^{142}Nd(^{10}B,3nγ) 1979Si19

History

Type	Author	Citation	Literature Cutoff Date
Full Evaluation	Balraj Singh and Jun Chen	NDS 185, 2 (2022)	23-Aug-2022

Also includes ^{141}Pr(^{12}C,4nγ) from 1990Ad02.

1979Si19: E=46-54 MeV ^{10}B beams were produced from the McMaster University FN tandem accelerator. Targets were self-supporting metal foils of 99% enriched ^{142}Nd, in thickness of 1.5 mg/cm^2 for conversion electron measurements and 5 mg/cm^2 for γ measurements. γ rays were detected with Ge(Li) detectors and conversion electrons were detected with the online orange β-ray spectrometer. Measured Eγ, Iγ, $\gamma\gamma$-coin, $\gamma(\theta)$, γ(lin pol), Eβ, Iβ. Deduced levels, J^π, band structure, conversion coefficients, γ-ray multipolarities, mixing ratios.

1990Ad02: E=80 MeV ^{12}C beam was produced from the SF cyclotron of Institute for Nuclear Study, University of Tokyo. Targets were self-supporting foils of natural Pr with thickness of 10 to 20 mg/cm^2. γ rays were detected with Ge detectors. Measured Eγ, Iγ, $\gamma(\theta$,H), γ(t), $\gamma\gamma$-coin, $T_{1/2}$, g-factor.

^{149}Tb Levels

E(level)[†]	J^π[‡]	$T_{1/2}$	Comments
35.75[#] *8*	11/2$^-$	4.17 min *5*	%ε+%β^+=99.978 *4*; %α=0.022 *4* Energy, J^π, $T_{1/2}$ and decay modes from the Adopted Levels. Additional information 1.
822.6[#] *2*	15/2$^-$		
841.3 *5*	13/2$^-$		Level and J^π based on data in the Adopted Levels.
1129.3[@] *3*	15/2$^+$		
1382.3[#] *3*	19/2$^-$		
1673.0[#] *4*	23/2$^-$		
1813.4 *5*	21/2$^-$		
1868.1[@] *4*	19/2$^+$		
2303.3[#] *4*	27/2$^-$		
2350.3[@] *4*	23/2$^+$		
2518.8[@] *4*	27/2$^+$	2.5 ns *2*	$T_{1/2}$: weighted average of 2.6 ns *2* (1990Ad02) and 2.1 ns *4* (1979Si19). g factor=0.33 *8* (1990Ad02) (integral PAD method).
2664.3 *7*	25/2$^-$,29/2$^-$		J^π: (25/2)$^-$ in the Adopted Levels.
2813.3[@] *4*	29/2$^+$		
3142.7[@] *5*	31/2$^+$		
3528.2[@] *5*	(33/2)$^+$		
4209.3[&] *6*	33/2$^+$		
4464.2[&] *6*	35/2$^+$		
4674.8[&] *6*	37/2$^+$		
4923.9[&] *8*	39/2$^+$		
5148.6[&] *10*	41/2$^+$		

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

[‡] As proposed by 1979Si19 based on measured $\gamma(\theta)$, γ(lin pol), ce data, band assignment and known assignments of low-lying states. Assignments in the Adopted Levels are almost the same, except that several spins are placed in parentheses due to lack of strong arguments.

[#] Band(A): ΔJ=2 band, based on 11/2$^-$. Band assignment from 1979Si19.

[@] Band(B): Band based on 15/2$^+$. Band assignment from 1979Si19.

[&] Band(C): ΔJ=1 band, based on 33/2$^+$ Band assignment from 1979Si19.

^{142}Nd(^{10}B,3nγ) 1979Si19 (continued)

$\gamma(^{149}Tb)$

POL(exp) under comments (same as pol) are experimental polarization from counting rate asymmetry $\Delta=(N_{\|}-N_{\perp})/(N_{\|}+N_{\perp})$ with respect to the reaction plane, and POL(AD) the polarization deduced from angular distribution coefficients A_2 and A_4 assuming pure multipole and no parity change, with $POL(AD)=[3A_2+1.25A_4]/[2-A_2+0.75A_4]$. So for the ratio of POL(exp)/POL(AD), positive values indicate no parity change (like M1 or E2) while negative values indicate parity change (like E1) (1979Si19). Uncertainties in A_2 and A_4 are statistical only.

E_γ †	I_γ †	E_i(level)	J_i^π	E_f	J_f^π	Mult.‡	δ#	Comments
140.3 *5*	3.0	1813.4	$21/2^-$	1673.0	$23/2^-$	D+Q		A_2=−0.16 *2*; A_4=+0.17 *3*
168.4 *5*	9.7	2518.8	$27/2^+$	2350.3	$23/2^+$	E2		A_2=+0.27 *3*; A_4=−0.05 *4*; pol=+0.39 *9* δ(O/Q)=−0.02 *5*. POL(AD)=+0.44 *7*, POL(exp)/POL(AD)=+0.89 *28*.
210.5 *5*	5.3	4674.8	$37/2^+$	4464.2	$35/2^+$	D+Q		A_2=−0.26 *3*; A_4=+0.06 *4*
215.3 *2*	32.9	2518.8	$27/2^+$	2303.3	$27/2^-$	E1		A_2=+0.29 *2*; A_4=0.00 *1*; pol=−0.52 *3* δ(M2/E1)=+0.21 *5*, which gives unacceptable B(M2)(W.u.) as compared to RUL(B(M2)(W.u.)=1. POL(AD)=+0.53 *3*, POL(exp)/POL(AD)=−0.98 *8*.
224.7 *5*	4.6	5148.6	$41/2^+$	4923.9	$39/2^+$	D		A_2=−0.21 *3*; A_4=+0.08 *4* δ(Q/D)=0.00 *10*.
249.1 *5*	8.2	4923.9	$39/2^+$	4674.8	$37/2^+$	D+Q	+0.09 *4*	A_2=−0.14 *3*; A_4=+0.03 *3*
254.7 *5*	5.3	4464.2	$35/2^+$	4209.3	$33/2^+$	D		A_2=−0.06 *4*; A_4=0.00 *5*
288.0 *5*	1.5	1129.3	$15/2^+$	841.3	$13/2^-$			Placement from Adopted Gammas. 1979Si19 place this transition from a 3816 level, which is not reported in other studies.
290.7 *2*	68.1	1673.0	$23/2^-$	1382.3	$19/2^-$	E2		A_2=+0.28 *1*; A_4=−0.14 *1*; α(K)exp=0.055 *6*; pol=+0.42 *2* δ(Q/O)=−0.05 *2*. POL(AD)=+0.39 *2*, POL(exp)/POL(AD)=+1.08 *7*.
294.3 *2*	28.8	2813.3	$29/2^+$	2518.8	$27/2^+$	M1		A_2=−0.25 *1*; A_4=−0.02 *2*; α(K)exp=0.092 *10*; pol=−0.31 *4* δ(Q/D)=0.00 *2*. POL(AD)=−0.35 *5*, POL(exp)/POL(AD)=+0.89 *18*.
306.7 *2*	14.0	1129.3	$15/2^+$	822.6	$15/2^-$	E1		A_2=+0.26 *2*; A_4=−0.04 *2*; α(K)exp=0.011 *2*; pol=−0.48 *5* δ(Q/D)=+0.14 *5*. POL(AD)=+0.39 *4*, POL(exp)/POL(AD)=−1.23 *16*.
329.4 *2*	35.0	3142.7	$31/2^+$	2813.3	$29/2^+$	M1		A_2=−0.12 *1*; A_4=−0.02 *2*; pol=−0.24 *4* POL(AD)=−0.21 *3*, POL(exp)/POL(AD)=+1.14 *24*.
361.0 *5*	5.0	2664.3	$25/2^-$,$29/2^-$	2303.3	$27/2^-$	M1+E2		A_2=−0.20 *5*; A_4=+0.10 *6*; pol=−0.37 *25* POL(AD)=−0.21 *8*, POL(exp)/POL(AD)=+1.8 *12*.
385.5 *2*	20.0	3528.2	$(33/2)^+$	3142.7	$31/2^+$	M1		A_2=−0.31 *3*; A_4=+0.02 *2*; α(K)exp=0.059 *6* δ(Q/D)=−0.04 *3*.
431.2 *5*	7.0	1813.4	$21/2^-$	1382.3	$19/2^-$	D+Q	+0.05 *2*	A_2=−0.18 *4*; A_4=+0.02 *4*
482.2 *2*	10.5	2350.3	$23/2^+$	1868.1	$19/2^+$	E2		A_2=+0.18 *2*; A_4=−0.06 *2*; pol=+0.26 *9* δ(O/Q)=−0.07 *3*. POL(AD)=+0.35 *5*, POL(exp)/POL(AD)=+0.75 *30*.
510.2 *2*	20.0	2813.3	$29/2^+$	2303.3	$27/2^-$			
559.7 *2*	78.2	1382.3	$19/2^-$	822.6	$15/2^-$	E2		A_2=+0.25 *1*; A_4=−0.12 *1*; α(K)exp=0.0084 *10*; pol=+0.43 *3* δ(Q/O)=−0.05 *2*. POL(AD)=+0.39 *2*, POL(exp)/POL(AD)=+1.10 *9*.
630.4 *2*	56.6	2303.3	$27/2^-$	1673.0	$23/2^-$	(Q)		A_2=+0.25 *2*; A_4=−0.03 *2*
738.7 *2*	12.1	1868.1	$19/2^+$	1129.3	$15/2^+$	E2		A_2=+0.31 *4*; A_4=−0.16 *5*; pol=+0.38 *15*

Continued on next page (footnotes at end of table)

^{142}Nd(^{10}B,3nγ) 1979Si19 (continued)

$\gamma(^{149}Tb)$ (continued)

E_γ [†]	I_γ [†]	E_i(level)	J_i^π	E_f	J_f^π	Mult. [‡]	Comments
							δ(O/Q)=−0.05 *7*. POL(AD)=+0.32 *5*, POL(exp)/POL(AD)=+1.19 *49*.
786.8 *2*	100	822.6	15/2$^-$	35.75	11/2$^-$	E2	A_2=+0.25 *1*; A_4=−0.12 *2*; pol=+0.35 *7* δ(Q/O)=−0.07 *3*. POL(AD)=+0.38 *2*, POL(exp)/POL(AD)=+0.92 *19*.
1146.7 *5*	8.6	4674.8	37/2$^+$	3528.2	(33/2)$^+$	Q	A_2=+0.29 *4*; A_4=−0.09 *5*
1321.6 *5*	5.4	4464.2	35/2$^+$	3142.7	31/2$^+$	Q	A_2=+0.33 *7*; A_4=−0.18 *10*
1395.8 *5*	7.0	4209.3	33/2$^+$	2813.3	29/2$^+$	Q	A_2=+0.27 *5*; A_4=−0.09 *7*

[†] From 1979Si19. Based on a general statement in 1979Si19 that the uncertainty in energy is 0.2 keV for strong lines and 0.5 keV for weak lines, the evaluators have assigned uncertainties as follows: $\Delta E\gamma$=0.2 keV if $I\gamma \geq 10$ and 0.5 keV otherwise.

[‡] From ce, $\gamma(\theta)$ and γ(lin pol) data in 1979Si19, given under comments.

[#] From $\gamma(\theta)$ in 1979Si19.

^{142}Nd(^{10}B,3nγ) 1979Si19

Level Scheme

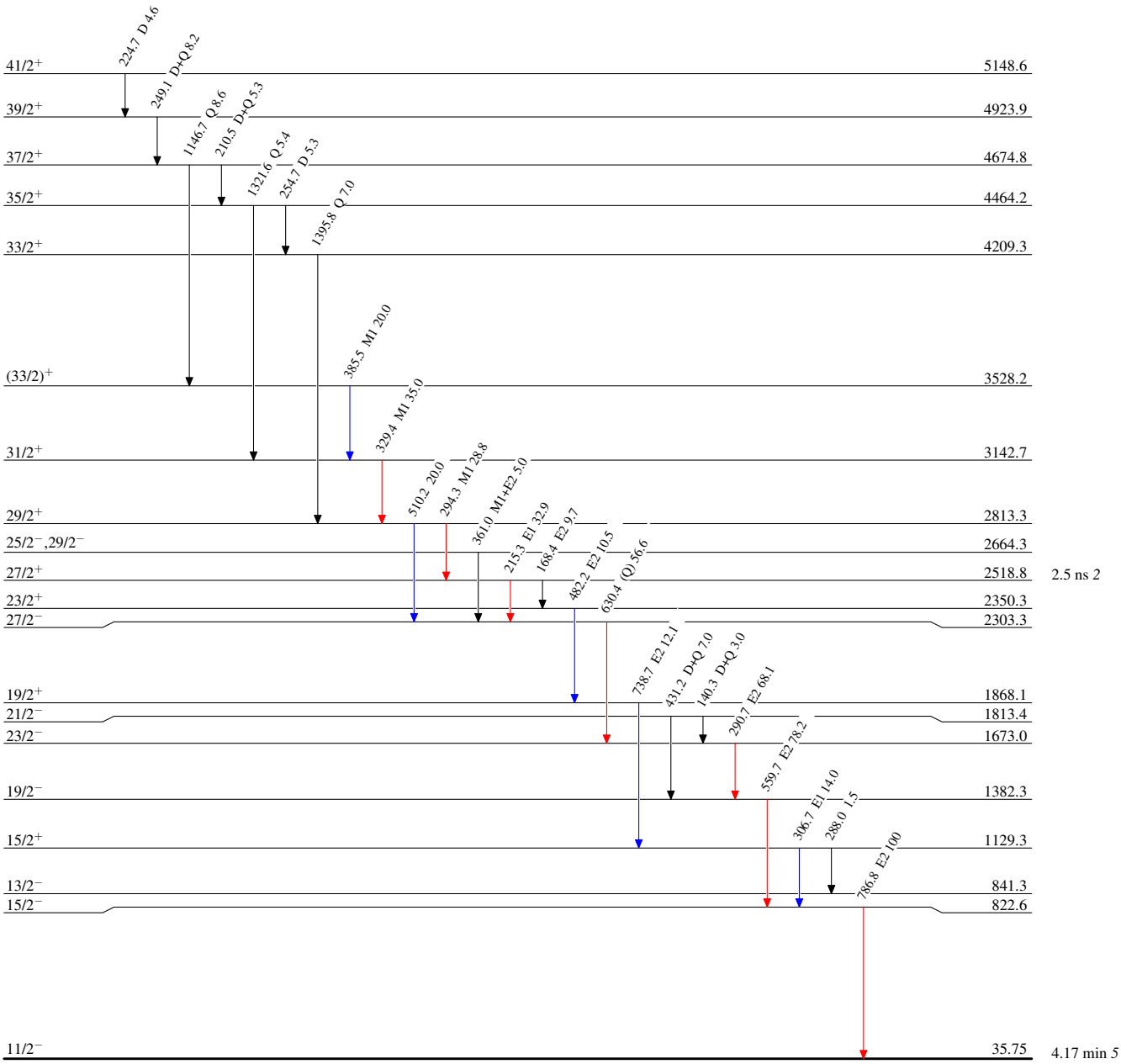
Intensities: Relative I_γ

Legend

$I_\gamma < 2\% \times I_\gamma^{max}$

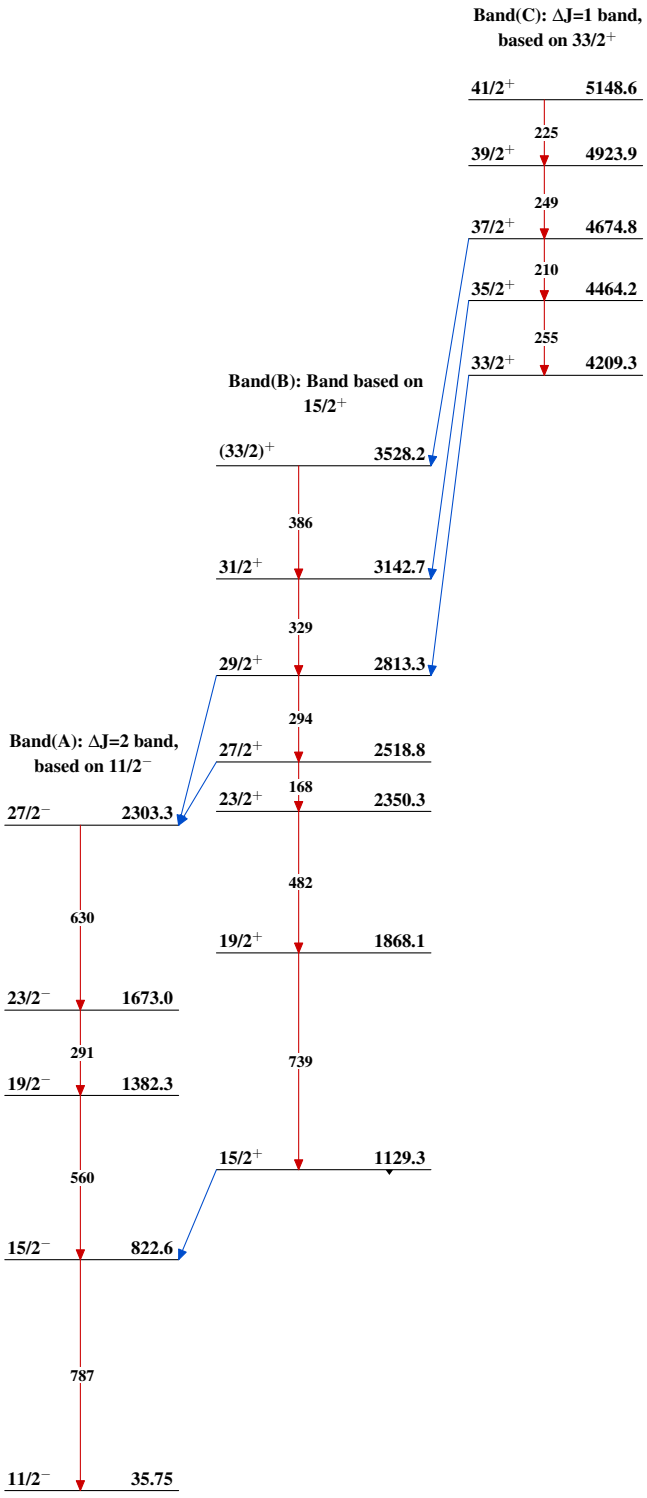
$I_\gamma < 10\% \times I_\gamma^{max}$

$I_\gamma > 10\% \times I_\gamma^{max}$



$^{149}_{65}Tb_{84}$

^{142}Nd(^{10}B,3nγ) 1979Si19



$^{149}_{65}Tb_{84}$