

Adopted Levels, Gammas

Type	Author	History	Citation	Literature Cutoff Date
Full Evaluation	M. S. Basunia, A. Chakraborty		NDS 197,1 (2024)	31-May-2024

$Q(\beta^-)=17356$ 5; $S(n)=2277$ 9; $S(p)=1.721 \times 10^4$ 15; $Q(\alpha)=-1.262 \times 10^4$ 11
 $S(2n)=6680$ 11, $S(2p)=3.951 \times 10^4$ 12, $Q(\beta^-n)=11016$ 5 ([2021Wa16](#)).

[2021Bh12](#): Inferred indirectly $^{29}\text{Na}(n,\gamma)$ reaction cross sections through Coulomb dissociation of ^{30}Na at incident projectile energy of 430 MeV/nucleon on a ^{208}Pb target using the FRS-LAND setup at GSI.

Nuclear effective root-mean-square (rms) radius measurement: 3.10 fm 3 and 3.13 fm 4, restricting size and diffuseness parameters, respectively ([1998Su07](#),[1997Su04](#)).

[2007No13](#): Production cross sections ~0.1 mb measured in fragmentation of $^9\text{Be}(^{40}\text{Ar},X)$, $E=90\text{A}$ MeV.

[2012Zh06](#): Production cross sections ~0.016 mb and ~0.018 mb were measured in fragmentation of $^9\text{Be}(^{40}\text{Ar},X)$ and $^{181}\text{Ta}(^{40}\text{Ar},X)$, $E=57$ MeV/nucleon, respectively.

In [2006Kh08](#), 46.97 and 41.00 MeV/A beams of ^{30}Na impinged on a Si target, measured $\sigma=2363$ mb 28 and $\sigma=2402$ mb 29, respectively, for the Si($^{30}\text{Na},x$) reaction and a reduced strong absorption radius of $\langle r_0^2 \rangle = 1.222 \text{ fm}^2$ 10 is deduced and used to study the isospin dependence.

Mass measurement: [2006Ga04](#), [2002To12](#), [2001Lu17](#).

 ^{30}Na Levels**Cross Reference (XREF) Flags**

A	^{30}Ne β^- decay	D	$\text{Be}(^{31}\text{Na},^{30}\text{Na}\gamma)$
B	$^1\text{H}(^{30}\text{Na},^{30}\text{Na}'\gamma)$,	E	$\text{Be}(^{31}\text{Mg},^{30}\text{Na}\gamma)$
C	Coulomb excitation	F	$\text{Be}(^{32}\text{Mg},X\gamma)$

E(level) [†]	J [‡]	T _{1/2}	XREF	Comments
0 [@]	2 ⁺	45.4 ms 11	ABCDEF	<p>%β^-=100; %β^-n=30 5; %β^-2n=1.27 25; %$\beta^-a=5.5 \times 10^{-5}$ 2 (1983De23) $\mu=+2.069$ 2 $Q=+0.15$ 4</p> <p>J[‡]: spin measured by LASER spectroscopy (1978Hu12), parity from shell model calculations (1983Wi08).</p> <p>T_{1/2}: weighted average of 48 ms 2 (1984La03), 50 ms 4 (1999Di01,2001Pe14 – previous value 48 ms 5 (1997Ta22)), 54 ms 12 and 52.2 ms 36 (1974Ro31 – from β and neutron counting, respectively), 50 ms 3 (1981ThZV – mass spectrometry – their previous value 55 ms 3 (1969Ki08,1972Ki04)), and 44.1 ms 8 – $\beta(t)$ (2017Ha23). Other: 38.5 ms 66 (2008ReZZ,1995ReZZ).</p> <p>μ: from 2000Ke09. Other value: +2.083 10 (1978Hu12, 2019StZV). N. Stone recommends the 2000Ke09 value by email (dated Mar 8, 2022), upon a private communication, was missed during the work of 2019StZV.</p> <p>Q: value from 2002Pr12 (Coulomb excitation) – spectroscopic quadrupole moment deduced by the evaluators from reported intrinsic quadrupole moment of 51 fm² 15. Others: +0.14 1 (1998KeZY (β-NMR) – value estimated from Figure 3 by the evaluators), 1998KeZY notes that the measured value is about 0.24 barn higher than the calculated value for sd-shell nuclei and did not report in their primary publication 2000Ke09; +0.142 5 (2000Ge20 – preliminary data in Fig. 9 estimated value by evaluators). Not listed in 2021StZZ – since it was not directly measured (email communication – Mar 8, 2022).</p> <p>%β^-n: from 2015Bi05,1984Gu19. Others: 26 4 (1979De02); 33 5 (1984La03); $P_n=47.8$ 56 (normalized value of 33.2 38 – 1974Ro31).</p> <p>%β^-2n: from 2015Bi05. Others: 1.30 25 and 1.15 25 (1980De26 – from neutron measurement and γ spectroscopy, respectively); $P_{2n}/P_n=0.042$ 8 (1981JoZV).</p>

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Adopted Levels, Gammas (continued) **^{30}Na Levels (continued)**

E(level) [†]	J^π [‡]	T _{1/2}	XREF	Comments
150.62 ^{&} 20	1 ⁺	≈347 ps	A CDEF	J^π : strongly populated from 0 ⁺ in ^{30}Ne β^- decay: log ft 4.05. T _{1/2} : from (^{31}Na , $^{30}\text{Na}'\gamma$) (2015Pe09).
337.9 ^a 14			DEF	
360 13			B	
424.0 [@] 18	(3 ⁺)		BCDEF	J^π : from comparison of the experimental and shell model calculated level energies (2004Ut03).
509.9 ^a 24			DEF	
516.1 ^{&} 5	(2 ⁺)		A DEF	J^π : from shell model calculations (2007Tr08 – ^{30}Ne β^- decay).
758 ^a 4			DEF	
925.0 [@] 21	(4 ⁺) [#]		CDEF	
926.0 6	1 ⁺		A F	J^π : Log ft=4.85 from 0 ⁺ .
1032.0 ^{&} 16			DEF	
1263.1 ^{&} 22			DEF	
1527 ^a 5			D F	
2113.6 6	1 ⁺		A	J^π : Log ft=4.40 from 0 ⁺ .

[†] From a least-squares fit to the γ -ray energies.[‡] Based on ^{30}Ne β^- decay feeding from 0⁺ g.s., except otherwise noted.

Tentative assignment in 2015Pe09 based on band structure.

@ Band(A): $K^\pi=(2^+)$, 2p2h, g.s. band.& Band(B): $K^\pi=(1^+)$, 2p2h band.^a Band(C): 1p1h/3p3h, $\pi=--$ band. **$\gamma(^{30}\text{Na})$**

E _i (level)	J_i^π	E _{γ} [†]	I _{γ} [†]	E _f	J_f^π	Mult.	Comments
						[M1+E2]	
150.62	1 ⁺	150.6 2	100	0	2 ⁺		B(M1)(W.u.)=0.019 +15-6 (if pure M1) B(E2)(W.u.)=3.8×10 ³ +32-13 exceeds RUL=100.
337.9		187 [‡] 2		150.62	1 ⁺		
		338 [‡] 2		0	2 ⁺		
360		360 [#] 13	100	0	2 ⁺		
424.0	(3 ⁺)	424 [‡] 2	100	0	2 ⁺		E _{γ} : Other: 403 keV 18 in (^{30}Na , $^{30}\text{Na}'\gamma$) (2006El03).
509.9		172 [‡] 2		337.9			
516.1	(2 ⁺)	365.5 5	100	150.62	1 ⁺		
758		248 [‡] 2		509.9			
925.0	(4 ⁺)	501 ^{‡‡} 2	67 [‡] 7	424.0	(3 ⁺)		
		925 ^{‡‡} 3	100 [‡] 7	0	2 ⁺		
926.0	1 ⁺	410.0 5	100 16	516.1	(2 ⁺)		
		775 1	22 8	150.62	1 ⁺		
1032.0		516 [‡] 2		516.1	(2 ⁺)		
		694 [‡] 3		337.9			
		1032 [‡] 3		0	2 ⁺		
1263.1		747 [‡] 3		516.1	(2 ⁺)		
		1263 [‡] 3		0	2 ⁺		
1527		769 [@] 3		758			
2113.6	1 ⁺	1597 1	100 20	516.1	(2 ⁺)		

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Adopted Levels, Gammas (continued) $\gamma(^{30}\text{Na})$ (continued)

E _i (level)	J _i ^π	E _γ [†]	I _γ [‡]	E _f	J _f ^π
2113.6	1 ⁺	1963 <i>I</i>	100 20	150.62	1 ⁺
		2114 <i>I</i>	80 20	0	2 ⁺

[†] From ^{30}Ne β^- decay, except otherwise noted.

[‡] From ($^{31}\text{Mg}, ^{30}\text{Nay}$).

[#] From ($^{30}\text{Na}, ^{30}\text{Na}'\gamma$).

[@] From ($^{31}\text{Na}, ^{30}\text{Nay}$).

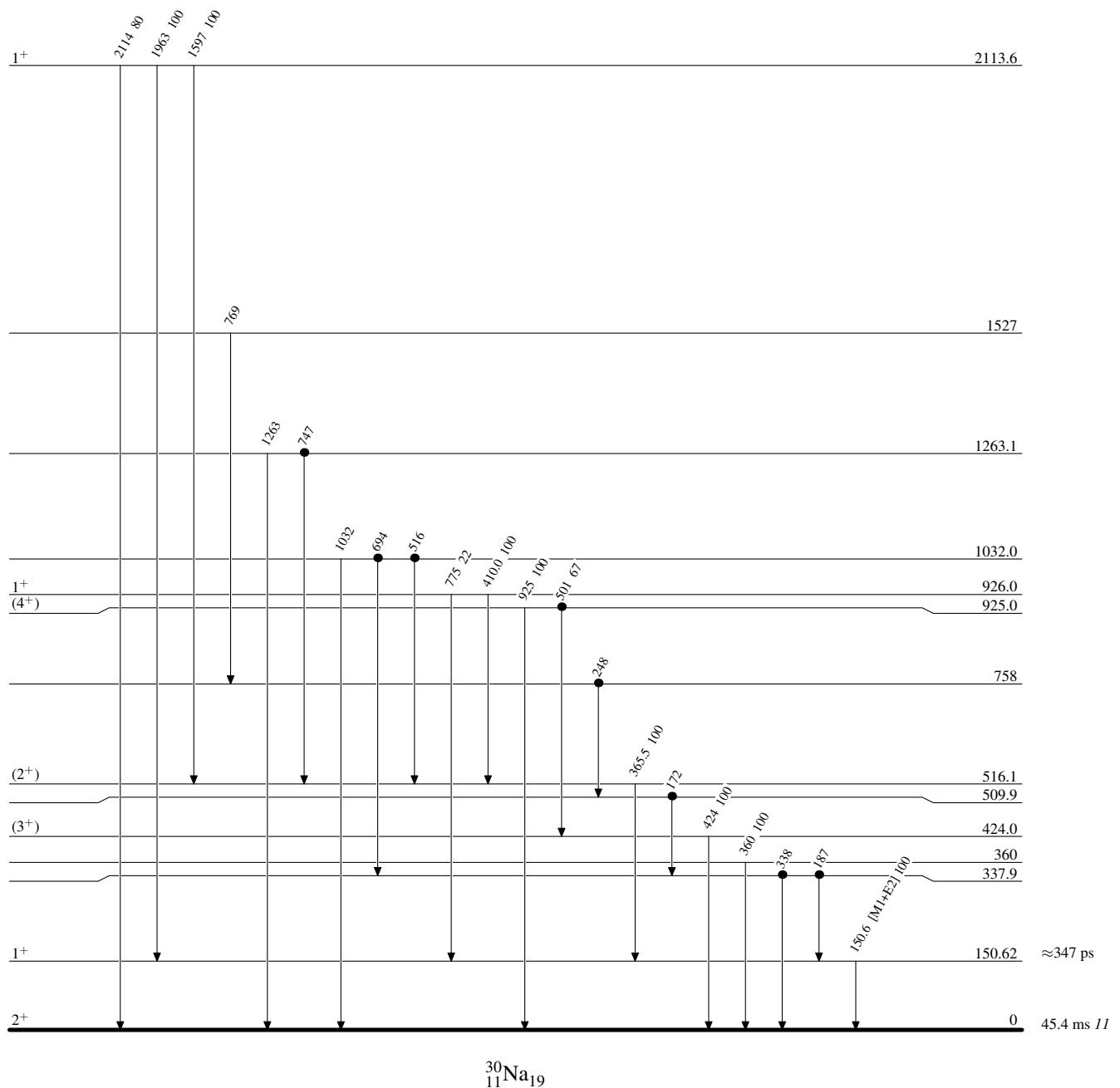
Adopted Levels, Gammas

Legend

Level Scheme

Intensities: Relative photon branching from each level

● Coincidence



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