^{23}Al εp decay 2011Sa15,2011Ki26,2000Pe28

History

Type	Author	Citation	Literature Cutoff Date
Full Evaluation	M. Shamsuzzoha Basunia	NDS 127, 69(2015)	1-Apr-2015

Parent: ^{23}Al: E=0.0; $J^\pi=5/2^+$; $T_{1/2}$=0.47 s *3*; Q(εp)=4640.6 *4*; %εp decay=1.25 *5*

^{23}Al-%εp decay: From ΣI(p). Note %β+p=1.22 *5* in 2011Sa15.

Other references: 1995Ti08, 2006Ia03.

Delayed proton emission.

2011Sa15: ^{23}Al produced from ^{1}H(^{24}Mg,^{23}Al) reaction, E=48 MeV/u, and implanted on detector stack. Target=H_2 cryogenic gas. Momentum achromat recoil separator (MARS) and a mass separator; Detectors: double-sided Si strip detector (DSSSD), a thick Si pad detector, HPGe detector; Measured Eγ, Iγ, delayed proton spectra, βp coin, βγ coin. 2006Ia03 – from same research group.

2011Ki26: ^{23}Al beam produced from ^{24}Mg(p,2n) reaction, E=40 MeV, of natural 4.3 mg/cm^2 thick Mg target and implanted in a carbon foil; Detectors: four double-sided silicon strip detectors (DSSSD). Measured E(proton), I(proton). Deduced excitation energies for proton unbound states, and branching ratios. Comparisons with shell-model calculations.

2000Pe28: ^{23}Al produced from ^{24}Mg(p,2n), E=40 MeV, and mass-separated using the IGISOL facility in Jyvaskyla and implanted in a carbon foil; Detectors: HPGe, 1 mm thick plastic ΔE_β detector, a gas ΔE-Si E detector telescope. Measured Eγ, Iγ, delayed proton spectra.

1995Ti08: ^{23}Al produced from ^{24}Mg(p,2n), E=40 MeV, and collected on tape, first experiment with ^{nat}Mg, and second one with 99.8% enriched ^{24}Mg targets. Observed four proton groups using Si ΔE+E telescope. Intensity calculated assuming measured relative proton branchings, log *ft*=3.3 to 7795 IAS, 100 microbarn cross section for ^{23}Al production (calculated), and ~100 nanobarn cross section for the 223 proton group (measured).

^{22}Na Levels

E(level)†	Jπ†	$T_{1/2}$†
0.0	3^+	2.6018 y *22*
583.1?	1^+	
890.8?	4^+	

† From Adopted Levels.

Delayed Protons (^{22}Na)

E(p)†	E(^{22}Na)	I(p)#&	E(^{23}Mg)	Comments
197‡ *11*	0.0	0.14 *3*	7787	E(p): Other values: 200 keV *20* (2000Pe28), 223 keV *20* (1995Ti08).
255‡ *9*	0.0	0.18 *4*	7848	E(p): Other values: 267 keV *9* (2000Pe28), 285 keV *20* (1995Ti08).
322‡ *14*	0.0	0.03 *1*	7917	
424‡ *14*	0.0	0.02 *1*	8024	E(p): Other value: 400 keV *20* (2000Pe28).
560 *5*	0.0	0.28 *1*	8166	E(p): From 1995Ti08. Other values: 554 keV *7* (2000Pe28), 554 keV *8* (2011Sa15),
839‡ *5*	0.0	0.41 *1*	8458	E(p): From 1995Ti08. Other values: 839 keV *6* (2000Pe28), 828 keV *8* (2011Sa15), 828.8 keV *19* (2011Ki26).
954[a] *2*	890.8?	0.0064@ *4*	9422	
1148 *3*	0.0	0.02 *1*	8781	E(p): Other value: 1152 keV *8* (2011Sa15). I(p): Other value: 0.0130 *7* (2011Ki26).
1204[a] *3*	583.1?	0.0058@ *4*	9468	
1266 *3*	0.0	0.02 *1*	8905	E(p): Other value: 1280 keV *9* (2011Sa15). I(p): Other value: 0.0168 *8* (2011Ki26).
1379 *4*	0.0	0.02 *1*	9023	E(p): Other value: 1357 keV *10* (2011Sa15).
1454 *5*	0.0	0.0032@ *6*	9102	
1495 *4*	0.0	0.03 *1*	9144	E(p): Other value: 1493 keV *9* (2011Sa15). I(p): Other value: 0.0174 *9* (2011Ki26).

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^{23}Al εp decay 2011Sa15,2011Ki26,2000Pe28 (continued)

Delayed Protons (continued)

E(p)[†]	E(^{22}Na)	I(p)[#&]	E(^{23}Mg)	Comments
1664 *4*	0.0	0.02 *1*	9321	E(p): Other value: 1654 keV *24* (2011Sa15). I(p): Other value: 0.0059 *4* (2011Ki26).
1760 *4*	0.0	0.05 *1*	9422	E(p): Other value: 1763 keV *9* (2011Sa15). I(p): Other value: 0.0214 *9* (2011Ki26).
1805 *5*	0.0	0.0084[@] *6*	9469	
1935 *5*	0.0	0.0025[@] *3*	9604	E(p): Other value: 1931 keV *14* (2000Pe28). 2011Ki26 argue this line in 2000Pe28 is a background.
2009 *7*	0.0	0.0008[@] *2*	9682	

[†] From 2011Ki26, except otherwise noted. Proton energies are in laboratory frame of reference.
[‡] From 2011Sa15 (values converted to lab energy).
[#] From 2011Sa15, except otherwise noted. All proton branches observed in 2011Ki26 are assumed to feed the ^{22}Na g.s., but as 2011Ki26 point out, 0.25% of the absolute proton intensity must feed the excited states in ^{22}Na, also stated in 2006Ia03. Proton intensity for two lowest-energy groups were low compared to values in 2011Sa15, 2000Pe28, and 1995Ti08. Considering total proton branch in the literature, evaluator list 2011Sa15 proton branch values in column. Other values are listed in comment section.
[@] From 2011Ki26.
[&] Absolute intensity per 100 decays.
[a] Placement of transition in the level scheme is uncertain.

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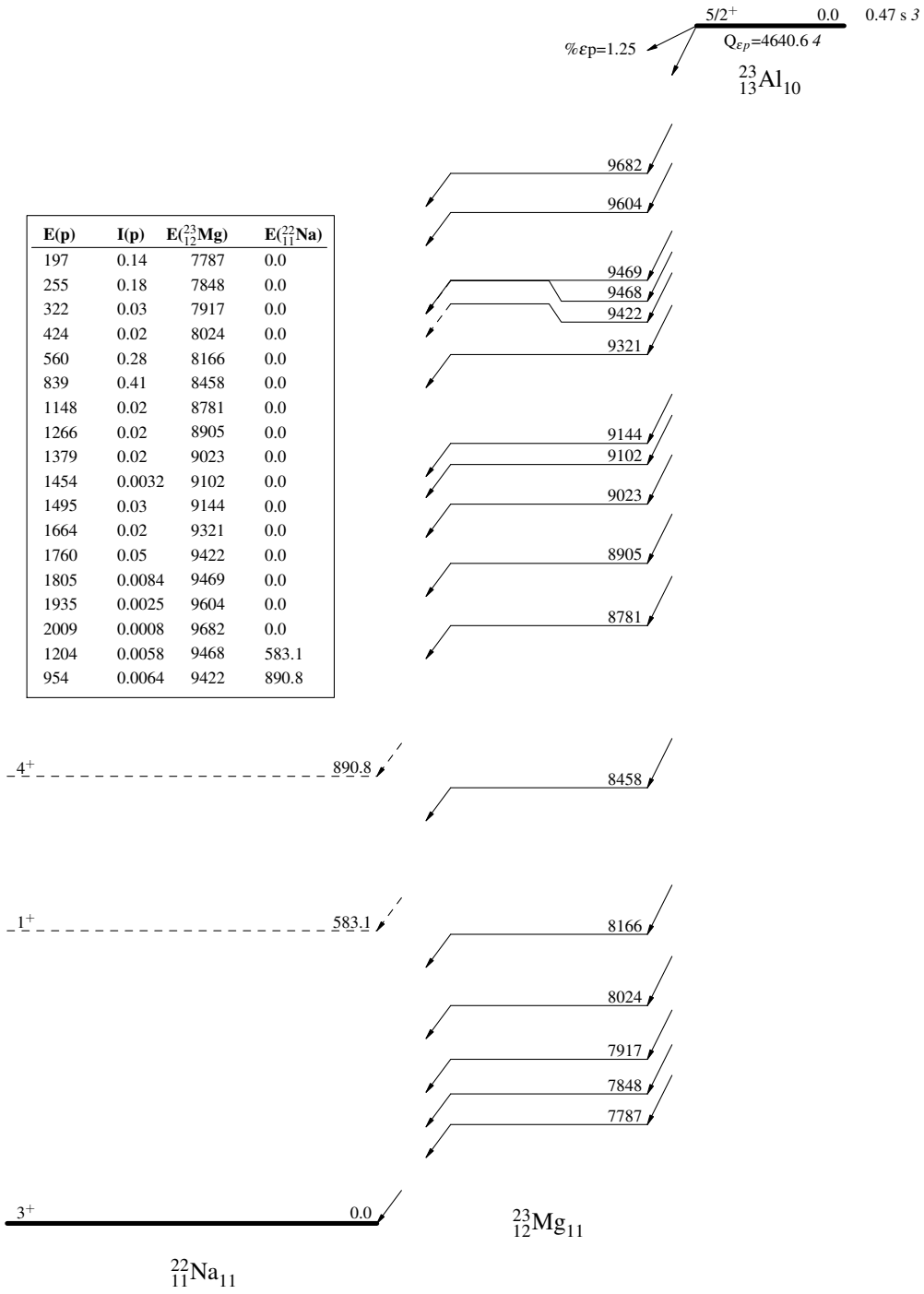
Decay Scheme

I(p) Intensities: I(p) per 100 parent decays



E(p)	I(p)	E($^{23}_{12}$Mg)	E($^{22}_{11}$Na)
197	0.14	7787	0.0
255	0.18	7848	0.0
322	0.03	7917	0.0
424	0.02	8024	0.0
560	0.28	8166	0.0
839	0.41	8458	0.0
1148	0.02	8781	0.0
1266	0.02	8905	0.0
1379	0.02	9023	0.0
1454	0.0032	9102	0.0
1495	0.03	9144	0.0
1664	0.02	9321	0.0
1760	0.05	9422	0.0
1805	0.0084	9469	0.0
1935	0.0025	9604	0.0
2009	0.0008	9682	0.0
1204	0.0058	9468	583.1
954	0.0064	9422	890.8