

Odd Z $T_z = +3/2$

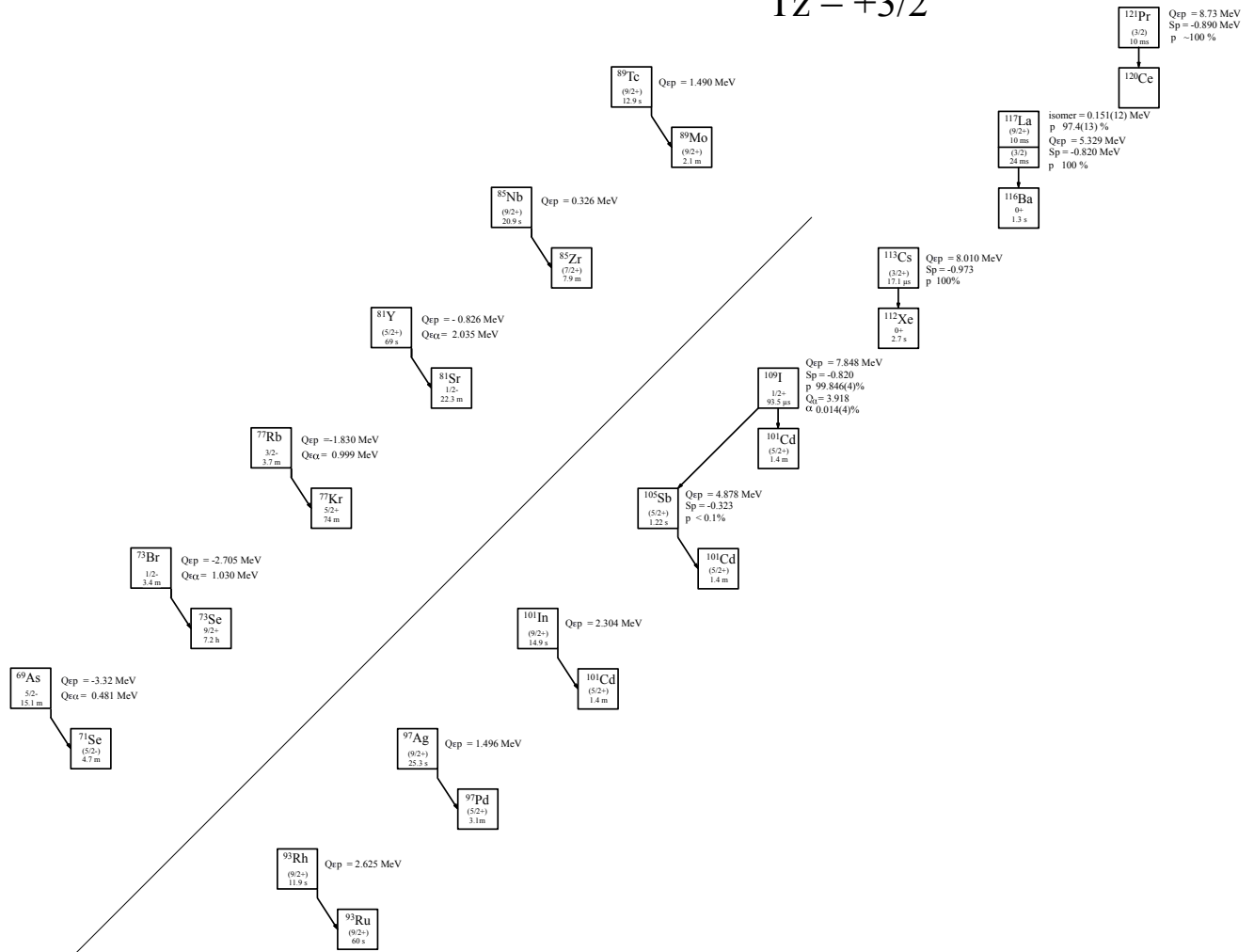


Fig. 1: Known experimental values for heavy particle emission of the odd-Z $T_z = +3/2$ nuclei.

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Table 1

Observed and predicted β -delayed particle emission from the odd- Z , $T_z = +3/2$ nuclei. Unless otherwise stated, all Q-values are taken from [2021Wa16] or deduced from values therein. J^π values for ^{69}As , ^{73}Br , ^{77}Rb , ^{81}Y , ^{85}Nd , ^{89}Tc , ^{93}Rh , ^{97}Ag 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
^{69}As		$5/2^-$	15.1(3) m	3.990(30)	-3.320(30)	—	-9.808(20)	0.377(20)	[1979Su02]
^{73}Br		$1/2^-$	3.4(2) m	4.5829(10)	-2.705(8)	—	-8.317(7)	1.030(7)	[1987He21]
^{77}Rb		$3/2^-$	3.78(4) m	5.3390(24)	-1.830(9)	—	-7.212(1)	0.999(7)	[1993A103]
^{81}Y		$(5/2^+)$	69.0(11) s	5.815(6)	-0.826(6)	—	-5.849(6)	2.032(5)	[1993Mi11]
^{85}Nb		$(9/2^+)$	20.9(7) s	6.896(8)	0.326(6)	—	-4.060(8)	2.823(5)	[1988Ku14]
^{89}Tc		$(9/2^+)$	12.8(9) s	7.620(5)	1.490(60)	—	-2.626(6)	3.355(7)	[1991He04]
^{93}Rh		$(9/2^+)$	11.9(7) s	8.205(3)	2.625(4)	—	-1.381(7)	3.578(5)	[2004De40]
^{97}Ag		$(9/2^+)$	25.3(3) s	6.902(13)	1.495(16)	—	-2.024(16)	3.888(12)	[1997Sc30]
^{101}In		$(9/2^+)$	14.9(12) s	7.292(12)	2.304(13)	$<1.7\%$	-0.940(13)	6.836(13)	[2019Pa16, 1997Sz04]
^{105}Sb		$(5/2^+)$	1.22(11) s	9.323(22)	4.878(23)	$<0.1\%$	2.059(22)	9.397(22)	[2007Ma35, 1997Sh13, 2007MaZB, 2005Li47, 2005LiZY, 1995Sc28, 1995Sc33, 1994Ti03]
^{109}I		$1/2^+$	93.5(3) μs	10.043(8)	7.484(9)	—	6.261(9)	13.240(8)	[2007Ma35, 2019Au02, 2012Ca03, 1995Ho26, 2007MaZB, 1999Yu02, 1997IkZZ, 1995Ho26, 1993HeZS, 1993Se04, 1991He21, 1987FaZT, 1987Gi02, 1984Fa04]
^{113}Cs		$(3/2^+)$	17.1(2) μs	10.439(11)	8.010(13)	—	7.244(11)	13.525(10)	[2015Wa02, 1995Ho26, 1994Pa12, 2012Ca03, 2012Wa10, 2002Ry02, 1998GrZT, 1998GrZZ, 1993HeZS, 1987Gi02, 1987FaZT, 1984Fa04]
^{117}La		$(3/2^+)$	20.1(25) ms	11.19(32)#	8.48(22)#	—	7.81(20)#	13.51(20)#	[2022Zh76, 2011Li28, 2001Ma69, 2001So02, 2007LiZR]
^{117m}La	0.151(12)	$(9/2^+)$	10(5) ms	11.34(32)#	8.63(22)#	—	7.96(20)#	13.66(20)#	[2001So02]
^{121}Pr		$(3/2)$	10_{-3}^{+6} ms	11.14(64)#	8.73(58)#	—	8.46(54)#	13.46(56)#	[2005Ro19, 2007DaZU, 1972Bo28]

Table 2

Particle emission from the odd- Z , $T_z = +3/2$ 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	BR_α	Experimental
^{69}As	3.420(30)	—	10.810(30)	-2.880(30)	—	
^{73}Br	3.067(7)	—	10.330(8)	-2.960(30)	—	
^{77}Rb	3.106(4)	—	10.301(4)	-3.610(7)	—	
^{81}Y	2.690(6)	—	9.488(6)	-3.307(6)	—	
^{85}Nb	2.147(7)	—	8.652(19)	-4.072(7)	—	
^{89}Tc	1.997(5)	—	8.098(8)	-3.540(6)	—	
^{93}Rh	2.000(4)	—	7.603(4)	-4.042(5)	—	
^{97}Ag	2.010(13)	—	7.141(13)	-4.317(12)	—	
^{101}In	1.639(12)	—	6.410(13)	-0.066(17)	—	
^{105}Sb	-0.323(22)	$<0.1\%$	3.961(24)	2.104(25)	—	[2007Ma35, 1997Sh13, 2007MaZB, 2005Li47, 2005LiZY, 1995Sc28, 1995Sc33, 1994Ti03]
^{109}I	-0.820(4)	99.846(4)%	1.597(8)	3.918(21)	0.014(4)%	[2007Ma35, 1995Ho26, 2019Au02, 2012Ca03, 2007MaZB, 1999Yu02, 1997IkZZ, 1995Ho26, 1993HeZS, 1993Se04, 1991He21, 1987FaZT, 1987Gi02, 1984Fa04]
^{113}Cs	-0.9728(22)	100%	1.389(10)	3.483(8)	—	[1995Ho26, 2015Wa02, 1994Pa12, 2012Ca03, 2012Wa10, 2010Ho16, 2002Ry02, 1998GrZT, 1998GrZZ, 1993HeZS, 1993HeZV, 1987Gi02, 1987FaZT, 1984Fa04]
^{117}La	-0.820(3)	100%	1.15(23)#	3.07(20)#	—	[2022Zh76, 2011Li28, 2001So02, 2011Ma69, 2007LiZR, 2003ScZZ]
^{117m}La	-0.970(3)	100%	1.30(23)#	3.22(20)#	—	[2001So02]
^{121}Pr	-0.890(10)	$\approx 100\%$	1.11(58)#	2.30(54)#	—	[2005Ro19, 2007DaZU, 1972Bo28]

Table 3
direct proton emission from $^{109}\text{I}^*$, $J^\pi = 1/2^+$, $T_{1/2} = 93.5(2) \mu\text{s}^{**}$, $BR_p = 99.846(4)\%$.

$E_p(\text{c.m.})$	$E_p(\text{lab})$	$I_p(\text{abs})$	J_f^π	$E_{\text{daughter}}(^{108}\text{Te})$	coincident γ -rays
0.8202(40)	0.8126(40)	99.846(4)%	0^+	0.0	—

* All Values from [1995Ho26], except where noted.
** [2007Ma15].

Table 4
direct α emission from ^{109}I , $J^\pi = 1/2^+$, $BR_\alpha = 0.014(4)\%^*$.

$E_\alpha(\text{c.m.})$	$E_\alpha(\text{lab})$	$I_\alpha(\text{rel})$	$I_\alpha(\text{abs})$	J_f^π	$E_{\text{daughter}}(^{105}\text{Sb})$	coincident γ -rays	R_0 (fm)	HF
3.915(20)	3.774(20)	100%	0.014(4)%	$(5/2^+)$	0.0	—	1.658(30)	31_{-14}^{+22}

* All Values from [2007Ma15].

Table 5
direct proton emission from $^{113}\text{Cs}^*$, $J^\pi = (3/2^+)$, $T_{1/2} = 17.1(2) \mu\text{s}^{**}$, $BR_p = 100\%$.

$E_p(\text{c.m.})$	$E_p(\text{lab})$	$I_p(\text{abs})$	J_f^π	$E_{\text{daughter}}(^{112}\text{Xe})$	coincident γ -rays
0.969(3)	0.960(3)	100%	0^+	0.0	—

* All values from [1995Ho26], except where noted
** [2015Wa02].

Table 6
direct proton emission from ^{117}La , $J^\pi = (3/2^+)$, $T_{1/2} = 20.7(25) \text{ms}^*$, $BR_p = \approx 100\%$.

$E_p(\text{c.m.})$	$E_p(\text{lab})$	$I_p(\text{abs})$	J_f^π	$E_{\text{daughter}}(^{116}\text{Ba})$	coincident γ -rays
0.819(3)	0.812(3)**	$\approx 100\%$	0^+	0.0	—

* Weighted average of 20.1(25) ms [2011Li28] and 21.6(31) ms [2022Zh76].
** Weighted average of 0.808(5) MeV [2022Zh76] and 0.813(3) MeV [2011Li28].

Table 7
direct proton emission from ^{117m}La , $E_x = 0.151(12) \text{MeV}$, $J^\pi = (9/2^+)$, $T_{1/2} = 10(5) \text{ms}$, $BR_p = 100\%$

$E_p(\text{c.m.})$	$E_p(\text{lab})$	$I_p(\text{abs})$	J_f^π	$E_{\text{daughter}}(^{116}\text{Ba})$	coincident γ -rays
0.941(10)	0.933(10)	97.4(13)%	0^+	0.0	—

* All values from [2001So02], transition not observed in [2011Li28].

Table 8
direct proton emission from $^{121}\text{Pr}^*$, $J^\pi = (3/2)$, $T_{1/2} = 10_{-3}^{+6} \text{ms}$, $BR_p \approx 100\%$.

$E_p(\text{c.m.})$	$E_p(\text{lab})$	$I_p(\text{abs})$	J_f^π	$E_{\text{daughter}}(^{120}\text{Tc})$	coincident γ -rays
0.889(10)	0.882(10)	$\approx 100\%$	0^+	0.0	—

* All values from [2005Ro19].

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