

Odd Z $T_z = -1/2$

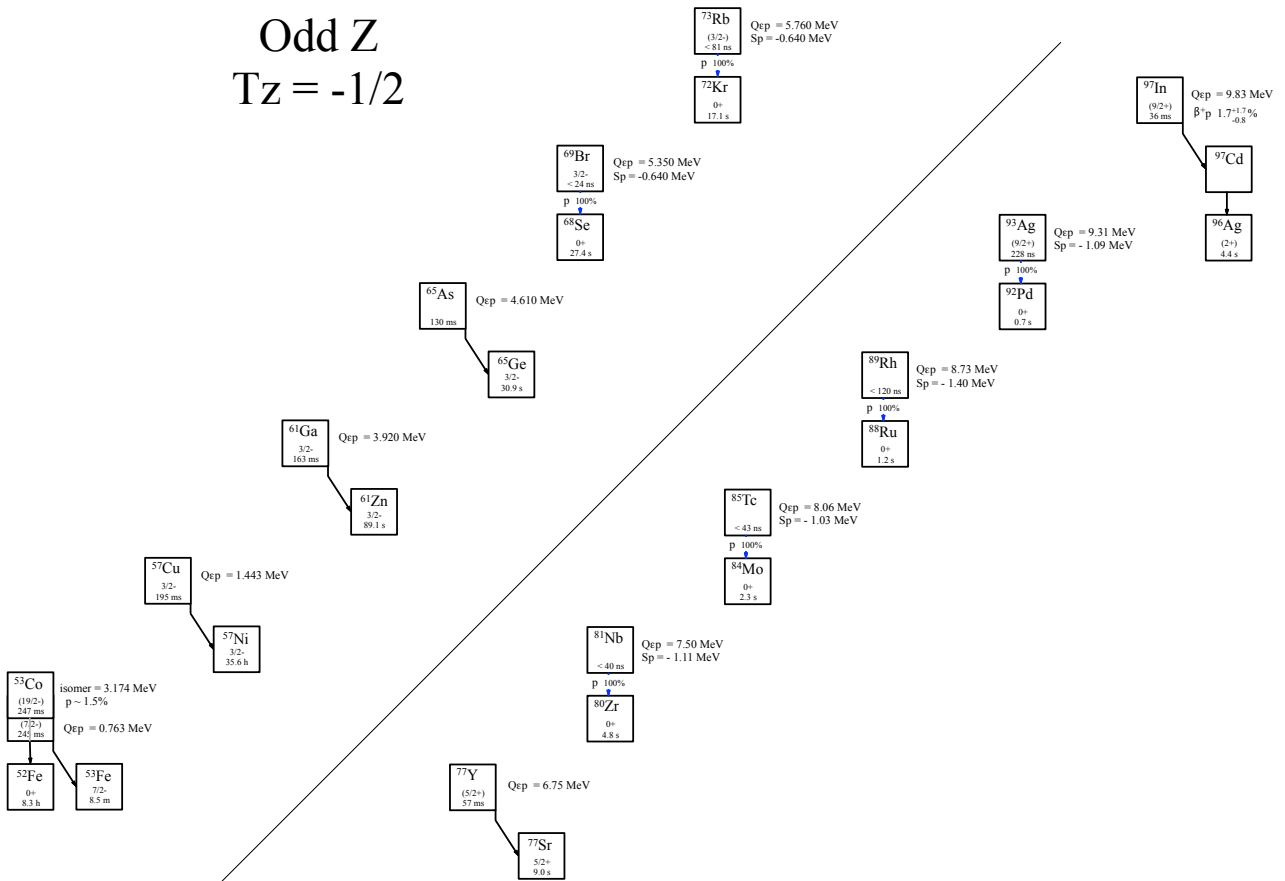


Fig. 1: Known experimental values for heavy particle emission of the odd-Z $T_z = -1/2$ nuclei.

Last Updated 12/11/2023

Table 1

Observed and predicted β -delayed particle emission from the odd-Z, $T_z = -1/2$ nuclei. Unless otherwise stated, all Q-values are taken from [2021Wa16] or deduced from values therein. J^π values for ^{57}Cu , and ^{61}Ga are taken from ENSDF.

Nuclide	Ex	J^π	$T_{1/2}$	Q_ϵ	$Q_{\epsilon p}$	$BR_{\beta p}$	$Q_{\epsilon 2p}$	$Q_{\epsilon \alpha}$	Experimental
^{53}Co		$(7/2^-)$	245(3) ms	8.2881(4)	0.7630(24)		-5.7867(17)	0.248(3)	[2017Ku12]
^{53m}Co	3.1752(23)	$(19/2^-)$	245(102) ms	11.403(8)	2.321(8)		-2.613(8)	3.422(8)	[2023SaXX, 2015Sh16, 1972Ce01, 1976Vi02, 1971Ce01, 1970Ce04]
^{57}Cu		$3/2^-$	195(4) ms	8.7749(4)	1.4425(5)		-4.4056(6)	1.214(2)	[2017Ku12]
^{61}Ga		$3/2^-$	163(5) ms	9.210(40)	3.920(40)	<0.25%**	-0.551(40)	6.529(40)	[2017Ku12, 2002We07]
^{65}As			130.3(6) ms	9.540(80)	4.610(80)		0.695(80)	6.984(82)	[2017GoZT, 2002Lo13]
^{69}Br		$3/2^-$	<24ns	10.180(40)	5.350(40)	7.793(40)	1.836(40)	7.793(40)	[2014De41]
^{73}Rb		$(3/2^-)$	< 81 ns	10.540(40)	5.760(40)		2.559(40)	8.00(40)	[2020Ho17, 2020Ho061]
^{77}Y		$(5/2^+)$	57^{+22}_{-12} ms	11.37(20)#	6.75(20)#	7.69(20)#	3.31(20)#	7.69(20)#	[2002Fa13]
^{81}Nb			< 40 ns	11.16(41)#	7.50(40)#		4.54(40)#	9.02(40)#	[2017Su26]
^{85}Tc			< 43 ns	11.66(40)#	8.06(40)#		5.48(40)#	9.25(41)#	[2017Su26]
^{89}Rh			< 120 ns	12.72(36)#	8.73(36)#		6.66(36)#	9.435(36)#	[2016Ce02]
^{93}Ag		$(9/2^+)$	228(16) ns	12.58(55)#	9.31(40)#		7.26(40)#	9.54(40)#	[2016Ce02]
^{97}In		$(9/2^+)$	36(6) ms	13.34(58)#	9.83(41)#	$1.7^{+1.7}_{-0.8}$ %	8.00(40)#	9.17(55)#	[2018Pa20, 2016Ce02, 2011StZV]
^{97m}In	0.61(18)	$(1/2^-)$	120(110) μs	13.95(61)#	10.44(45)#		8.61(44)#	9.78(58)#	[2018Pa20]

* Deduced from $\text{Sp}(^{53}\text{Co})$ and p energy.

** Not observed.

Table 2

Particle emission from the odd-Z, $T_z = -1/2$ nuclei. Unless otherwise stated, all Q-values and separation energies are taken from [2021Wa16] or deduced from values therein.

Nuclide	S_p	BR_{1p}	S_{2p}	Q_α	Experimental
^{53}Co	1.6163(17)	—	8.9941(17)	-7.464(3)	
^{53m}Co	-1.580(30)	1.3(1)%	5.798(30)	-4.267(30)	[2023SaXX, 2015Sh16, 1972Ce01, 1976Vi02, 1971Ce01, 1970Ce04]
^{57}Cu	0.6903(4)	—	7.8570(5)	-7.0746(18)	
^{61}Ga	0.250(40)	—	5.350(40)	-2.250(40)	
^{65}As	-0.090(80)		4.970(80)	-2.230(90)	
^{69}Br	-0.640(40)	100%	4.250(40)	-1.750(90)	[2014De41, 2011Ro18, 2011Ro47]
^{73}Rb	-0.642(40)	100%	4.090(40)	-2.180(60)	[2020Ho06, 2020Ho17, 2017Su31]
^{77}Y	-0.52(20)#		3.80(20)#	-2.85(21)#	
^{81}Nb	-1.11(50)#	100 %*	3.14(41)#	-2.35(45)#	[2017Su26, 2016Ce02, 2001Ki13]
^{85}Tc	-1.03(50)#	100 %*	2.82(43)#	-1.91(57)#	[2017Su26, 2016Ce02]
^{89}Rh	-1.40(20)#	100 %*	2.54(36)#	-2.23(54)#	[2016Ce02]
^{93}Ag	-1.09(53)#	100 %*	2.41(50)#	-3.17(54)#	[2016Ce02]
^{97}In	-0.89(57)#		2.06(57)#	-3.42(57)#	
^{97m}In	-1.50(60)#	100 %	1.45(60)#	2.81(60)#	[2018Pa20]

* Inferred by half-life

Table 3

Direct proton emission from $^{53m}\text{Co}^*$, Ex = 3.1752(23) MeV, $T_{1/2} = 250(10)$ ms, BR_p 1.3(1) %.

$E_p(\text{c.m.})$	$E_p(\text{lab})$	$I_p(\text{rel})$	$I_p(\text{abs})$	$E_{\text{daughter}}(^{52}\text{Fe})$	coinc γ -rays
0.7095(16)	0.6961(16)	1.90(29)%	0.025(4)%	0.849	0.849
1.5589(16)	1.5295(16)	100%	1.3(1) %	0.0	—

* All values taken from [2023SaXX].

Table 4Direct proton emission from $^{69}\text{Br}^*$, $T_{1/2} = <24$ ns, $\text{BR}_p \approx 1.5$ %.

$E_p(\text{c.m.})$	$E_p(\text{lab})$	$I_p(\text{abs})$	$E_{\text{emitter}}(^{69}\text{Br})$	$E_{\text{daughter}}(^{68}\text{Se})$
0.641(42)	0.632(42)	100 %	0	0

* All values taken from [2014De41].

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