} = 9.8^{+11.3}_{-4.5}$ m, $BR_\alpha = 100\%^{**}$.

E_α (c.m.)	E_α (lab)	I_α (abs)	$\pi_f^\oplus$	$E_{\text{daughter}}(^{263}\text{Rg})$	coincident γ -rays (keV)	R_0 (fm)	HF
8.396(20)	8.270(20)	(9/2)			1.457(60)	1 $^{+5}_{-1}$	

* All values from [2024Og02],

** Only α -decay has been observed.

Table 9direct α emission from $^{271}\text{Hs}^*$, $J^\pi = (11/2)$, $T_{1/2} = 46^{+56}_{-16}$ s, $BR_\alpha = 100\%^{**}$.

E_α (c.m.)	E_α (lab)	I_α (abs)	π_f	$E_{daughter}(^{267}\text{Sg})$	coincident γ -rays (keV)	R_0 (fm)	HF
9.480(20)	9.340(20)				1.478(50)	90^{+22}_{-13}	

* All values from [2024Og02],

** Only α -decay has been observed.**Table 10**direct α emission from $^{271m}\text{Hs}^*$, Ex. =unk, $J^\pi = (3/2)$, $T_{1/2} = 7.1^{+8.4}_{-2.5}$ s, $BR_\alpha = 100\%^{**}$.

E_α (c.m.)	E_α (lab)	I_α (abs)	π_f	$E_{daughter}(^{267}\text{Sg})$	coincident γ -rays (keV)	R_0 (fm)	HF
9.180(20)	9.050(20)	(3/2)			1.478(50)	2^{+5}_{-1}	

* All values from [2024Og02],

** Only α -decay has been observed.**Table 11**direct α emission from $^{275}\text{Ds}^*$, $J^\pi = (3/2)$, $T_{1/2} = 0.43^{+0.29}_{-0.12}$ ms, $BR_\alpha = 100\%^{**}$.

E_α (c.m.)	E_α (lab)	I_α (abs)	π_f	$E_{daughter}(^{271}\text{Hs})$	coincident γ -rays (keV)	R_0 (fm)	HF
11.365(20)	11.200(20)	(3/2)					

* All values from [2024Og02],

** Only α -decay has been observed.**References used in the Tables**

- [1] **1954St33** C. M. Stevens, M. H. Studier, P. R. Fields, J. F. Mech, P. A. Sellers, A. M. Friedman, H. Diamond, J. R. Huizenga, Phys. Rev. 94, 974 (1954). <https://doi.org/10.1103/PhysRev.94.974>
- [2] **1955Gh01** A. Ghiorso, S. G. Thompson, G. H. Higgins, G. T. Seaborg, M. H. Studier, P. R. Fields, S. M. Fried, H. Diamond, J. F. Mech, G. L. Pyle, J. R. Huizenga, A. Hirsch, W. M. Manning, C. I. Browne, H. L. Smith, R. W. Spence, Phys. Rev. 99, 1048 (1955). <https://doi.org/10.1103/PhysRev.99.1048>
- [3] **1956Jo09** M. Jones, R. P. Schuman, J. P. Butler, G. Cowper, T. A. Eastwood, H. G. Jackson, Phys. Rev. **102**, 203 (1956). <https://doi.org/10.1103/PhysRev.102.203>
- [4] **1961Br40** R. Brandt, R. C. Gatti, L. Phillips, S. G. Thompson, UCRL-10023, p. 66 (1961).
- [5] **1962Br45** R. Brandt, UCRL-10481 (1962).
- [6] **1963Fi08** P. R. Fields, A. M. Friedman, J. Lerner, D. Metta, R. Sjoblom, Phys. Rev. 131, 1249 (1963). <https://doi.org/10.1103/PhysRev.131.1249>
- [7] **1963Ph01** L. Phillips, R. C. Gatti, R. Brandt, S. G. Thompson, J. Inorg. Nucl. Chem. **25**, 1085 (1963). [https://doi.org/10.1016/0022-1902\(63\).80125-6](https://doi.org/10.1016/0022-1902(63).80125-6)
- [8] **1964As01** F. Asaro, S. Bjornholm, I. Perlman, Phys. Rev. 133, B291 (1964). <https://doi.org/10.1103/PhysRev.133.B291>
- [9] **1966Rg01** Combined Radiochemistry Group LRL, LASL, UCRL, ANL, Phys. Rev. 148, 1192 (1966). <https://doi.org/10.1103/PhysRev.148.1192>
- [10] **1968Ch03** A. Chetham-Strode, Jr., R. J. Silva, J. R. Tarrant, I. R. Williams, Nucl. Phys. A107, 645 (1968). [https://doi.org/10.1016/0375-9474\(68\).90791-4](https://doi.org/10.1016/0375-9474(68).90791-4)
- [11] **1968Di09** H. Diamond, J. J. Hines, R. K. Sjoblom, R. F. Barnes, D. N. Metta, J. L. Lerner, P. R. Fields, J. Inorg. Nucl. Chem. 30, 2553 (1968). [https://doi.org/10.1016/0022-1902\(68\).80379-3](https://doi.org/10.1016/0022-1902(68).80379-3)
- [12] **1969Ba57** S. A. Baranov, V. M. Shatinskii, V. M. Kulakov, Yadern. Fiz. **10**, 1110 (1969); Soviet J. Nucl. Phys. **10**, 632 (1970).
- [13] **1969Me01** D. N. Metta, H. Diamond, F. R. Kelly, J. Inorg. Nucl. Chem. **31**, 1245 (1969). [https://doi.org/10.1016/0022-1902\(69\).80235-6](https://doi.org/10.1016/0022-1902(69).80235-6)

- [14] **1970BaZZ** S. A. Baranov, V. M. Shatinskii, V. M. Kulakov, Program and Theses, Proc. 20th Ann. Conf. Nucl. Spectrosc. Struct. At. Nuclei, Pt. 1, Leningrad, p. 169 (1970).
- [15] **1970BrZN** E. Browne, F. Asaro, UCRL-19530, p. 8 (1970).
- [16] **1971Ah01** I. Ahmad, F. T. Porter, M. S. Freedman, R. F. Barnes, R. K. Sjoblom, F. Wagner, Jr., J. Milsted, P. R. Fields, Phys. Rev. C **3**, 390 (1971). <https://doi.org/10.1103/PhysRevC.3.390>
- [17] **1971Bb10** S. A. Baranov, V. M. Shatinskii, V. M. Kulakov, Yad. Fiz. **14**, 1101 (1971); Sov. J. Nucl. Phys. **14**, 614 (1972).
- [18] **1971Fi01** P. R. Fields, I. Ahmad, A. M. Friedman, J. Lerner, D. N. Metta, Nucl. Phys. A **160**, 460 (1971). [https://doi.org/10.1016/0375-9474\(71\).90089-3](https://doi.org/10.1016/0375-9474(71).90089-3)
- [19] **1971SiYZ** R. J. Silva, M. L. Mallory, P. F. Dittner, P. J. Hammons, O. L. Keller, ORNL-4706, p. 65 (1971).
- [20] **1972SiZF** Jag J. Singh, THESIS, Carnegie-Mellon Univ, C D Siegal, DABBB 33B 864, 9/22/72
- [21] **1973Si40** R. J. Silva, P. F. Dittner, M. L. Mallory, O. L. Keller, K. Eskola, P. Eskola, M. Nurmi, A. Ghiorso, Nucl. Phys. A **216**, 97 (1973). [https://doi.org/10.1016/0375-9474\(73\).90520-4](https://doi.org/10.1016/0375-9474(73).90520-4)
- [22] **1975Ah01** I. Ahmad, J. Milsted, Nucl. Phys. A **239**, 1 (1975). [https://doi.org/10.1016/0375-9474\(75\).91129-X](https://doi.org/10.1016/0375-9474(75).91129-X)
- [23] **1975BrZP** E. Browne, F. Asaro, unpublished, (June 1975).
- [24] **1978WiZT** J. F. Wild, E. F. Hulet, R. W. Lougheed, J. H. Landrum, J. M. Nitschke, A. Ghiorso, LBL-6575, p. 31 (1978).
- [25] **1982Wi08** J. F. Wild, E. K. Hulet, R. W. Lougheed, P. A. Baisden, J. H. Landrum, R. J. Dougan, M. G. Mustafa, Phys. Rev. C **26**, 1531 (1982). <https://doi.org/10.1103/PhysRevC.26.1531>
- [26] **1986Mi10** S. Mirzadeh, Y. Y. Chu, S. Katcoff, L. K. Peker, Phys. Rev. C **33**, 2159 (1986). <https://doi.org/10.1103/PhysRevC.33.2159>
- [27] **1989Ab05** A. Abzouzi, M. S. Antony, V. B. Ndocko Ndongue, J. Radioanal. Nucl. Chem. **135**, 1 (1989). <https://doi.org/10.1007/BF02165454>
- [28] **1990Po14** Yu. S. Popov, I. B. Makarov, D. Kh. Srurov, E. A. Erin, Radiokhimiya **32**, 2 (1990); Sov. J. Radiochemistry **32**, 425 (1990).
- [29] **1991Po17** Yu. S. Popov, D. Kh. Srurov, I. B. Makarov, E. A. Erin, G. A. Timofeev, Radiokhimiya **33**, 3 (1991); Sov. J. Radiochemistry **33**, 1 (1991).
- [30] **1991Ry01** A Rytz, At Data NuclData Tables **47**, 205 (1991). [https://doi.org/10.1016/0092-640X\(91\)90002-L](https://doi.org/10.1016/0092-640X(91)90002-L)
- [31] **1995GrZV** K. E. Gregorich, C. D. Kacher, M. F. Mohar, D. M. Lee, M. R. Lane, E. Sylwester, D. C. Hoffman, M. Schadel, W. Bruchle, B. Schausten, E. Schimpf, J. V. Kratz, R. Gunther, U. Becker, N. Trautmann, GSI-94-1, p. 14 (1995).
- [32] **1997Ku20** W. Kurcewicz, I. S. Grant, K. Gulda, A. J. Aas, J. Billowes, M. J. G. Borge, D. G. Burke, P. A. Butler, J. F. C. Cocks, B. Fogelberg, S. J. Freeman, G. D. Jones, E. Hagebo, P. Hoff, J. Honsi, A. Lindroth, G. Lovhoiden, H. Mach, T. Martinez, R. A. Naumann, K. Nybo, G. Nyman, H. Ravn, B. Rubio, J. Simpson, A. G. Smith, J. F. Smith, K. Steffensen, J. L. Tain, O. Tengblad, T. F. Thorsteinsen, and the ISOLDE Collaboration, Nucl. Phys. A **621**, 827 (1997). [https://doi.org/10.1016/S0375-9474\(97\).00190-5](https://doi.org/10.1016/S0375-9474(97).00190-5)
- [33] **1999AhZY** I. Ahmad, M. P. Carpenter, R. V. F. Janssens, T. L. Khoo, T. Lauritsen, C. J. Lister, D. Seweryniak, I. Wiedenhover, A. Sonzogni, J. Uusitalo, P. Bhattacharyya, ANL-99/12 (Physics Division Ann. Rept., 1998), p. 33 (1999).
- [34] **2000Ah09** I. Ahmad, M. P. Carpenter, R. R. Chasman, J. P. Greene, R. V. F. Janssens, T. L. Khoo, F. G. Kondev, T. Lauritsen, C. J. Lister, P. Reiter, D. Seweryniak, A. Sonzogni, J. Uusitalo, I. Wiedenhover, P. Bhattacharyya, Phys. Rev. C **62**, 064302 (2000). <https://doi.org/10.1103/PhysRevC.62.064302>
- [35] **2002KrZV** J. V. Kratz, A. Nahler, U. Rieth, A. Kronenberg, B. Kuczewski, E. Strub, W. Bruchle, M. Schadel, B. Schausten, A. Turler, H. Gaggeler, C. Laue, R. Sudowe, P. A. Wilk, Univ. Mainz, 2001 Ann. Rept., p. A2 (2002); IKMZ 2002-1 (2002).
- [36] **2002KrZY** J. V. Kratz, A. Nahler, U. Rieth, A. Kronenberg, B. Kuczewski, E. Strub, W. Bruchle, M. Schadel, B. Schausten, A. Turler, H. Gaggeler, C. Laue, R. Sudowe, P. A. Wilk, GSI 2002-1, p. 2 (2002).
- [37] **2003Ah07** I. Ahmad, R. R. Chasman, J. P. Greene, F. G. Kondev, E. F. Moore, E. Browne, C. E. Porter, L. K. Felker, Phys. Rev. C **68**, 044306 (2003). <https://doi.org/10.1103/PhysRevC.68.044306>
- [38] **2003AhZZ** I. Ahmad, R. R. Chasman, J. P. Greene, F. G. Kondev, E. F. Moore, E. Browne, unpublished (2003).
- [39] **2003Kr20** J. V. Kratz, A. Nahler, U. Rieth, A. Kronenberg, B. Kuczewski, E. Strub, W. Bruchle, M. Schadel, B. Schausten, A. Turler, H. W. Gaggeler, D. T. Jost, K. E. Gregorich, H. Nitsche, C. Laue, R. Sudowe, P. A. Wilk, Radiochim. Acta **91**, 59 (2003). <https://doi.org/10.1524/ract.91.1.59.19010>

- [40] **2005Ah09** I. Ahmad, J. P. Greene, E. F. Moore, F. G. Kondev, R. R. Chasman, C. E. Porter, L. K. Felker, Phys. Rev. C **72**, 054308 (2005). <https://doi.org/10.1103/PhysRevC.72.054308>
- [41] **2008Du09** Ch. E. Dullmann, A. Turler, Phys. Rev. C **77**, 064320 (2008).; Erratum Phys. Rev. C **78**, 029901 (2008). <https://doi.org/10.1103/PhysRevC.77.064320>
- [42] **2010Al24** H. Alvarez-Pol, J. Benlliure, E. Casarejos, L. Audouin, D. Cortina-Gil, T. Enqvist, B. Fernandez-Dominguez, A. R. Junghans, B. Jurado, P. Napolitani, J. Pereira, F. Rejmund, K. -H. Schmidt, O. Yordanov, Phys. Rev. C **82**, 041602 (2010). <https://doi.org/10.1103/PhysRevC.82.041602>
- [43] **2010Gr04** R. Graeger, D. Ackermann, M. Chelnokov, V. Chepigin, Ch. E. Dullmann, J. Dvorak, J. Even, A. Gorshkov, F. P. Hessberger, D. Hild, A. Hubner, E. Jager, J. Khuyagbaatar, B. Kindler, J. V. Kratz, J. Krier, A. Kuznetsov, B. Lommel, K. Nishio, H. Nitsche, J. P. Omtvedt, O. Petrushkin, D. Rudolph, J. Runke, F. Samadani, M. Schadel, B. Schausten, A. Turler, A. Yakushev, Q. Zhi, Phys. Rev. C **81**, 061601 (2010). <https://doi.org/10.1103/PhysRevC.81.061601>
- [44] **2012Tu01** A. Turler, Radiochim. Acta **100**, 75 (2012). <https://doi.org/10.1524/ract.2011.1874>
- [45] **2013As02** M. Asai, K. Tsukada, M. Sakama, H. Haba, T. Ichikawa, Y. Ishii, A. Toyoshima, T. Ishii, I. Nishinaka, Y. Nagame, Y. Kasamatsu, M. Shibata, Y. Kojima, H. Hayashi, Phys. Rev. C **87**, 014332 (2013). <https://doi.org/10.1103/PhysRevC.87.014332>
- [46] **2014Ne14** C. D. Nesaraja, E. A. McCutchan, Nucl. Data Sheets **121**, 695 (2014). <https://doi.org/10.1016/j.nds.2014.09.005>
- [47] **2021Wa16** M. Wang, W. J. Huang, F. G. Kondev, G. Audi, S. Naimi, Chin. Phys. C **45**, 030003 (2021). <https://doi.org/10.1088/1674-1137/abddaf>
- [48] **2022Ah03** I. Ahmad, F. G. Kondev, M. Gott, J. P. Greene, K. Teh, Phys. Rev. C **106**, 064329 (2022). <https://doi.org/10.1103/PhysRevC.106.064329>
- [49] **2023Mo11** C. Morse, Nucl. Data Sheets **189**, 111 (2023). <https://doi.org/10.1016/j.nds.2023.04.002>
- [50] **2024Og02** Yu. Ts. Oganessian, V. K. Utyonkov, M. V. Shumeiko, F. Sh. Abdullin, G. G. Adamian, S. N. Dmitriev, D. Ibadullayev, M. G. Itkis, N. D. Kovrizhnykh, D. A. Kuznetsov, O. V. Petrushkin, A. V. Podshibiakin, A. N. Polyakov, A. G. Popeko, I. S. Rogov, R. N. Sagaidak, L. Schlattauer, V. D. Shubin, D. I. Solovyev, Yu. S. Tsyganov, A. A. Voinov, V. G. Subbotin, N. S. Bublikova, M. G. Voronyuk, A. V. Sabelnikov, A. Yu. Bodrov, N. V. Aksenov, A. V. Khalkin, Z. G. Gan, Z. Y. Zhang, M. H. Huang, H. B. Yang, Phys. Rev. C **109**, 054307 (2024). <https://doi.org/10.1103/PhysRevC.109.054307>