Adopted Levels, Gammas

History

Type	Author	Citation	Literature Cutoff Date
Full Evaluation	M. Shamsuzzoha Basunia	NDS 112,1875 (2011)	30-Nov-2010

Q(β^-)=9069 *4*; S(n)=6728 *6*; S(p)=13286 *19*; Q(α)=-1.126×10^4 *5* 2012Wa38
Note: Current evaluation has used the following Q record 9068 4 *6728* 5 *13286* 19-112.5E210 2011AuZZ.
S(p)=13240 *30*, Q(α)=$-$11270 *80* 2003Au03.
Some recent nuclear structure calculations: 2006Ko02, 2004Ge02, 2004La24.
2010Ro23: Measured one-neutron knock out cross section for 39 neutron rich isotopes, ranging from carbon to aluminium and with neutron numbers from 8 to 22. For ^{27}Ne, the measured one-neutron knock out cross section is 64(8) mb on a beryllium target.
^{27}Na matter radii: 2.95 fm 4 (1998Su07); ^{27}Na charge radii: 3.01 fm 5 (2004An14).
Production cross section ~0.1 μb and ~0.5 μb, measured in ^{40}Ar fragmentation through ^{9}Be(^{40}Ar,X), E=90α MeV, and ^{181}Ta(^{40}Ar,X), E=94α MeV, reactions, respectively − 2007No13.
In 2006Kh08, 57.92 MeV/u and 50.65 MeV/u beams of ^{27}Na impinged on a Si target, measured σ=2099 (86) mb and σ=2192 (31) mb, respectively, for the Si(^{27}Na,x) reaction and a squared reduced absorption radius of r_0^2=1.172 (16) fm^2 is deduced and used to study the isospin dependence.

g-factor measurement: 1.557 *3* (2001Ne03), 1.558 *2* (1978Hu12).

^{27}Na Levels

Cross Reference (XREF) Flags

A	^{27}Ne β^- decay	D	^{2}H(^{26}Ne,nγ)
B	^{28}Ne β^-n decay	E	^{14}C(^{14}C,pγ)
C	^{29}Ne β^-2n decay	F	^{26}Mg(^{18}O,^{17}F)

E(level)[†]	J$^\pi$[@]	T$_{1/2}$	XREF	Comments
0.0[#]	5/2$^+$	301 ms *6*	ABCDEF	%β^-=100; %β^-n=0.13 *4* μ=+3.895 *5*; Q=$-$0.007 *3* J$^\pi$: J=5/2 from laser spectroscopy (1978Hu12), positive parity based on the logft=4.3 and 5.0 to 3/2$^+$ and 5/2$^+$ states, respectively, of ^{27}Mg in ^{27}Na β^- decay. Configuration: $\pi d_{5/2}$. T$_{1/2}$: weighted average of 280 ms 20 (1973Al13), 304 ms 7 (1974Ro31) and 295 ms 20 (1986Du07). %β^-n: From 1984Gu19. μ: From 1978Hu12. Other: 3.894 *3* (2000Ke09). Q: From 2000Ke09 (β − NMR). Other: Q=$-$0.03 *5*, recalculated value in 2000Ke09 from Q=0.06 *5* (1982To05) using a recent reference value of ^{23}Na.
62.9 *6*	(3/2$^+$)		ABCDE	J$^\pi$: From an analog state at 90 keV of J$^\pi$=3/2$^+$ in ^{25}Na and shell-model calculations (2002Co11). 63γ (M1+E2) to 5/2$^+$ state.
1728.0 *8*	(1/2$^+$)		A DEF	J$^\pi$: J$^\pi$=1/2$^-$ for this state is proposed in 2002Co11 (^{14}C(^{14}C,pγ)); in inverse kinematics reaction of ^{2}H(^{26}Ne,nγ) the state was mainly produced via direct (d,n) reaction and should be a proton particle state and assigned a positive parity in 2006Ob05. In shell model calculation a 1/2$^+$ state at 1630 keV has been predicted with a configuration of $\pi(d_{5/2})^2(s_{1/2})^1$.
1815.7 *9*	[1/2$^+$]		E	
2191.8 *10*	(7/2$^+$)		A EF	J$^\pi$: 2129γ (E2) to (3/2$^+$) state.
2224.2[#] *9*	(9/2$^+$)		E	J$^\pi$: 2224γ (E2) to 5/2$^+$ state. Band member.
2287.9 *12*			A	
2729.1[‡] *10*	[5/2$^+$]		E	
2799.1 *8*			A	
3019.1 *8*	[3/2$^+$]		A E	
3508.2 *10*			A	

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Adopted Levels, Gammas (continued)

^{27}Na Levels (continued)

E(level)†	Jπ@	XREF	E(level)†	Jπ@	XREF
3582.3 *10*		A	5190.4# *13*	[13/2+]	E
3638.3 *10*		E	5408.9 *10*	[11/2+]	E
3657.2 *13*	[9/2+]	E	5590 *50*		F
3685.3 *10*		A	5704.6 *8*	[11/2+]	E
3781.3 *10*		A F	5762.7 *10*		E
3837.8 *14*	[5/2+]	E	5948.0 *12*	[9/2+]	E
4235.4 *9*	[7/2+]	E	6158.7 *8*	[9/2+]	E
4355.0 *16*		A	6518.4‡ *15*	[5/2+]	E
4525.4 *10*		E	6742.1 *12*	[7/2+,9/2,11/2+]	E
4716.7 *9*	[3/2+]	E	9186.7# *17*	[17/2+]	E
4980 *50*		F			

† From a least-square fit to γ-ray energies, assuming ΔE=1 keV for all γ-rays.
‡ Depopulating γ-ray from this level has been shown to feed the g.s. in the decay scheme (^{14}C,pγ). If the γ-ray feeds the 62.9 keV state, then the energy of the state would be 62.9 keV higher, indicated in 2002Co11.
# g.s. band.
@ Jπ between brackets are assigned mainly from a comparison of shell model level energies with experimental levels (2002Co11 – (^{14}C,pγ)).

γ(^{27}Na)

E_i(level)	J^π_i	E_γ†	I_γ†	E_f	J^π_f	Mult.@
62.9	(3/2+)	63	100	0.0	5/2+	(M1+E2)
1728.0	(1/2+)	1665	100 *17*	62.9	(3/2+)	
		1728	14 *7*	0.0	5/2+	
1815.7	[1/2+]	1753‡	100	62.9	(3/2+)	
2191.8	(7/2+)	2129	100	62.9	(3/2+)	(E2)
2224.2	(9/2+)	2224‡	100	0.0	5/2+	(E2)
2287.9		2225	100	62.9	(3/2+)	
2729.1	[5/2+]	2729‡	100	0.0	5/2+	
2799.1		2736	100 *14*	62.9	(3/2+)	
		2799	51 *8*	0.0	5/2+	
3019.1	[3/2+]	2956	32 *6*	62.9	(3/2+)	
		3019	100 *11*	0.0	5/2+	
3508.2		3508	100	0.0	5/2+	
3582.3		3582	100	0.0	5/2+	
3638.3		3638‡	100	0.0	5/2+	
3657.2	[9/2+]	1433‡	100	2224.2	(9/2+)	
3685.3		3685	100	0.0	5/2+	
3781.3		3781	100	0.0	5/2+	
3837.8	[5/2+]	1646‡	100	2191.8	(7/2+)	
4235.4	[7/2+]	4235‡	100	0.0	5/2+	
4355.0		2067	100	2287.9		
4525.4		4525‡	100	0.0	5/2+	
4716.7	[3/2+]	2901#	35#	1815.7	[1/2+]	
		4716#	100#	0.0	5/2+	
5190.4	[13/2+]	2966‡	100	2224.2	(9/2+)	
5408.9	[11/2+]	3217‡	100	2191.8	(7/2+)	

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Adopted Levels, Gammas (continued)

$\gamma(^{27}Na)$ (continued)

E_i(level)	J^π_i	E_γ †	I_γ †	E_f	J^π_f
5704.6	[11/2+]	1469#	61#	4235.4	[7/2+]
		3480#	100#	2224.2	(9/2+)
5762.7		5762‡	100	0.0	5/2+
5948.0	[9/2+]	539‡	100	5408.9	[11/2+]
6158.7	[9/2+]	454#	100#	5704.6	[11/2+]
		750#	50#	5408.9	[11/2+]
		6158#	50#	0.0	5/2+
6518.4	[5/2+]	3789‡	100	2729.1	[5/2+]
6742.1	[7/2+,9/2,11/2+]	794#	79#	5948.0	[9/2+]
		4550#	100#	2191.8	(7/2+)
9186.7	[17/2+]	3996‡	100	5190.4	[13/2+]

† From ^{27}Ne β^- Decay, except otherwise noted.
‡ From $^{14}C(^{14}C,p\gamma)$.
# From $^{14}C(^{14}C,p\gamma)$.
@ From angular distribution measurement (($^{14}C,p\gamma$)−2002Co11).

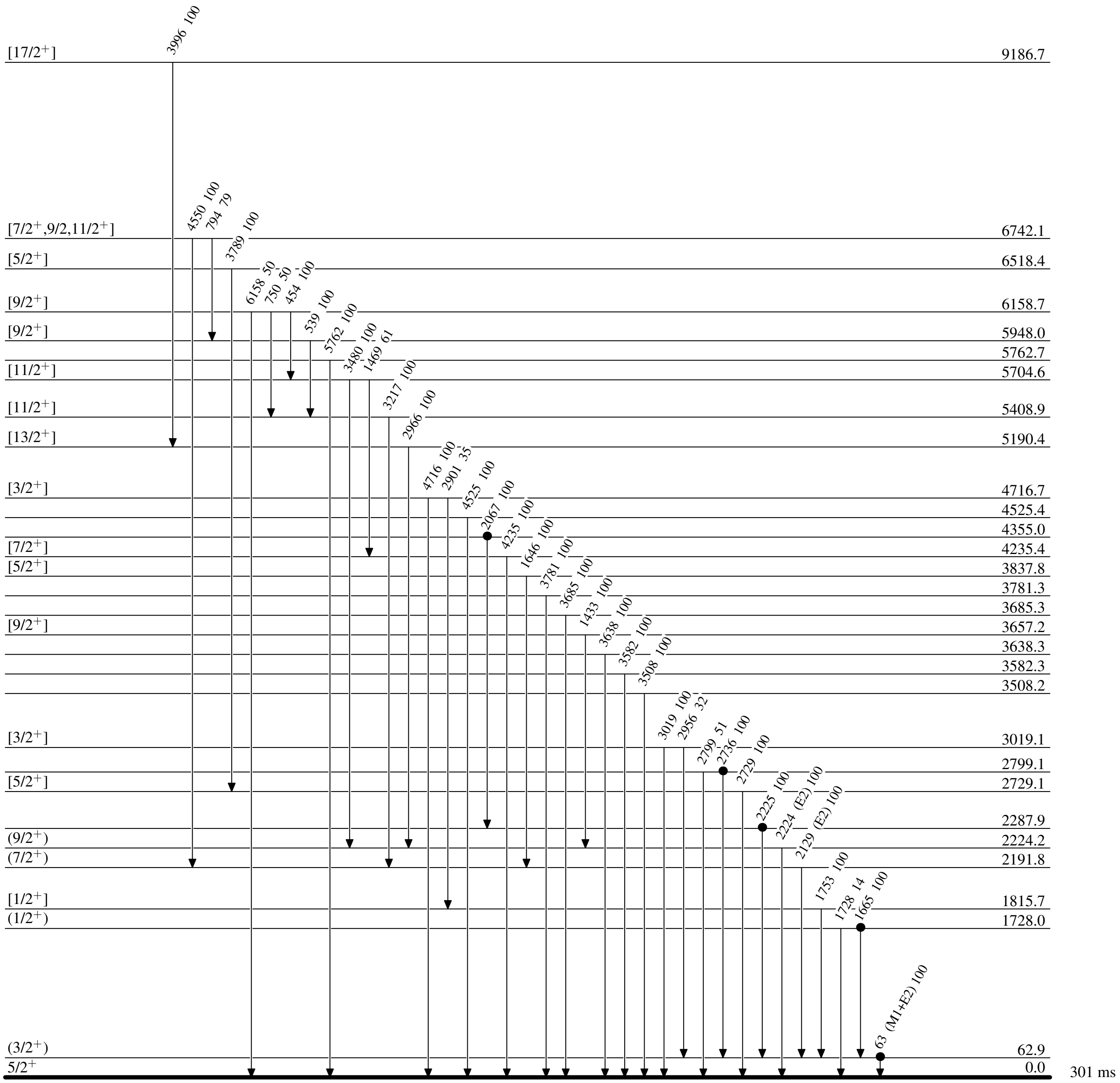
Adopted Levels, Gammas

Level Scheme

Intensities: Relative photon branching from each level

Legend

● Coincidence



$^{27}_{11}Na_{16}$