^{30}Si(d,pγ) 1970Wo03,1970Gr15,1968Gi04

History

Type	Author	Citation	Literature Cutoff Date
Full Evaluation	Jun Chen and Balraj Singh	NDS 184, 29 (2022)	24-Jun-2022

1970Gr15: 5 MeV deuterons from Utrecht Van De Graaff tandem accelerator, targets were 95.5% enriched SiO_2. Measured Eγ, Iγ, $\gamma\gamma$, lifetimes using Doppler shift attenuation method (DSAM).

1970Wo03: 2-4 MeV deuterons. Targets were 95.55% enriched ^{30}Si. Measured proton spectra, lifetimes using DSAM.

1968Gi04: 2.95-4.00 MeV deuterons from Oxford University Van De Graaff accelerator, targets were 95.5% enriched SiO_2. Measured Eγ, pγ coin, E(p), angular distributions, deduced mixing ratios. Compared with DWBA analysis.

1968We07: 3.01-3.22 MeV deuterons from the Duke University Van de Graaff. Enriched SiO_2 targets (95.5% ^{30}Si). Measured Eγ, angular distributions and correlations.

Other:

1973Go02: 4.15 MeV polarized deuteron beam from the Triangle Universities Nuclear Laboratory Lamb-shift, polarized ion source. 200 μg/cm^2 enriched Si target. Measured $\gamma(\theta)$, $\gamma\gamma(\theta)$ with an array of four NaI(Tl) detectors. Deduced mixing ratios.

^{31}Si Levels

E(level)[†]	J$^\pi$[‡]	$T_{1/2}$[#]	Comments
0.0	3/2$^+$		J$^\pi$: from the Adopted Levels.
752.6 *2*	(1/2)	0.53 ps *12*	J$^\pi$: from $\gamma(\theta)$ in 1968Gi04; no unique spin from $\gamma(\theta)$ in 1968We07. $T_{1/2}$: from τ=0.76 ps *17*, weighted average of 0.79 ps *17* (1970Gr15) and 0.72 ps *+26−18* (1970Wo03).
1694.9 *3*	5/2$^+$	0.57 ps *15*	J$^\pi$: other: (5/2,7/2) from 1968Gi04. Parity from M1+E2 γ to g.s., 3/2$^+$. $T_{1/2}$: from τ=0.82 ps *21*, weighted average of 0.89 ps *21* (1970Gr15) and 0.74 ps *23* (1970Wo03).
2317.4 *10*	3/2$^+$	38 fs *17*	J$^\pi$: other: (1/2,3/2,5/2) from 1968Gi04. Parity from M1+E2 γ to g.s., 3/2$^+$. $T_{1/2}$: other: <0.21 ps (1970Wo03).
2790.1 *8*	1/2$^+$,3/2$^+$,5/2$^+$	14 fs *14*	J$^\pi$: M1+E2 γ to g.s., 3/2$^+$.
3133.5 *5*	7/2	0.37 ps *8*	J$^\pi$: other: (3/2,7/2) from 1968Gi04. $T_{1/2}$: from τ=0.54 ps *12*, weighted average of 0.55 ps *12* (1970Gr15) and 0.50 ps *+22−26* (1970Wo03).
3534.6 *8*	3/2	<10 fs	J$^\pi$: also from $\gamma\gamma(\theta)$ in 1968Gi04. $T_{1/2}$: other: <26 fs (1970Wo03).
4380	3/2		J$^\pi$: from $\gamma\gamma(\theta)$ in 1968Gi04. E(level): from 1968Gi04.

[†] From 1970Gr15, unless otherwise stated.
[‡] Assignments for excited states are from $\gamma\gamma(\theta)$ in 1968We07, unless otherwise noted.
[#] From DSAM in 1970Gr15, unless otherwise noted. Weighted average is taken where value from DSAM in 1970Wo03 is also available. Uncertainty reported by 1970Gr15 and 1970Wo03 include a 20% systematic uncertainty.

$\gamma(^{31}Si)$

A_2 and A_4 are from 1968Gi04 and 1968We07.

E$_i$(level)	J$_i^\pi$	E$_\gamma$[†]	I$_\gamma$[‡]	E$_f$	J$_f^\pi$	Mult.[#]	δ[#]	Comments
752.6	(1/2)	752.6	100	0.0	3/2$^+$			3627γ-752.6$\gamma(\theta)$: A_2=−0.02 *5*, A_4=+0.04 *7* (1968Gi04). 2781.8γ-752.6$\gamma(\theta)$: A_2=+0.01 *3*, A_4=−0.02 *4* (1968Gi04), A_2=+0.015 *15*, A_4=+0.026 *21* (1968We07).
1694.9	5/2$^+$	942.2	4 *2*	752.6	(1/2)			I$_\gamma$: others: <3 (1970Gr15), <5 (1968Gi04).
		1694.8	96 *2*	0.0	3/2$^+$	M1+E2	+4.4 *10*	I$_\gamma$: others: 100 (1970Gr15, 1968Gi04).

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^{30}Si(d,pγ) 1970Wo03,1970Gr15,1968Gi04 (continued)

$\gamma(^{31}Si)$ (continued)

E_i(level)	J_i^π	E_γ[†]	I_γ[‡]	E_f	J_f^π	Mult.[#]	δ[#]	Comments
								δ: weighted average of +4.7 *10* (1968We07), and +4 *1* (1968Gi04). A_2=+0.49 *3*, A_4=+0.23 *4* weighted average of data from (1968Gi04, 1968We07). 1438.5γ-1694.8$\gamma(\theta)$: A_2=+0.52 *6*, A_4=+0.15 *8* (1968Gi04), A_2=+0.54 *4*, A_4=+0.35 *5*, or A_2=+0.53 *2*, A_4=+0.29 *3* (1968We07). 1694.8$\gamma(\theta)$: A_2=+0.46 *12*, A_4=+0.36 *15* (1968Gi04), A_2=+0.50 *5*, A_4=+0.36 *7*, or A_2=+0.38 *3*, A_4=+0.12 *3* (1968We07).
2317.4	$3/2^+$	622.4	10 *6*	1694.9	$5/2^+$			I_γ: original value=10 *+2−6* (1968We07). Others: 14 *2* (1970Gr15), <10 (1968Gi04).
		1564.7	18 *6*	752.6	(1/2)			I_γ: others: 20 *3* (1970Gr15), ≈20 (1968Gi04).
		2317.3	72 *6*	0.0	$3/2^+$	M1+E2	+0.41 *22*	I_γ: others: 66 *3* (1970Gr15), ≈80 (1968Gi04). δ: 1973Go02 obtain +0.41 *22* and +1.34 *+44−77* from measured $\gamma\gamma(\theta)$ and rule out the larger value based on γ-decay pattern and RUL. Other: +0.09 to +2.75 or −0.7 to −2.75 from 1968We07. 2317.3$\gamma(\theta)$: A_2=+0.41 *8*, A_4=−0.09 *10*, or A_2=+0.13 *4*, A_4=+0.03 *5* (1968We07).
2790.1	$1/2^+,3/2^+,5/2^+$	472.7	<4[@]	2317.4	$3/2^+$			I_γ: others: <3 (1970Gr15); 14 *5* (1968We07) is discrepant.
		1095.2[&]	<4[@]	1694.9	$5/2^+$			I_γ: others: <10 (1970Gr15), <3 (1968We07).
		2037.5	5[@] *2*	752.6	(1/2)			I_γ: others: <4 (1968We07), <10 (1970Gr15).
		2790.1	95[@] *2*	0.0	$3/2^+$	M1+E2	+0.20 *5*	I_γ: others: 100 (1970Gr15), 86 *5* (1968We07). 2790.1$\gamma(\theta)$: A_2=+0.04 *7*, A_4=+0.10 *10* (1968Gi04), A_2=+0.01 *3*, A_4=+0.01 *5*, or A_2=−0.06 *5*, A_4=+0.04 *7* (1968We07). δ: weighted average of +0.20 *5* (1968We07), +0.2 *+1−2* (1968Gi04), for J(2790)=5/2.
3133.5	7/2	343.4[&]	<3	2790.1	$1/2^+,3/2^+,5/2^+$			I_γ: other: <4 (1968Gi04).
		816.1[&]	<3	2317.4	$3/2^+$			I_γ: other: <4 (1968Gi04).
		1438.5	100	1694.9	$5/2^+$	D+Q	−0.11 *10*	δ: from 1968We07. Other: 0.0 *1* (1968Gi04). 1438.5γ-1694.8$\gamma(\theta)$: A_2=−0.23 *5*, A_4=−0.07 *8* (1968Gi04),

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^{30}Si(d,pγ) 1970Wo03,1970Gr15,1968Gi04 (continued)

$\gamma(^{31}Si)$ (continued)

E_i(level)	J_i^π	E_γ[†]	I_γ[‡]	E_f	J_f^π	Mult.[#]	δ[#]	Comments
								A_2=−0.43 *4*, A_4=+0.11 *5* (1968We07).
3133.5	7/2	2380.8[&]	<3	752.6	(1/2)			I_γ: other: <4 (1968Gi04).
		3133.3[&]	<3	0.0	$3/2^+$			I_γ: other: <4 (1968Gi04).
3534.6	3/2	401.1[&]	<3	3133.5	7/2			I_γ: other: <5 (1968Gi04).
		744.4	8 *8*	2790.1	$1/2^+,3/2^+,5/2^+$			I_γ: deduced from <15 in 1968We07. Other: <5 (1968Gi04).
		1839.6[&]	<3	1694.9	$5/2^+$			I_γ: other: <5 (1968Gi04).
		2781.8	92 *8*	752.6	(1/2)	D(+Q)	+0.015 *40*	I_γ: deduced from %branching>85 in 1968We07. Other: 92 *4* (1968Gi04). Mult.,δ: from $\gamma\gamma(\theta)$ in 1973Go02. Other: −1.8 *2* is also from $\gamma\gamma(\theta)$ in 1973Go02, but is ruled out by the authors based on RUL. 2781.8γ-752.6$\gamma(\theta)$: A_2=−0.38 *3*, A_4=+0.04 *5* (1968Gi04), A_2=−0.390 *9*, A_4=+0.045 *13*, or A_2=−0.410 *17*, A_4=+0.079 *23* (1968We07).
		3534.4[&]	<1	0.0	$3/2^+$			I_γ: other: 8 *4* (1968Gi04).
4380	3/2	845[&]	<5[@]	3534.6	3/2			
		1246[&]	<5[@]	3133.5	7/2			
		1590[&]	<5[@]	2790.1	$1/2^+,3/2^+,5/2^+$			
		2062[&]	<5[@]	2317.4	$3/2^+$			
		2685	10[@] *3*	1694.9	$5/2^+$			
		3627	76[@] *8*	752.6	(1/2)			3627γ-752.6$\gamma(\theta)$: A_2=−0.58 *9*, A_4=+0.02 *13* (1968Gi04).
		4380	14[@] *5*	0.0	$3/2^+$			

[†] From level-energy differences with the recoil correction removed. Measured Eγ values with uncertainties are not given in references listed in this dataset.
[‡] 1968We07, except as noted.
[#] From angular correlation data of 1968Gi04 and 1968We07, with electric or magnetic natures determined based RUL where $T_{1/2}$ is known, unless otherwise noted.
[@] From 1968Gi04.
[&] Placement of transition in the level scheme is uncertain.

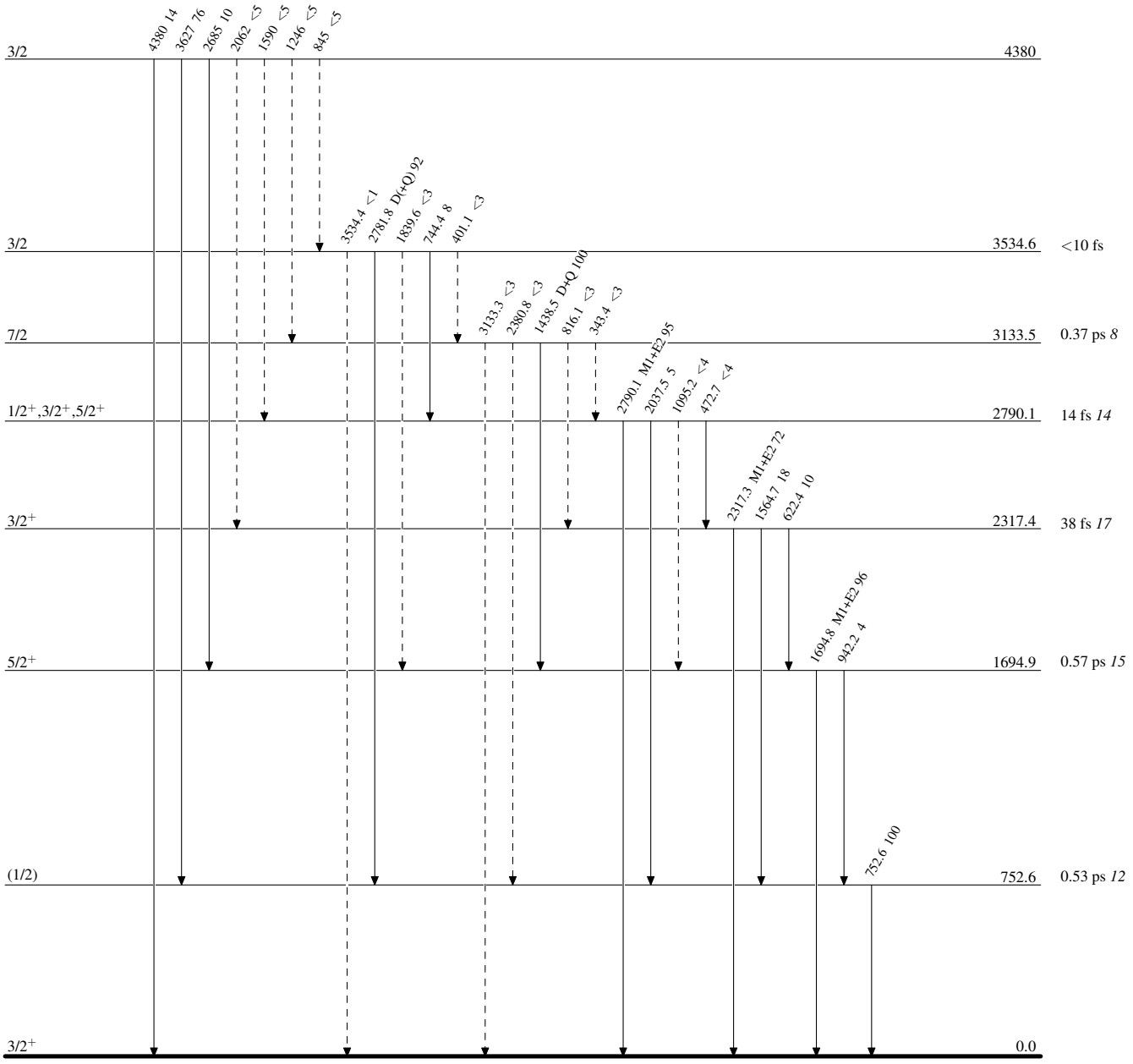
^{30}Si(d,pγ) 1970Wo03,1970Gr15,1968Gi04

Legend

Level Scheme

Intensities: % photon branching from each level

- - - - - - ► γ Decay (Uncertain)



$^{31}_{14}Si_{17}$