

Adopted Levels, Gammas

Type	Author	History	Citation	Literature Cutoff Date
Full Evaluation	Jun Chen and Balraj Singh		NDS 190,1 (2023)	20-Jun-2023

$Q(\beta^-)=11270$ 90; $S(n)=5080$ 7; $S(p)=21530$ *syst*; $Q(\alpha)=-1730\times 10^1$ 12 [2021Wa16](#)
 Estimated uncertainty=300 for $S(p)$ ([2021Wa16](#)).
 $S(2n)=7709$ 6, $S(2p)=40620$ 300 (*syst*), $Q(\beta^-n)=6880$ 60 ([2021Wa16](#)).
 Other measurements:
[1989Le16](#): ⁴⁴S identified in ¹⁸¹Ta(⁴⁸Ca,X) reaction. Measured isotopic half-life.
[1993So06](#) (also [1995So03](#)): ⁴⁴S identified in ⁶⁴Ni(⁴⁸Ca,X) E=60 MeV/nucleon using LISE fragment spectrometer at GANIL facility, measured isotopic half-life and decay modes.
[2006Kh08](#): measured energy-integrated reaction cross section.
 Mass measurements: [2012Ga45](#), [2009Ri12](#), [2007Ju03](#), [2000Sa21](#) (also [2001Sa72](#)).
[2010Mo12](#): analyzed effects of the tensor force on the neutron and proton gaps.
 Mean-square radius from energy-integrated cross sections: [2006Kh08](#).
 Theoretical structure calculations:
[2022Su12](#): calculated levels, J^π , potential energy surfaces, B(E2) using antisymmetrized molecular dynamics.
[2016Eg01](#), [2011Ro48](#): calculated levels, J^π , B(E2), quadrupole moments using symmetry conserving configuration mixing (SCCM) method.
[2015Ut01](#), [2012Ut02](#): calculated levels, J^π , B(E2), S(2n), potential-energy surfaces deformation parameters using shell model.
[2014Ch21](#): calculated levels, J^π , B(E2), B(M1), quadrupole moment, β and γ deformation parameters using shell model.
[1994We16](#): calculated S(2n), quadrupole mass deformations, neutron distribution rms radii using self-consistent mean field theory.
 Other theoretical calculations: 57 other references for structure and two for radioactive decays retrieved from the NSR database (www.nndc.bnl.gov/nsr/) are listed in document records which can be accessed via web-based ENSDF database.
[Additional information 1](#).

⁴⁴S Levels

Cross Reference (XREF) Flags

A	⁴⁴ P β^- decay (18.2 ms)	E	⁹ Be(⁴⁶ Ar, ⁴⁴ S γ)
B	⁴⁵ P β^-n decay (24 ms)	F	⁹ Be(⁴⁸ Ca, ⁴⁴ S γ)
C	¹ H(⁴⁴ S,p' γ)	G	Coulomb excitation
D	⁹ Be(⁴⁵ Cl, ⁴⁴ S γ)		

E(level) [†]	J ^π	T _{1/2}	XREF	Comments
0.0	0 ⁺	117 ms 6	ABCDEF G	$\% \beta^- = 100$; $\% \beta^-n = 29$ 6 T _{1/2} : unweighted average of 125.5 ms 25 in (implants) β -decay curve and 119 ms 6 in (implants) $\beta\gamma$ -decay curve (2022Tr03); 100 ms 1 in (implants) β -decay (2004Gr20 , 2003Gr22); 123 ms 10 in (implants) β -decay (1995So03 , 1993So06). Other: 200 ms +50-30 (1989Le16). $\% \beta^-n$: unweighted average of 40 5 (2022Tr03 , β and γ decay of ⁴⁴ S and its descendants in the decay chain at NSCL-MSU); 18 3 (1993So06 , also 1995So03); and 30 10 (1989Le16). The values from 1993So06 and 1989Le16 are from (implants) β -n-coin in two different reactions at GANIL. Measured mean square radius (r_0^2)=1.62 fm ² 17 (2006Kh08). B(E2) \uparrow =0.0230 28 B(E2) \uparrow : weighted average of 0.0221 28 (2021Lo08) and 0.0314 88 (1997GI02) in Coulomb excitation. J ^π : level excited from 0 ⁺ in Coulomb excitation. T _{1/2} : deduced from adopted B(E2). $\%IT=100$ XREF: C(1385). J ^π : E0 transition to 0 ⁺ .
1329.0 5	2 ⁺	3.0 ps 4	A CDEFG	
1365.0 10	0 ⁺	2.619 μ s 26	C EF	

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Adopted Levels, Gammas (continued)

^{44}S Levels (continued)

E(level) [†]	J ^π	T _{1/2}	XREF	Comments
1617 7			F	T _{1/2} : from time distribution of 1362.5 electron peak in $^9\text{Be}(^{48}\text{Ca},\text{X}\gamma)$ (2010Fo04). J ^π : 2002So14 in ($^{48}\text{Ca},\text{X}\gamma$) proposed (0 ⁺) tentatively, but only one excited 0 ⁺ at ≈1365 is seen in other studies (2011Sa25,2005Gr30), and predicted by shell-model calculations in this energy region.
2150 11	(2 ⁺) [‡]		DE	
2281.1 10	(2 ⁺) [‡]	<2.1 ps	A CDE G	B(E2) _↑ =0.0010 6 (2021Lo08) XREF: A(?)G(2265). B(E2) from Coulomb excitation. T _{1/2} : recoil-distance method (2017Pa02) in $^9\text{Be}(^{46}\text{Ar},^{44}\text{S}\gamma)$. XREF: C(2479).
2467 6	(4 ⁺) [‡]	63 ps 14	CDE	T _{1/2} : weighted average of 69 ps 14 from ($^{45}\text{Cl},^{44}\text{S}\gamma$) and 53 ps 17 from ($^{46}\text{Ar},^{44}\text{S}\gamma$).
2632 11	(2 ⁺) [‡]		F	
3261 5	(2 ⁺) [‡]		C E	
3311 7	(2 ⁺)		DE	
4027 13			C	
4509 26			D	

[†] From a least-squares fit to γ -ray energies.

[‡] From shell-model prediction (2011Sa25).

$\gamma(^{44}\text{S})$

E _i (level)	J _i ^π	E _γ [‡]	I _γ [‡]	E _f	J _f ^π	Mult.	α [†]	I _(γ+ce) [‡]	Comments
1329.0	2 ⁺	1329.0 5	100	0.0	0 ⁺	[E2]	6.09×10 ⁻⁵ 9		B(E2)(W.u.)=4.9 +8-6 α(K)=2.289×10 ⁻⁵ 32; α(L)=1.766×10 ⁻⁶ 25; α(M)=1.489×10 ⁻⁷ 21 α(IPF)=3.61×10 ⁻⁵ 5 E _γ : others: 1320 8 from ($^{45}\text{Cl},^{44}\text{S}\gamma$), 1319 7 from ($^{46}\text{Ar},^{44}\text{S}\gamma$), and 1324 6 from Coulomb excitation.
1365.0	0 ⁺	(36)		1329.0	2 ⁺	[E2]	9.7 11	16.1 9	B(E2)(W.u.)=5.0 +11-8 ce(K)/(γ+ce)=0.83 4; ce(L)/(γ+ce)=0.070 11; ce(M)/(γ+ce)=0.0057 9 α(K)=8.9 10; α(L)=0.75 9; α(M)=0.060 7 E _γ : from level-energy difference; not observed. An uncertainty of 1 keV is assumed by 2010Fo04 in ($^{48}\text{Ca},^{44}\text{S}\gamma$). E _γ ,Mult.: electron transition in $^9\text{Be}(^{48}\text{Ca},\text{X}\gamma)$ (2005Gr30). Monopole strength ρ ² (E0)=0.0087 7 (2010Fo04).
		1365 1		0.0	0 ⁺	E0		100 6	
1617		288 7	100	1329.0	2 ⁺				E _γ : from ($^{46}\text{Ar},^{44}\text{S}\gamma$). Other: 2150 13 from ($^{45}\text{Cl},^{44}\text{S}\gamma$).
2150	(2 ⁺)	2150 [#] 11	100	0.0	0 ⁺				E _γ : weighted average of 954 4 from $^1\text{H}(^{44}\text{S},\text{p}'\gamma)$, 952 7 from ($^{45}\text{Cl},^{44}\text{S}\gamma$), 949 5 from ($^{46}\text{Ar},^{44}\text{S}\gamma$), and 941 19 from Coulomb excitation.
2281.1	(2 ⁺)	952 4	100	1329.0	2 ⁺				

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Adopted Levels, Gammas (continued)

$\gamma(^{44}\text{S})$ (continued)								
$E_i(\text{level})$	J_i^π	E_γ^\ddagger	I_γ^\ddagger	E_f	J_f^π	Mult.	α^\dagger	Comments
2281.1	(2 ⁺)	2281 [#]	<85	0.0	0 ⁺			I_γ : deduced by evaluators from measured $B(E2)^\dagger=0.0010$ 6 and $T_{1/2}<2.1$ ps.
2467	(4 ⁺)	1138 6	100	1329.0	2 ⁺	[E2]	3.79×10^{-5} 5	$B(E2)(\text{W.u.})=0.51$ +15-9 $\alpha(\text{K})=3.25 \times 10^{-5}$ 6; $\alpha(\text{L})=2.51 \times 10^{-6}$ 5; $\alpha(\text{M})=2.11 \times 10^{-7}$ 4 $\alpha(\text{IPF})=2.8 \times 10^{-6}$ 4 E_γ : weighted average of 1144 9 from $(^{45}\text{Cl}, ^{44}\text{S}\gamma)$, 1128 6 from $(^{46}\text{Ar}, ^{44}\text{S}\gamma)$, 1150 11 from $^1\text{H}(^{44}\text{S}, \text{p}'\gamma)$ and 1144 9 from $(^{45}\text{Cl}, ^{44}\text{S}\gamma)$.
2632	(2 ⁺)	988 15	50	1617				This γ was not used in the least-squares fit procedure, as the fit is poor with level-energy difference=1015 13 as compared to $E_\gamma=988$ 15, differing by about 2σ .
3261	(2 ⁺)	2632 11 1897 [#] 6	100 100 15	0.0 0 ⁺ 1365.0 0 ⁺				E_γ : weighted average of 1899 6 from $^1\text{H}(^{44}\text{S}, \text{p}'\gamma)$ and 1891 10 from $(^{46}\text{Ar}, ^{44}\text{S}\gamma)$. I_γ : from $^1\text{H}(^{44}\text{S}, \text{p}'\gamma)$. E_γ : weighted average of 1955 25 from $^1\text{H}(^{44}\text{S}, \text{p}'\gamma)$ and 1929 7 from $(^{46}\text{Ar}, ^{44}\text{S}\gamma)$. I_γ : from $^1\text{H}(^{44}\text{S}, \text{p}'\gamma)$.
3311	(2 ⁺)	1030 6 1979 19	42 8 100 21	2281.1 (2 ⁺) 1329.0 2 ⁺				E_γ, I_γ : from $(^{45}\text{Cl}, ^{44}\text{S}\gamma)$. E_γ, I_γ : from $(^{45}\text{Cl}, ^{44}\text{S}\gamma)$.
4027		2698 13	100	1329.0 2 ⁺				E_γ : from $^1\text{H}(^{44}\text{S}, \text{p}'\gamma)$.
4509		1198 [#] 25	100	3311 (2 ⁺)				E_γ : from $(^{45}\text{Cl}, ^{44}\text{S}\gamma)$.

[†] Additional information 2.

[‡] From $^9\text{Be}(^{48}\text{Ca}, \text{X}\gamma)$, unless otherwise noted.

[#] Placement of transition in the level scheme is uncertain.

Adopted Levels, Gammas

Legend

Level Scheme

Intensities: Relative photon branching from each level

-----▶ γ Decay (Uncertain)