

¹⁴²Nd(²⁷Al,4n γ) 2001Ro01

Type	Author	History	Citation	Literature Cutoff Date
Full Evaluation	Ashok K. Jain and Anwesha Ghosh, Balraj Singh		NDS 107, 1075 (2006)	15-Apr-2006

2001Ro01: E=150 MeV. Measured E γ , I γ , $\gamma\gamma$, $\gamma(q)$, $\gamma\gamma(\theta)$ (DCO), and $\gamma(\text{lin pol})$ using AFRODITE spectrometer, comprised of eight Compton-suppressed Clover detectors, and seven fourfold segmented LEPS's.

Other:

1991CIZX, 1992Si12: ¹⁰⁶Pd(⁶³Cu,2p2n γ) E=290 MeV. Measured E γ , I γ , $\gamma\gamma$ using TESSA3 array. In **1991CIZX**, four tentative discrete structures were reported, none of which were interconnected. Cascades labeled as 1, 2 and 4 have some similarity with those in **2001Ro01**, whereas those labeled as 3, 5 and 6 are not reported by **2001Ro01**. About 10 γ rays were assigned to ¹⁶⁵Ta (energies not quoted) in γ -spectrum figure 1 of **1992Si12** based on a level scheme reported by **1991CIZX**.

¹⁶⁵Ta Levels

E(level) [†]	J π [‡]	E(level) [†]	J π [‡]	E(level) [†]	J π [‡]	E(level) [†]	J π [‡]
0.0 [#]	(9/2 ⁻)	1399.2 [#] 4	(21/2 ⁻)	2974.3 [#] 6	(33/2 ⁻)	4622.2 [#] 7	(45/2 ⁻)
70.60 [@] 24	(11/2 ⁻)	1618.4 [@] 4	(23/2 ⁻)	3174.5 [@] 6	(35/2 ⁻)	4983.1 [@] 7	(47/2 ⁻)
297.30 [#] 24	(13/2 ⁻)	2071.0 [#] 5	(25/2 ⁻)	3412.8 [#] 6	(37/2 ⁻)	5355.5 [#] 7	(49/2 ⁻)
470.1 [@] 3	(15/2 ⁻)	2294.8 [@] 5	(27/2 ⁻)	3683.0 [@] 6	(39/2 ⁻)	5752.5 [@] 7	(51/2 ⁻)
793.9 [#] 3	(17/2 ⁻)	2655.7 [#] 5	(29/2 ⁻)	3969.8 [#] 6	(41/2 ⁻)	6168.2 [#] 8	(53/2 ⁻)
997.9 [@] 4	(19/2 ⁻)	2790.5 [@] 5	(31/2 ⁻)	4291.7 [@] 6	(43/2 ⁻)		

[†] From least-squares fit to E γ 's.

[‡] As proposed by **2001Ro01**; parentheses have been added by the evaluators since the ground-state J π is tentative. The same assignments are given in the 'Adopted Levels'.

[#] Band(A): $\pi 9/2[514]$, $\alpha=+1/2$. The alignment of the first pair of i_{13/2} neutrons occurs at $\hbar\omega \approx 0.25$ MeV between spins 29/2 and 33/2.

[@] Band(a): $\pi 9/2[514]$, $\alpha=-1/2$. The alignment of the first pair of i_{13/2} neutrons occurs at $\hbar\omega \approx 0.25$ MeV between spins 27/2 and 31/2.

$\gamma(^{165}\text{Ta})$

DCO's are for 45° and 90° and gated on $\Delta J=2$, quadrupole transitions. DCO=0.8 and 1.3 correspond to $\Delta J=1$, dipole and $\Delta J=2$, quadrupole transitions, respectively.

POL=linear polarization coefficient of γ rays, positive for electric transitions and negative for magnetic transitions.

E γ	I γ	E _i (level)	J π _i [†]	E _f	J π _f [†]	Mult. [†]	Comments
70.6 3	21 4	70.60	(11/2 ⁻)	0.0	(9/2 ⁻)		DCO=1.01 20.
134.5 3	62 5	2790.5	(31/2 ⁻)	2655.7	(29/2 ⁻)	D	DCO=0.85 12.
172.8 [#] 3	79 15	470.1	(15/2 ⁻)	297.30	(13/2 ⁻)	M1	DCO=0.90 13. POL=-0.14 2.
^x 179 [‡]							
183.8 3	100 8	2974.3	(33/2 ⁻)	2790.5	(31/2 ⁻)	M1	DCO=0.78 11. POL=-0.15 3.
^x 188 [‡]							
200.2 3	80 6	3174.5	(35/2 ⁻)	2974.3	(33/2 ⁻)	M1	DCO=0.83 12. POL=-0.22 3.
204.0 3	46 6	997.9	(19/2 ⁻)	793.9	(17/2 ⁻)	D	DCO=0.68 19.
^x 207 [‡]							
^x 210 [‡]							
219.2 3	20.1 20	1618.4	(23/2 ⁻)	1399.2	(21/2 ⁻)	D	DCO=0.62 10.
224.0 3	25.3 23	2294.8	(27/2 ⁻)	2071.0	(25/2 ⁻)		

Continued on next page (footnotes at end of table)

¹⁴²Nd(²⁷Al,4n γ) **2001Ro01** (continued)

γ (¹⁶⁵Ta) (continued)

<u>Eγ</u>	<u>Iγ</u>	<u>E_i(level)</u>	<u>Jπ_i</u>	<u>E_f</u>	<u>Jπ_f</u>	<u>Mult.[†]</u>	<u>Comments</u>
^x 225 [‡]							
226.7 [#] 3	151 21	297.30	(13/2 ⁻)	70.60	(11/2 ⁻)	M1	DCO=1.06 15 for an unresolved doublet. POL=-0.08 I.
238.4 3	81.3 24	3412.8	(37/2 ⁻)	3174.5	(35/2 ⁻)	M1	DCO=0.89 12. POL=-0.09 I.
^x 251 [‡]							
^x 252 [‡]							
270.3 3	73 5	3683.0	(39/2 ⁻)	3412.8	(37/2 ⁻)	M1	DCO=0.78 11. POL=-0.09 I.
286.7 3	55 22	3969.8	(41/2 ⁻)	3683.0	(39/2 ⁻)	M1	DCO=0.81 11. POL=-0.08 I.
297.3 3	18 8	297.30	(13/2 ⁻)	0.0	(9/2 ⁻)		
319 [@] 1	≤4	2974.3	(33/2 ⁻)	2655.7	(29/2 ⁻)		
322.1 3	47.5 10	4291.7	(43/2 ⁻)	3969.8	(41/2 ⁻)	M1	DCO=0.80 15, POL=-0.10 I for 323.8+322.1.
323.8 3	79 19	793.9	(17/2 ⁻)	470.1	(15/2 ⁻)	M1	DCO=0.80 15, POL=-0.10 I for 323.8+322.1.
330.3 3	41.8 25	4622.2	(45/2 ⁻)	4291.7	(43/2 ⁻)	M1	DCO=0.78 12. POL=-0.18 I.
360.5 3	43 9	4983.1	(47/2 ⁻)	4622.2	(45/2 ⁻)	M1	DCO=0.84 12, POL=-0.11 I for 360.5+361.0.
361.0 3	89 21	2655.7	(29/2 ⁻)	2294.8	(27/2 ⁻)	M1	DCO=0.84 12, POL=-0.11 I for 360.5+361.0.
372.4 3	26.1 25	5355.5	(49/2 ⁻)	4983.1	(47/2 ⁻)		
384.0 3	23 4	3174.5	(35/2 ⁻)	2790.5	(31/2 ⁻)		
399.5 3	113 23	470.1	(15/2 ⁻)	70.60	(11/2 ⁻)	E2	DCO=1.02 14 for 399.5+401.3. POL=+0.07 I.
401.3 3	63 14	1399.2	(21/2 ⁻)	997.9	(19/2 ⁻)	M1	DCO=1.02 14 for 399.5+401.3. POL=-0.07 I.
438.4 3	45 9	3412.8	(37/2 ⁻)	2974.3	(33/2 ⁻)	(E2)	POL=+0.11 I.
452.5 3	50 7	2071.0	(25/2 ⁻)	1618.4	(23/2 ⁻)	M1	DCO=0.84 17. POL=-0.05 I.
496.0 3	86 8	2790.5	(31/2 ⁻)	2294.8	(27/2 ⁻)	E2	DCO=1.5 3, POL=+0.06 I for 496.6+496.0.
496.6 3	46 5	793.9	(17/2 ⁻)	297.30	(13/2 ⁻)	E2	DCO=1.5 3, POL=+0.06 I for 496.6+496.0.
508.4 3	45 16	3683.0	(39/2 ⁻)	3174.5	(35/2 ⁻)	(E2)	POL=+0.08 I.
527.8 3	198 6	997.9	(19/2 ⁻)	470.1	(15/2 ⁻)	E2	DCO=1.16 19. POL=+0.07 I.
557.0 3	45 6	3969.8	(41/2 ⁻)	3412.8	(37/2 ⁻)	E2	DCO=0.93 38. POL=+0.18 I.
584.5 3	78 11	2655.7	(29/2 ⁻)	2071.0	(25/2 ⁻)	E2	DCO=1.5 3. POL=+0.03 I.
605.3 3	57 13	1399.2	(21/2 ⁻)	793.9	(17/2 ⁻)		
608.8 3	34 7	4291.7	(43/2 ⁻)	3683.0	(39/2 ⁻)		
620.5 3	179 5	1618.4	(23/2 ⁻)	997.9	(19/2 ⁻)	E2	DCO=1.28 20. POL=+0.07 I.
652.3 3	42 6	4622.2	(45/2 ⁻)	3969.8	(41/2 ⁻)	E2	DCO=1.25 25. POL=+0.11 2.
671.7 3	44 14	2071.0	(25/2 ⁻)	1399.2	(21/2 ⁻)		
676.5 3	161 21	2294.8	(27/2 ⁻)	1618.4	(23/2 ⁻)	E2	DCO=1.25 17. POL=+0.06 I.
691.8 3	23 9	4983.1	(47/2 ⁻)	4291.7	(43/2 ⁻)	(E2)	POL=+0.07 I.
733.2 3	17 4	5355.5	(49/2 ⁻)	4622.2	(45/2 ⁻)	Q	DCO=1.5 3.
769.4 3	12.2 20	5752.5	(51/2 ⁻)	4983.1	(47/2 ⁻)		
812.7 3	13 3	6168.2	(53/2 ⁻)	5355.5	(49/2 ⁻)		

[†] From $\gamma\gamma(\theta)$ (DCO) and/or γ (lin pol). For mult= $\Delta J=1$, M1 transitions, small E2 admixture cannot be ruled out. The mult=D indicates $\Delta J=1$ transition.

[‡] 2001Ro01 state that the γ transition belongs to an unidentified sequence in ¹⁶⁵Ta.

[#] Doublet. The second component belongs to another unidentified band in ¹⁶⁵Ta.

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

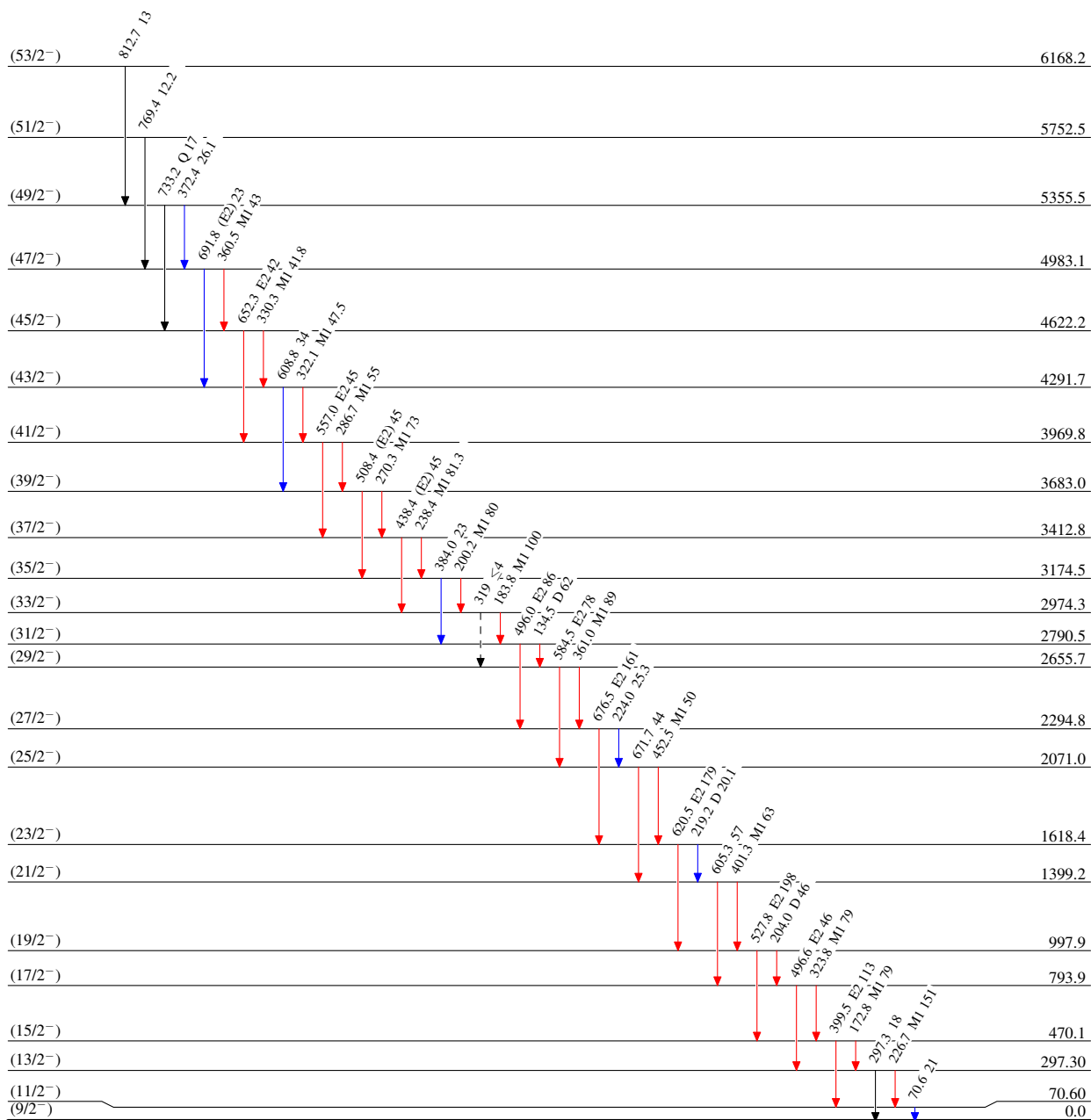
^x γ ray not placed in level scheme.

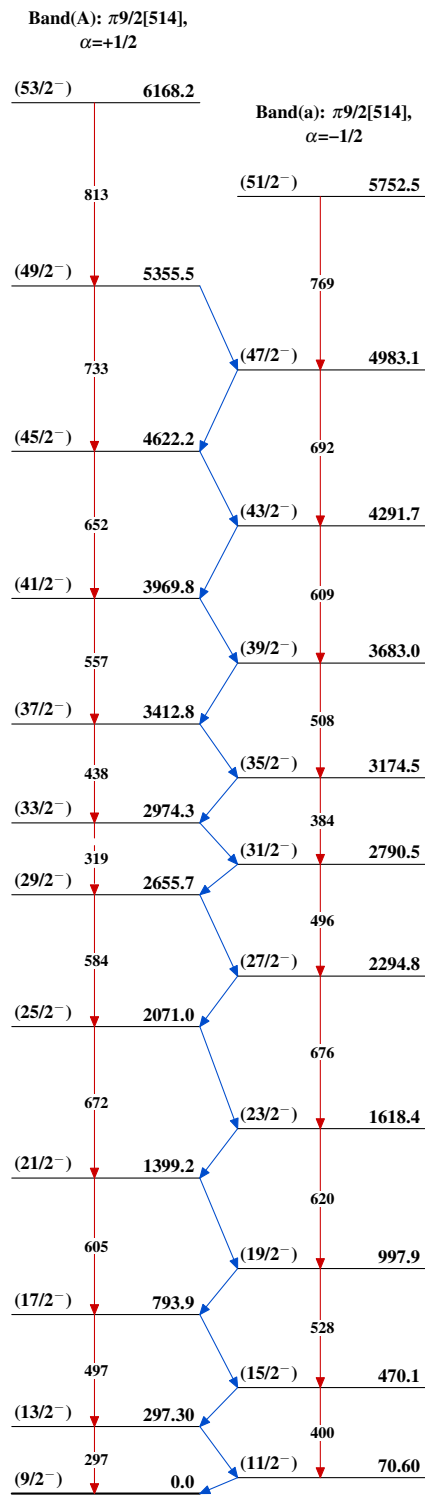
$^{142}\text{Nd}(^{27}\text{Al},4n\gamma)$ 2001Ro01

Legend

Level Scheme
 Intensities: Relative I_γ

- \longrightarrow $I_\gamma < 2\% \times I_\gamma^{\max}$
 \longrightarrow $I_\gamma < 10\% \times I_\gamma^{\max}$
 \longrightarrow $I_\gamma > 10\% \times I_\gamma^{\max}$
 \dashrightarrow γ Decay (Uncertain)

 $^{165}_{73}\text{Ta}_{92}$

$^{142}\text{Nd}(^{27}\text{Al},4n\gamma)$ 2001Ro01 $^{165}_{73}\text{Ta}_{92}$