

$^{127}\text{I}(\text{n},\text{n}'\gamma)$ 1978De41

Type	Author	History Citation	Literature Cutoff Date
Full Evaluation	A. Hashizume	NDS 112, 1647 (2011)	1-Oct-2009

1978De41: reactor neutrons, semi γ ; I_γ measured at 90° .

1972Si07: E(n)=0.5-1.6 MeV from $^7\text{Li}(\text{p},\text{n})$; semi γ , semi-scin $\gamma\gamma$ coin; I_γ measured at 90° .

1971Ba35: E(n)=0.4-1.91 MeV from $^7\text{Li}(\text{p},\text{n})$, $^3\text{H}(\text{p},\text{n})$; semi γ ; I_γ measured at 85° .

1978Av06: reactor fast neutron; semi γ , $I_\gamma(\theta)$; enriched target.

The decay scheme is that proposed by 1978De41. The evaluator tentatively added levels at 827.57, 1318.9, 1345.4, 1377.4, 1722.0, 1793, 1886.4, 1908.0 and 1918.3 keV, comparing with levels from ($^3\text{He},\text{d}$) and (α,t) reactions. Questionable levels given by 1978De41 at 1823.4 and 2149.2 keV are not adopted here.

 ^{127}I Levels

E(level) [†]	J^π [‡]	E(level) [†]	J^π [‡]	E(level) [†]	J^π [‡]
0.0	$5/2^+$	1044.19 14	$7/2^+$	1413.20 15	$(9/2^+)$
57.606 20	$7/2^+$	1094.37 12	$3/2^+, 5/2^+$	1442.9 12	$1/2^+, 3/2^+, 5/2^+$
202.92 7	$3/2^+$	1122.82 21	$1/2^+$	1516.64 15	
374.96 9	$1/2^+$	1181.40 15	$(9/2^+)$	1555.6 17	$(1/2^+, 3/2^+, 5/2^+)$
418.00 6	$5/2^+$	1218.47 17	$(7/2^+)$	1654.06 21	
618.31 16	$3/2^+$	1228.91 20		1658.6 3	
628.71 17	$7/2^+$	1235.08 14	$(11/2)^-$	1775.5 8	
650.85 15	$9/2^{(+)}$	1275.00 10	$(7/2)^+$	1860.4 4	
716.51 12	$(11/2^+)$	1350.2? 4	$(9/2^+)$	1869.5 9	$(3/2^+, 5/2^+)$
744.72 9	$(9/2)^+$	1363.97 20		2075.4? 8	
990.92 12	$3/2^+, 5/2^+$	1401.82 14	$3/2^+, 5/2^+$		

[†] From a least-squares fit to E_γ 's.

[‡] From Adopted Levels.

¹²⁷I(n,n'γ) **1978De41** (continued)

						$\gamma(^{127}\text{I})$			
E_γ †	I_γ †@	E_i (level)	J_i^π	E_f	J_f^π	Mult. &	α^c	Comments	
57.61# 2		57.606	7/2 ⁺	0.0	5/2 ⁺			E _γ : From ¹²⁷ Xe ε decay. γ of 58 keV confirmed by γγ coin (1972Si07).	
145.6 4	7.4 6	202.92	3/2 ⁺	57.606	7/2 ⁺				
^x 160.5 4	1.7 4								
172.1 2	31 3	374.96	1/2 ⁺	202.92	3/2 ⁺				
^x 193.7 3	2.6 3								
202.94 10	145 8	202.92	3/2 ⁺	0.0	5/2 ⁺				
215.17 13	3.3 3	418.00	5/2 ⁺	202.92	3/2 ⁺				
360.32 10	14.7 10	418.00	5/2 ⁺	57.606	7/2 ⁺	(M1+E2)	0.0229 5	α(K)=0.0195 7; α(L)=0.00274 20; α(M)=0.00056 5; α(N+..)=0.000124 9 α(N)=0.000111 8; α(O)=1.26×10 ⁻⁵ 5 δ: +0.6 5 or <-45 or +2.5 +∞-14 (1978Av06).	
374.96 10	19.3 10	374.96	1/2 ⁺	0.0	5/2 ⁺				
417.95 10	100	418.00	5/2 ⁺	0.0	5/2 ⁺	(M1+E2)	0.0152 9	α(K)=0.0130 9; α(L)=0.00177 5; α(M)=0.000358 11; α(N+..)=8.03×10 ⁻⁵ 16 α(N)=7.21×10 ⁻⁵ 16; α(O)=8.23×10 ⁻⁶ 17 δ: -0.40 +35-60 or <-4 or >+1.75 (1978Av06).	
^x 436.7 3	1.6 4								
465.4 3	1.8 2	1094.37	3/2 ⁺ ,5/2 ⁺	628.71	7/2 ⁺			E _γ : not reported in 1971Ba35.	
^x 466# 1									
^x 490# 1									
490.36 10	18.5 15	1235.08	(11/2) ⁻	744.72	(9/2) ⁺	(E1+M2) ^a	0.019 17	α(K)=0.016 14; α(L)=0.0022 20; α(M)=0.0005 4; α(N+..)=0.00010 9 α(N)=9.E-5 8; α(O)=1.1×10 ⁻⁵ 10 δ: +0.11 +4-5 or -50 +30-∞ (1978Av06).	
529.7 7	1.2 3	1275.00	(7/2) ⁺	744.72	(9/2) ⁺				
^x 549.70 12	6.3 7								
^x 561.6 2	1.9 2								
570.9# 10	5 1	628.71	7/2 ⁺	57.606	7/2 ⁺			E _γ : assigned by 1971Ba35 from the 1658 level. I _γ : from I(570.9γ)/I(628.6γ)=(6 1)/(98 9) (1972Si07).	
572.9 2	8.6 7	990.92	3/2 ⁺ ,5/2 ⁺	418.00	5/2 ⁺	(M1+E2) ^a	0.0066 8	α=0.0066 8; α(K)=0.0057 7; α(L)=0.00074 5; α(M)=0.000150 10; α(N+..)=3.37×10 ⁻⁵ 24 α(N)=3.02×10 ⁻⁵ 21; α(O)=3.5×10 ⁻⁶ 3 δ: -4<δ<-1 (1978Av06).	
593.3 2	64 5	650.85	9/2 ⁽⁺⁾	57.606	7/2 ⁺	D+Q		δ: -0.38 +30-49 (1978Av06).	
615.3 5	3.7 4	990.92	3/2 ⁺ ,5/2 ⁺	374.96	1/2 ⁺				
^x 616								E _γ : uncertain transition (1972Si07).	
618.5 2	41 4	618.31	3/2 ⁺	0.0	5/2 ⁺	D+Q		δ: -10<δ<+0.1 (1978Av06).	
628.6 2	85 7	628.71	7/2 ⁺	0.0	5/2 ⁺	(M1+E2) ^b	0.0052 7	α=0.0052 7; α(K)=0.0045 6; α(L)=0.00058 5; α(M)=0.000117 10; α(N+..)=2.65×10 ⁻⁵ 23 α(N)=2.37×10 ⁻⁵ 20; α(O)=2.8×10 ⁻⁶ 3 δ: -0.42 +17-33 or -1.4 7 (1978Av06).	
650.8 2	4.8 3	650.85	9/2 ⁽⁺⁾	0.0	5/2 ⁺	(E2)	0.00423 6	α=0.00423 6; α(K)=0.00362 5; α(L)=0.000488 7; α(M)=9.85×10 ⁻⁵	

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¹²⁷I(n,n'γ) 1978De41 (continued)

γ(¹²⁷I) (continued)

<u>E_γ[†]</u>	<u>I_γ^{†@}</u>	<u>E_i(level)</u>	<u>J_i^π</u>	<u>E_f</u>	<u>J_f^π</u>	<u>Mult.&</u>	<u>α^c</u>	<u>Comments</u>
658.90 11	41 4	716.51	(11/2 ⁺)	57.606	7/2 ⁺	(E2)	0.00410 6	14; α(N+..)=2.21×10 ⁻⁵ 3 α(N)=1.98×10 ⁻⁵ 3; α(O)=2.26×10 ⁻⁶ 4 α=0.00410 6; α(K)=0.00351 5; α(L)=0.000472 7; α(M)=9.53×10 ⁻⁵ 14; α(N+..)=2.13×10 ⁻⁵ 3 α(N)=1.92×10 ⁻⁵ 3; α(O)=2.19×10 ⁻⁶ 3
^x 677.8 3	6.2 6					D,Q		E _γ : corresponds to 674γ (1972Si07) and 677γ (1971Ba35), but these were given by both authors as γ deexciting the 1094 level. I _γ : other: 1.6 (1971Ba35).
687.2 2	16 2	744.72	(9/2) ⁺	57.606	7/2 ⁺	D+Q		δ: -0.1<δ<+0.3 (1978Av06).
744.70 10	56 6	744.72	(9/2) ⁺	0.0	5/2 ⁺	(E2)	0.00302 5	δ: +0.40 9 or +4.0 +20-12 (1978Av06). α=0.00302 5; α(K)=0.00260 4; α(L)=0.000342 5; α(M)=6.89×10 ⁻⁵ 10; α(N+..)=1.548×10 ⁻⁵ 22 α(N)=1.388×10 ⁻⁵ 20; α(O)=1.596×10 ⁻⁶ 23 α=0.00285 4; α(K)=0.00245 4; α(L)=0.000322 5; α(M)=6.47×10 ⁻⁵ 9; α(N+..)=1.454×10 ⁻⁵ 21
763.2 2	5.8 4	1181.40	(9/2 ⁺)	418.00	5/2 ⁺	(E2)	0.00285 4	α(N)=1.304×10 ⁻⁵ 19; α(O)=1.501×10 ⁻⁶ 21 δ: -0.15 +15-20 or -2.1 +4-12 (1978Av06).
783.7 2	3.8 4	1401.82	3/2 ⁺ ,5/2 ⁺	618.31	3/2 ⁺	D,Q		I _γ : other: 8.2 20 (1972Si07).
788.2 2	2.4 3	990.92	3/2 ⁺ ,5/2 ⁺	202.92	3/2 ⁺			E _γ : 795 in 1972Si07, and assigned by authors from the 1413 level.
^x 791.7 2	5.8 6							
^x 806.1 2	3.6 4							
^x 827.56 15	6.1 7							E _γ : 826 in 1972Si07 and 1971Ba35, and assigned by 1971Si07 from the 1444 level. I _γ : from I(840.5γ)/I(1044γ)=5/61 (1971Ba35).
840.5 [#] 10	1.1	1044.19	7/2 ⁺	202.92	3/2 ⁺			
857.2 2	2.3 3	1275.00	(7/2) ⁺	418.00	5/2 ⁺			
909.4 2	2.8 2	1654.06		744.72	(9/2) ⁺			
919.9 2	3.7 3	1122.82	1/2 ⁺	202.92	3/2 ⁺			
932.9 6	0.86 26	990.92	3/2 ⁺ ,5/2 ⁺	57.606	7/2 ⁺			
^x 944.9 4	2.4 4							E _γ : 942.6 in 1972Si07 and assigned by authors from the 1658 level.
986.6 2	6.2 3	1044.19	7/2 ⁺	57.606	7/2 ⁺	(M1+E2) ^a	0.00181 24	α=0.00181 24; α(K)=0.00157 21; α(L)=0.000195 23; α(M)=3.9×10 ⁻⁵ 5; α(N+..)=8.8×10 ⁻⁶ 11 α(N)=7.9×10 ⁻⁶ 9; α(O)=9.3×10 ⁻⁷ 12 δ: -1.2 +5-10 or <-2.2 or >+7 (1978Av06).
990.9 2	3.9 4	990.92	3/2 ⁺ ,5/2 ⁺	0.0	5/2 ⁺	(M1+E2) ^a	0.00179 23	α=0.00179 23; α(K)=0.00155 21; α(L)=0.000193 22; α(M)=3.9×10 ⁻⁵ 5; α(N+..)=8.8×10 ⁻⁶ 11 α(N)=7.8×10 ⁻⁶ 9; α(O)=9.2×10 ⁻⁷ 12 I _γ : other: 10 3 (1972Si07). +0.3<δ<+0.9 (1978Av06).
995.0 2	4.1 4	1413.20	(9/2 ⁺)	418.00	5/2 ⁺			
1015.7 3	4.2 3	1218.47	(7/2 ⁺)	202.92	3/2 ⁺	(E2)	0.001480 21	α=0.001480 21; α(K)=0.001279 18; α(L)=0.0001619 23;

¹²⁷I(n,n'γ) 1978De41 (continued)

γ(¹²⁷I) (continued)

<u>E_γ[†]</u>	<u>I_γ^{†@}</u>	<u>E_i(level)</u>	<u>J_i^π</u>	<u>E_f</u>	<u>J_f^π</u>	<u>Mult.&</u>	<u>α^c</u>	<u>Comments</u>
								α(M)=3.25×10 ⁻⁵ 5; α(N+..)=7.32×10 ⁻⁶ α(N)=6.56×10 ⁻⁶ 10; α(O)=7.64×10 ⁻⁷ 11 E _γ : other: 1013 (1972Si07).
1025.8 4	1.4 4	1401.82	3/2 ⁺ ,5/2 ⁺	374.96	1/2 ⁺			
1037.0 6	2.0 4	1094.37	3/2 ⁺ ,5/2 ⁺	57.606	7/2 ⁺			E _γ ,I _γ : others: E _γ =1034, I _γ =9 3 (1972Si07).
1044.2 2	13 2	1044.19	7/2 ⁺	0.0	5/2 ⁺	(M1+E2) ^a	0.00159 21	α=0.00159 21; α(K)=0.00138 18; α(L)=0.000171 20; α(M)=3.4×10 ⁻⁵ 4; α(N+..)=7.8×10 ⁻⁶ 9 α(N)=6.9×10 ⁻⁶ 8; α(O)=8.2×10 ⁻⁷ 10 δ: -0.28 +16-47 or -1.9 +9-11 (1978Av06).
^x 1069								E _γ : reported in 1972Si07 only, and assigned from the 1444 level.
1071.95 12	5.9 5	1275.00	(7/2) ⁺	202.92	3/2 ⁺	(E2)	0.001318 19	α=0.001318 19; α(K)=0.001139 16; α(L)=0.0001434 20; α(M)=2.88×10 ⁻⁵ 4; α(N+..)=6.49×10 ⁻⁶ α(N)=5.81×10 ⁻⁶ 9; α(O)=6.77×10 ⁻⁷ 10
1094.40 12	11 3	1094.37	3/2 ⁺ ,5/2 ⁺	0.0	5/2 ⁺	(M1+E2) ^a	0.00144 18	E _γ : others: 1070.5 (1971Ba35), 1070 (1972Si07). α=0.00144 18; α(K)=0.00125 16; α(L)=0.000154 18; α(M)=3.1×10 ⁻⁵ 4; α(N+..)=7.0×10 ⁻⁶ 8 α(N)=6.2×10 ⁻⁶ 7; α(O)=7.3×10 ⁻⁷ 9 E _γ : 1092 (1972Si07). δ: -0.8 +4-12 or <-0.75 or >+6.5 (1978Av06).
^x 1112.5 6	0.73 26							
1124.0 2	9.4 8	1181.40	(9/2 ⁺)	57.606	7/2 ⁺	D+Q		δ: -3 +1-2 or -0.14 +12-15 (1978Av06).
^x 1125	12.0 15							
1142.1 2	2.2 2	1516.64		374.96	1/2 ⁺			E _γ : other: 1139 (1971Ba35). Not observed in 1972Si07.
^x 1159.7 [‡] 10	1.1							E _γ : assigned by 1971Ba35 from the 1363 level with I _γ /I _γ (1363)=0.85.
^x 1162.9 3	2.1 4							
^x 1177.3 9	0.43 20							E _γ : assigned by 1971Ba35 from the 1554 level.
1198.8 4	1.0 3	1401.82	3/2 ⁺ ,5/2 ⁺	202.92	3/2 ⁺			
^x 1215	3 1							E _γ : reported in 1972Si07 only, assigned from the 1274 level with I _γ /I _γ (1070)=0.9.
1218.4 2	5.7 4	1218.47	(7/2 ⁺)	0.0	5/2 ⁺	D+Q		δ: -1.6 +8-9 or +0.36 +21-39 (1978Av06).
1228.9 2	6.2 7	1228.91		0.0	5/2 ⁺			
1235.5 [‡] 10	0.5	1654.06		418.00	5/2 ⁺			
^x 1267.8 7	1.6 5							
1275.2 2	1.7 4	1275.00	(7/2) ⁺	0.0	5/2 ⁺	(E2)	0.000934 13	α=0.000934 13; α(K)=0.000794 12; α(L)=9.84×10 ⁻⁵ 14; α(M)=1.97×10 ⁻⁵ 3; α(N+..)=2.22×10 ⁻⁵ 4 α(N)=3.99×10 ⁻⁶ 6; α(O)=4.67×10 ⁻⁷ 7; α(IPF)=1.77×10 ⁻⁵ 3 E _γ : other: 1273 (1972Si07).
^x 1279.3 9	1.1 5							
1292.6 4	1.0 3	1350.2?	(9/2 ⁺)	57.606	7/2 ⁺			
1306.4 2	6.4 5	1363.97		57.606	7/2 ⁺			E _γ : other: 1304.6 5 (1971Ba35).
^x 1318.9 5	1.1 4							
1345.4 4	1.3 4	1401.82	3/2 ⁺ ,5/2 ⁺	57.606	7/2 ⁺			

¹²⁷I(n,n'γ) **1978De41** (continued)

γ(¹²⁷I) (continued)

<u>E_γ[†]</u>	<u>I_γ^{†@}</u>	<u>E_i(level)</u>	<u>J_i^π</u>	<u>E_f</u>	<u>J_f^π</u>	<u>Mult.&</u>	<u>α^c</u>	<u>Comments</u>
^x 1350.2 [‡] 20	1.7							E _γ : assigned by 1971Ba35 from the 1350 level with I _γ /(1292γ)=1.7.
1358.0 9	0.40 20	1775.5		418.00	5/2 ⁺			I _γ : other: 0.83 (1971Ba35).
1362.8	<1.4	1363.97		0.0	5/2 ⁺			E _γ : complex peak (1978De41). 1361.1 (1971Ba35).
^x 1377.4 4	2.3 4							
1401.6 2	3.7 6	1401.82	3/2 ⁺ ,5/2 ⁺	0.0	5/2 ⁺	(M1+E2) ^a	0.00089 9	α=0.00089 9; α(K)=0.00073 8; α(L)=9.0×10 ⁻⁵ 9; α(M)=1.79×10 ⁻⁵ 18; α(N+..)=5.05×10 ⁻⁵ 13
								α(N)=3.6×10 ⁻⁶ 4; α(O)=4.3×10 ⁻⁷ 5; α(IPF)=4.64×10 ⁻⁵ 16
								δ: -0.4<δ<+6.5 (1978Av06).
1413.4 2	4.4 6	1413.20	(9/2 ⁺)	0.0	5/2 ⁺	(E2)	0.000797 12	α=0.000797 12; α(K)=0.000647 9; α(L)=7.95×10 ⁻⁵ 12; α(M)=1.591×10 ⁻⁵ 23; α(N+..)=5.50×10 ⁻⁵ 8
								α(N)=3.22×10 ⁻⁶ 5; α(O)=3.78×10 ⁻⁷ 6; α(IPF)=5.14×10 ⁻⁵ 8
^x 1420.4 6	1.0 5							
1442.9 12	0.9 5	1442.9	1/2 ⁺ ,3/2 ⁺ ,5/2 ⁺	0.0	5/2 ⁺			
^x 1488.6 15	1.4 7							
1516.2 2	5.4 6	1516.64		0.0	5/2 ⁺			
1555.6 17	1.2 3	1555.6	(1/2 ⁺ ,3/2 ⁺ ,5/2 ⁺)	0.0	5/2 ⁺			
^x 1590.3 16	2.2 9							
1601.1 8	2.8 8	1658.6		57.606	7/2 ⁺			E _γ : other: 1599.2 (1971Ba35).
								I _γ : other: 5.3 (1971Ba35).
^x 1620.5 14	1.9 6							E _γ : placed by 1978De41 as deexciting a questionable level at 1823.4.
1653.1 [‡] 10	0.3	1654.06		0.0	5/2 ⁺			
1658.6 3	6.1 4	1658.6		0.0	5/2 ⁺			
^x 1715.4 14	1.2 6							
^x 1723.2	1.2 6							E _γ : complex peak (1978De41). E _γ =1721.6 (1971Ba35).
^x 1761.2	0.8 4							E _γ : complex peak (1978De41).
1774.3 13	1.2 5	1775.5		0.0	5/2 ⁺			E _γ : other: 1776.8 (1971Ba35).
1802.9 17	0.7 4	1860.4		57.606	7/2 ⁺			
1860.4 4	2.3 3	1860.4		0.0	5/2 ⁺	D,Q		
1869.5 9	1.3 6	1869.5	(3/2 ⁺ ,5/2 ⁺)	0.0	5/2 ⁺			δ: +0.5<δ<+5 (1978Av06).
^x 1887.9 17	4.1 8							
^x 1908.3 15	3.5 6							
2017	<1.8	2075.4?		57.606	7/2 ⁺			E _γ : complex peak (1978De41).
2076.5 12	1.2 5	2075.4?		0.0	5/2 ⁺			
^x 2119.2 10	0.52 25							
^x 2149.2 10	1.3 6							E _γ : placed by 1978De41 as deexciting a questionable level at 2149.2.

[†] From 1978De41, unless otherwise noted.

‡ Observed in 1971Ba35 only. Uncertainty of 1 keV is assigned by the evaluator.

Not reported in 1978De41.

@ Relative to $I(417.95\gamma)=100$, measured at $\theta=90^\circ$ to the neutron-beam direction; $I\gamma$'s from 1971Ba35 and 1972Si07 are normalized as far as possible by using γ -branching ratios. For uncertainties of $I\gamma$'s, 1978De41 point out possible additional corrections amounting to as much as 30% due to large solid angle for γ 's with large A_2 coefficient, and 1971Ba35 point out possible additional corrections amounting to as much as 25% due to poor counting statistics or background peak for weak transitions deexciting levels above 1250 keV.

& From A_2 values in $\gamma(\theta)$ (1978Av06). Mult=Q is assumed E2, and see the additional comments for $\Delta\pi$.

^a $\Delta\pi$ =no from placement in level scheme.

^b $\Delta\pi$ =yes assumed from large δ .

^c Total theoretical internal conversion coefficients, calculated using the BrIcc code (2008Ki07) with Frozen orbital approximation based on γ -ray energies, assigned multipolarities, and mixing ratios, unless otherwise specified.

^x γ ray not placed in level scheme.

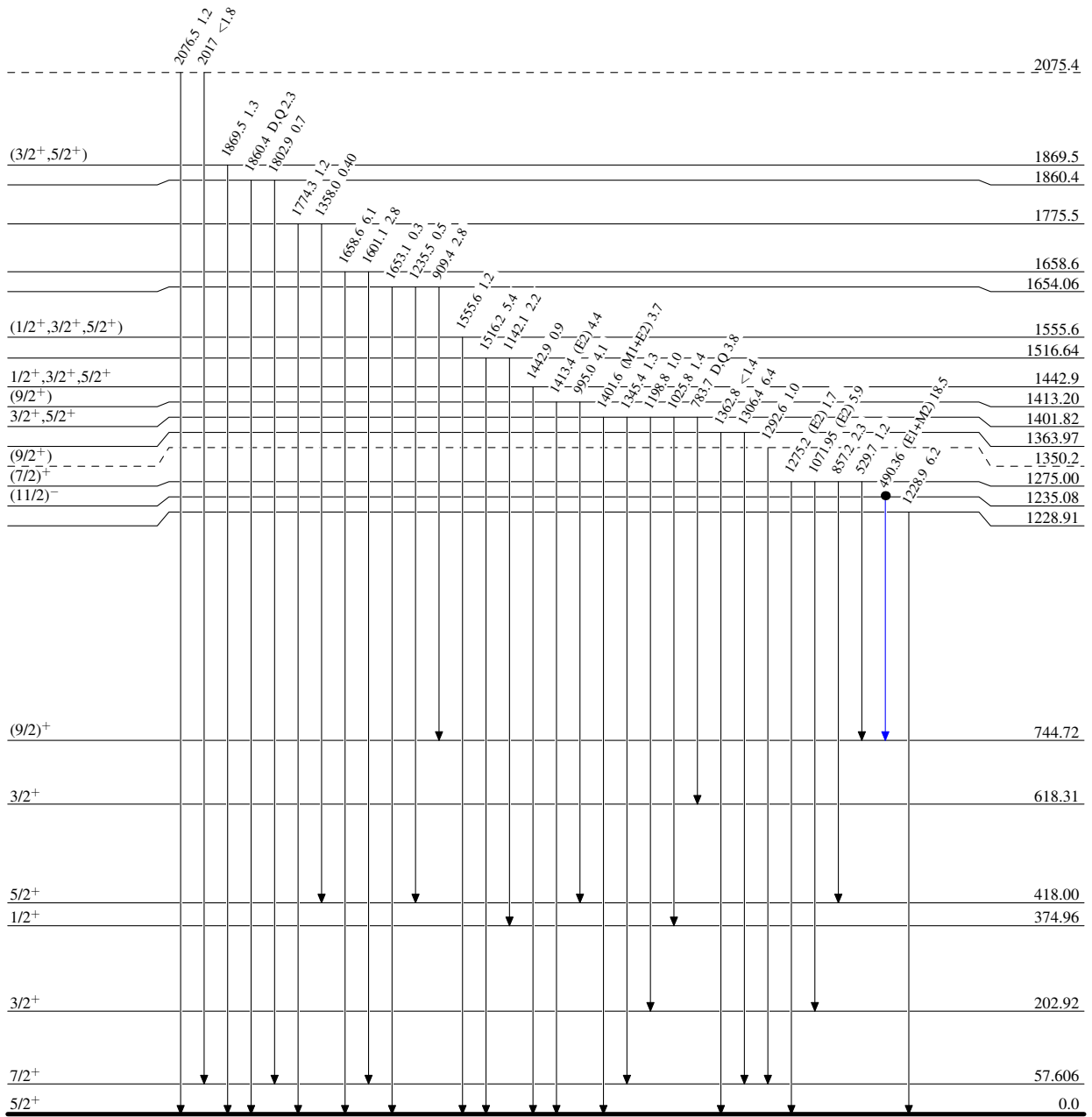
$^{127}\text{I}(n,n'\gamma)$ 1978De41

Legend

Level Scheme

Intensities: Relative I_γ

- $I_\gamma < 2\% \times I_\gamma^{\max}$
- $I_\gamma < 10\% \times I_\gamma^{\max}$
- $I_\gamma > 10\% \times I_\gamma^{\max}$
- Coincidence





 $^{127}_{53}\text{I}_{74}$

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Level Scheme (continued)

Intensities: Relative I _{γ}

Legend

-  I _{γ} < 2% × I _{γ} ^{max}
-  I _{γ} < 10% × I _{γ} ^{max}
-  I _{γ} > 10% × I _{γ} ^{max}
-  Coincidence

