

$^{104}\text{Pd}(^{28}\text{Si},2\text{pn}\gamma)$ **1996Ga13**

Type	Author	History	Citation	Literature Cutoff Date
Full Evaluation	Janos Timar and Zoltan Elekes, Balraj Singh		NDS 121, 143 (2014)	31-May-2014

1996Ga13: E=125 MeV. Measured $E\gamma$, $I\gamma$, $\gamma\gamma$, lifetimes by Doppler- shift attenuation method (DSAM) using the 8π array of 20 Compton- suppressed detectors and 27 BGO inner array detectors at Chalk-River facility. Deduced SD band and extended previously known strongly coupled normal bands to $51/2^+$ and $55/2^-$.

^{129}Ce Levels

E(level) [†]	J ^π	T _{1/2} [@]
0&	5/2 ⁺	
107.0 ^b 10	7/2 ⁻	60 ns 2
144.4 ^a 8	7/2 ⁺	
189.2 ^c 13	9/2 ⁻	
334.8 ^b 13	11/2 ⁻	
347.6& 8	9/2 ⁺	
589.5 ^a 10	11/2 ⁺	
594.9 ^c 14	13/2 ⁻	
804.9 ^b 15	15/2 ⁻	
867.5& 11	13/2 ⁺	
1176.6 ^a 12	15/2 ⁺	
1185.7 ^c 15	17/2 ⁻	
1421.4 ^b 16	19/2 ⁻	
1513.3& 13	17/2 ⁺	
1869.1 ^a 13	19/2 ⁺	
1907.7 ^c 17	21/2 ⁻	
2148.2 ^b 17	23/2 ⁻	
2231.1& 14	21/2 ⁺	
2534.3 ^a 15	23/2 ⁺	
2663.4 ^c 18	25/2 ⁻	
2773.8& 15	25/2 ⁺	
2887.3 ^b 18	27/2 ⁻	
3009.2 ^a 16	27/2 ⁺	
3205.4 ^c 19	29/2 ⁻	
3289.4& 17	29/2 ⁺	
3458.1 ^b 20	31/2 ⁻	
3583.3 ^a 17	31/2 ⁺	
3784.7 ^c 20	33/2 ⁻	
3932.3& 18	33/2 ⁺	
4113.3 ^b 21	35/2 ⁻	
4291.4 ^a 18	35/2 ⁺	
4503.0 ^c 21	37/2 ⁻	
4709.2& 19	37/2 ⁺	
4906.1 ^b 22	39/2 ⁻	
5132.8 ^a 20	39/2 ⁺	
5362.1 ^c 22	41/2 ⁻	
5616.2& 22	41/2 ⁺	
5832.1 ^b 22	43/2 ⁻	
6100.8 ^a 22	43/2 ⁺	

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$^{104}\text{Pd}(^{28}\text{Si},2\text{pn}\gamma)$ **1996Ga13** (continued) ^{129}Ce Levels (continued)

E(level) [†]	J ^π	Comments
6356.1 ^c 23	45/2 ⁻	
6645.2 ^{&} 24	45/2 ⁺	
6879.1 ^b 24	47/2 ⁻	
7186.8 ^a 24	47/2 ⁺	
7474.1 ^c 25	49/2 ⁻	
7785 ^{&} 3	49/2 ⁺	
8032 ^b 3	51/2 ⁻	
8379 ^a 3	51/2 ⁺	
8707 ^c 3	53/2 ⁻	
9275 ^b 3	55/2 ⁻	
0+y ^{‡d}	J≈(17/2 ⁺) [‡]	Additional information 1.
547.0+y ^{#d} 10	J+2	
1148.0+y ^d 15	J+4	
1782.0+y ^d 18	J+6	
2480.0+y ^d 20	J+8	
3253.0+y ^d 23	J+10	
4102.0+y ^d 25	J+12	
5025+y ^d 3	J+14	
6022+y ^d 3	J+16	
7093+y ^d 3	J+18	
8239+y ^d 4	J+20	
9460+y ^d 4	J+22	
10758+y ^d 4	J+24	
12133+y ^d 4	J+26	
13584+y ^d 4	J+28	

[†] From least-squares fit to E_γ data, assuming 1 keV uncertainty for each γ ray.

[‡] This level is at 419.9+y in Adopted Levels with J^π=(13/2⁻) based on level scheme from [2009Pa40](#) in (³⁴S,5nγ). J=17/2 and positive parity are preferred ([1996Ga13](#)) on the basis of coincidences observed between SD band transitions and those of 5/2[402] positive parity band, [2009Pa40](#) propose (13/2⁻). Possible transitions to 13/2⁺ and 17/2⁺ levels of 5/2[402] band.

Possible transition to 17/2⁺ level of 5/2[402] band.

@ From Adopted Levels.

& Band(A): ν5/2[402],α=+1/2 Q(transition)=3.5 5 ([1996Ga13](#)) from DSAM data.

^a Band(a): ν5/2[402],α=-1/2.

^b Band(B): ν7/2[523],α=-1/2.

^c Band(b): ν7/2[523],α=+1/2.

^d Band(C): SD band. Possible intruder neutron orbitals: i_{13/2}[660]1/2 or h_{9/2}/f_{7/2} [541]1/2 with preference for the latter two ([1996Ga13](#)). Q(transition)=6.3 4 ([1996Ga13](#)) from DSAM data for ten γ rays in the cascade. The band intensity=1.7% of total intensity of 5/2[402] and 7/2[523] bands ([1996Ga13](#)). The same band is populated in (³⁴S,5nγ) reaction and shown in Adopted Levels, where 419.9+y level corresponds to 0+y level here.

$^{104}\text{Pd}(^{28}\text{Si},2\text{pn}\gamma)$ **1996Ga13 (continued)** $\gamma(^{129}\text{Ce})$

E_γ	$E_i(\text{level})$	J_i^π	E_f	J_f^π	Comments
82	189.2	9/2 ⁻	107.0	7/2 ⁻	
107	107.0	7/2 ⁻	0	5/2 ⁺	
144	144.4	7/2 ⁺	0	5/2 ⁺	
145	334.8	11/2 ⁻	189.2	9/2 ⁻	
203	347.6	9/2 ⁺	144.4	7/2 ⁺	
210	804.9	15/2 ⁻	594.9	13/2 ⁻	
224	2887.3	27/2 ⁻	2663.4	25/2 ⁻	
228	334.8	11/2 ⁻	107.0	7/2 ⁻	
235	3009.2	27/2 ⁺	2773.8	25/2 ⁺	
236	1421.4	19/2 ⁻	1185.7	17/2 ⁻	
239	2773.8	25/2 ⁺	2534.3	23/2 ⁺	
240	2148.2	23/2 ⁻	1907.7	21/2 ⁻	
242	589.5	11/2 ⁺	347.6	9/2 ⁺	
253	3458.1	31/2 ⁻	3205.4	29/2 ⁻	
260	594.9	13/2 ⁻	334.8	11/2 ⁻	
278	867.5	13/2 ⁺	589.5	11/2 ⁺	
280	3289.4	29/2 ⁺	3009.2	27/2 ⁺	
294	3583.3	31/2 ⁺	3289.4	29/2 ⁺	
303	2534.3	23/2 ⁺	2231.1	21/2 ⁺	
309	1176.6	15/2 ⁺	867.5	13/2 ⁺	
318	3205.4	29/2 ⁻	2887.3	27/2 ⁻	
327	3784.7	33/2 ⁻	3458.1	31/2 ⁻	
329	4113.3	35/2 ⁻	3784.7	33/2 ⁻	
337	1513.3	17/2 ⁺	1176.6	15/2 ⁺	
348	347.6	9/2 ⁺	0	5/2 ⁺	
349	3932.3	33/2 ⁺	3583.3	31/2 ⁺	
356	1869.1	19/2 ⁺	1513.3	17/2 ⁺	
359	4291.4	35/2 ⁺	3932.3	33/2 ⁺	
362	2231.1	21/2 ⁺	1869.1	19/2 ⁺	
381	1185.7	17/2 ⁻	804.9	15/2 ⁻	
390	4503.0	37/2 ⁻	4113.3	35/2 ⁻	
403	4906.1	39/2 ⁻	4503.0	37/2 ⁻	
406	594.9	13/2 ⁻	189.2	9/2 ⁻	
418	4709.2	37/2 ⁺	4291.4	35/2 ⁺	
424	5132.8	39/2 ⁺	4709.2	37/2 ⁺	
445	589.5	11/2 ⁺	144.4	7/2 ⁺	
456	5362.1	41/2 ⁻	4906.1	39/2 ⁻	
470	804.9	15/2 ⁻	334.8	11/2 ⁻	
470	5832.1	43/2 ⁻	5362.1	41/2 ⁻	
475	3009.2	27/2 ⁺	2534.3	23/2 ⁺	
486	1907.7	21/2 ⁻	1421.4	19/2 ⁻	
515	2663.4	25/2 ⁻	2148.2	23/2 ⁻	
516	3289.4	29/2 ⁺	2773.8	25/2 ⁺	
520	867.5	13/2 ⁺	347.6	9/2 ⁺	
523	6879.1	47/2 ⁻	6356.1	45/2 ⁻	
524	6356.1	45/2 ⁻	5832.1	43/2 ⁻	
542	3205.4	29/2 ⁻	2663.4	25/2 ⁻	
543	2773.8	25/2 ⁺	2231.1	21/2 ⁺	
547	547.0+y	J+2	0+y	J≈(17/2 ⁺)	Additional information 2.
571	3458.1	31/2 ⁻	2887.3	27/2 ⁻	
574	3583.3	31/2 ⁺	3009.2	27/2 ⁺	
579	3784.7	33/2 ⁻	3205.4	29/2 ⁻	
587	1176.6	15/2 ⁺	589.5	11/2 ⁺	
591	1185.7	17/2 ⁻	594.9	13/2 ⁻	
601	1148.0+y	J+4	547.0+y	J+2	Additional information 3.

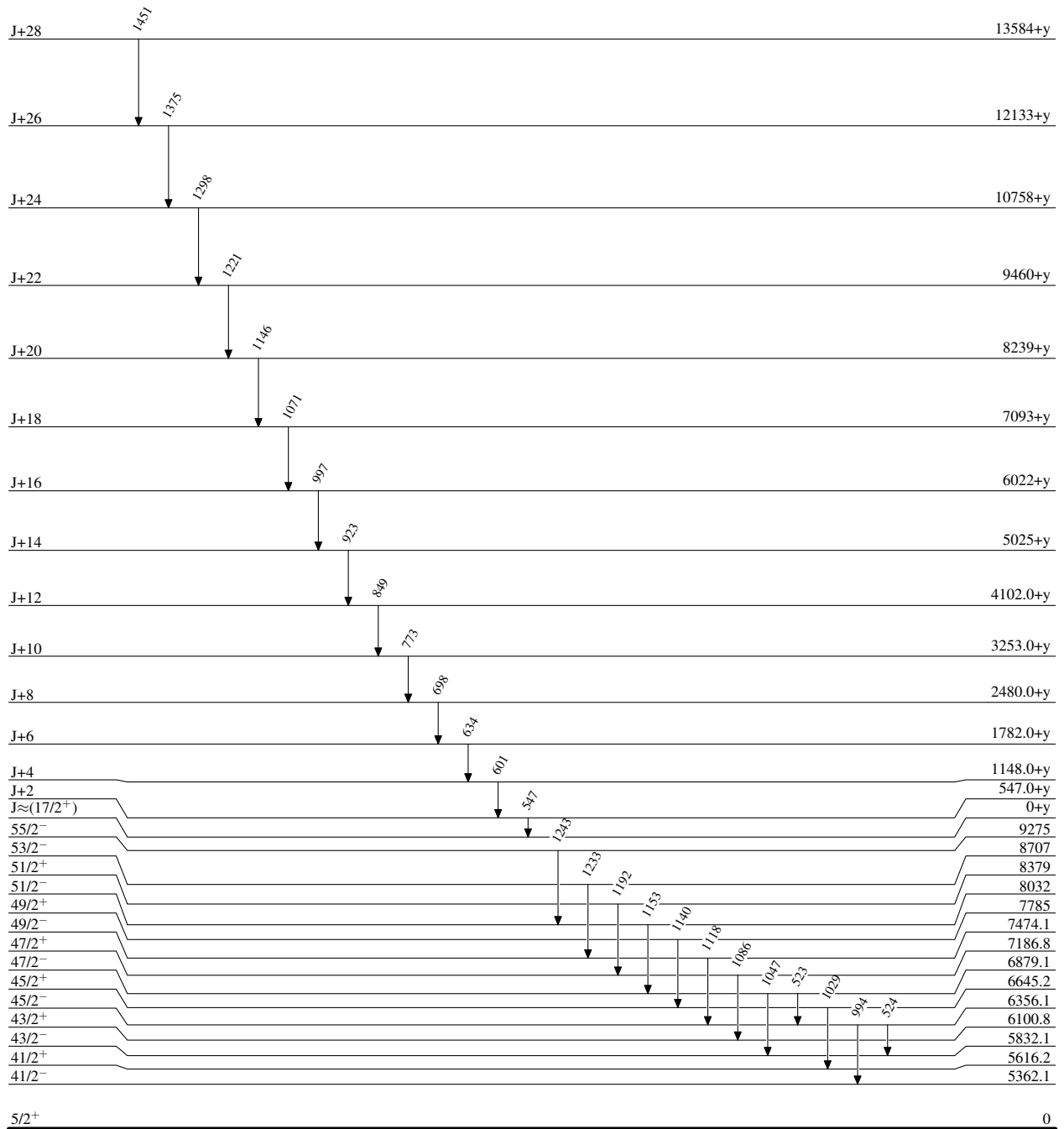
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$^{104}\text{Pd}(^{28}\text{Si},2\text{pn}\gamma)$ 1996Ga13 (continued) $\gamma(^{129}\text{Ce})$ (continued)

E_γ	$E_i(\text{level})$	J_i^π	E_f	J_f^π	Comments
616	1421.4	19/2 ⁻	804.9	15/2 ⁻	
634	1782.0+y	J+6	1148.0+y	J+4	
643	3932.3	33/2 ⁺	3289.4	29/2 ⁺	
646	1513.3	17/2 ⁺	867.5	13/2 ⁺	
655	4113.3	35/2 ⁻	3458.1	31/2 ⁻	
665	2534.3	23/2 ⁺	1869.1	19/2 ⁺	
692	1869.1	19/2 ⁺	1176.6	15/2 ⁺	
698	2480.0+y	J+8	1782.0+y	J+6	
708	4291.4	35/2 ⁺	3583.3	31/2 ⁺	
718	2231.1	21/2 ⁺	1513.3	17/2 ⁺	
718	4503.0	37/2 ⁻	3784.7	33/2 ⁻	
722	1907.7	21/2 ⁻	1185.7	17/2 ⁻	
727	2148.2	23/2 ⁻	1421.4	19/2 ⁻	
739	2887.3	27/2 ⁻	2148.2	23/2 ⁻	
756	2663.4	25/2 ⁻	1907.7	21/2 ⁻	
773	3253.0+y	J+10	2480.0+y	J+8	
777	4709.2	37/2 ⁺	3932.3	33/2 ⁺	
793	4906.1	39/2 ⁻	4113.3	35/2 ⁻	
841	5132.8	39/2 ⁺	4291.4	35/2 ⁺	
849	4102.0+y	J+12	3253.0+y	J+10	
859	5362.1	41/2 ⁻	4503.0	37/2 ⁻	
907	5616.2	41/2 ⁺	4709.2	37/2 ⁺	
923	5025+y	J+14	4102.0+y	J+12	Additional information 4.
926	5832.1	43/2 ⁻	4906.1	39/2 ⁻	
968	6100.8	43/2 ⁺	5132.8	39/2 ⁺	
994	6356.1	45/2 ⁻	5362.1	41/2 ⁻	
997	6022+y	J+16	5025+y	J+14	Additional information 5.
1029	6645.2	45/2 ⁺	5616.2	41/2 ⁺	
1047	6879.1	47/2 ⁻	5832.1	43/2 ⁻	
1071	7093+y	J+18	6022+y	J+16	
1086	7186.8	47/2 ⁺	6100.8	43/2 ⁺	
1118	7474.1	49/2 ⁻	6356.1	45/2 ⁻	
1140	7785	49/2 ⁺	6645.2	45/2 ⁺	
1146	8239+y	J+20	7093+y	J+18	Additional information 6.
1153	8032	51/2 ⁻	6879.1	47/2 ⁻	
1192	8379	51/2 ⁺	7186.8	47/2 ⁺	
1221	9460+y	J+22	8239+y	J+20	Additional information 7.
1233	8707	53/2 ⁻	7474.1	49/2 ⁻	
1243	9275	55/2 ⁻	8032	51/2 ⁻	
1298	10758+y	J+24	9460+y	J+22	Additional information 8.
1375	12133+y	J+26	10758+y	J+24	
1451	13584+y	J+28	12133+y	J+26	

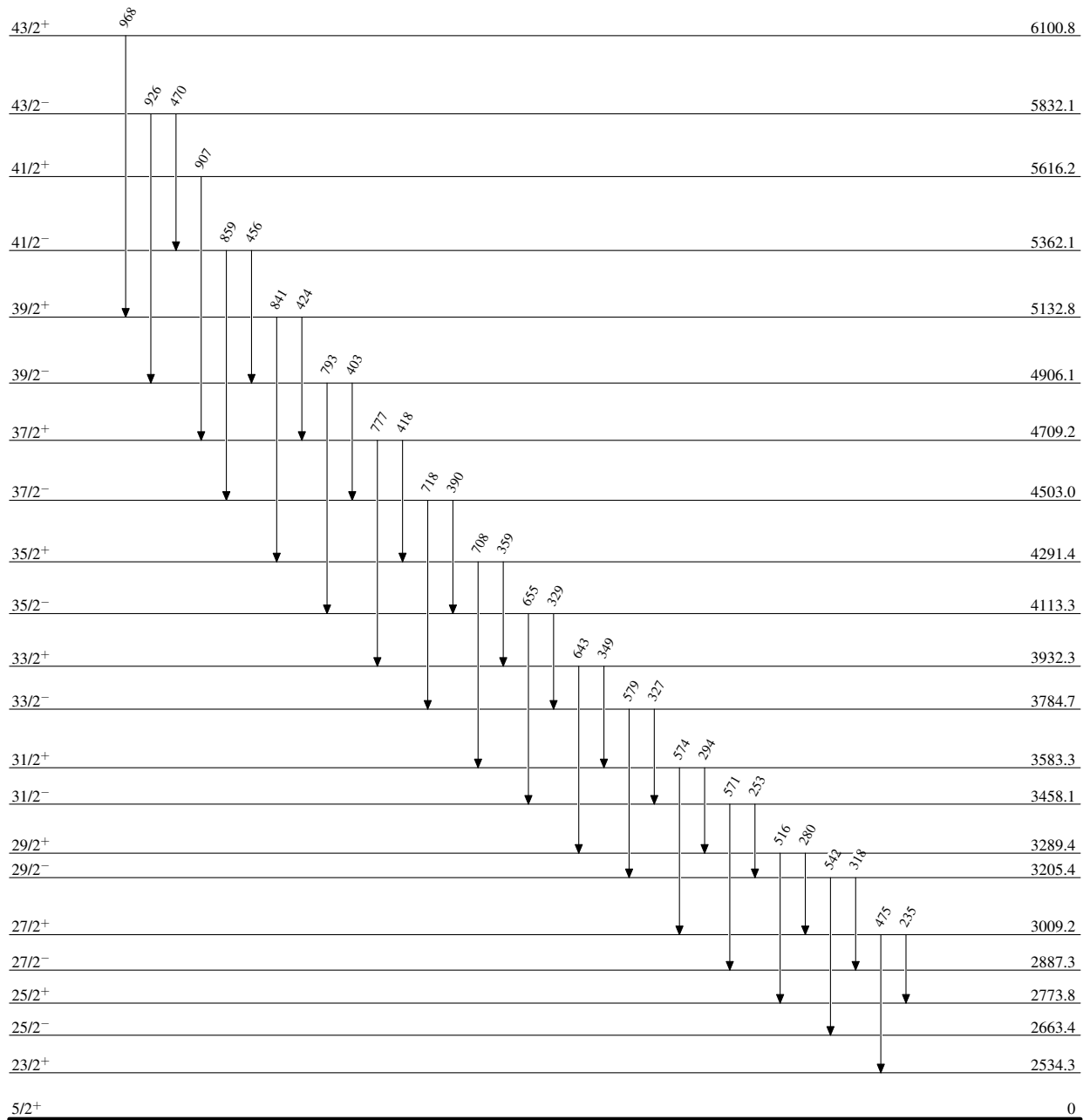
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Level Scheme



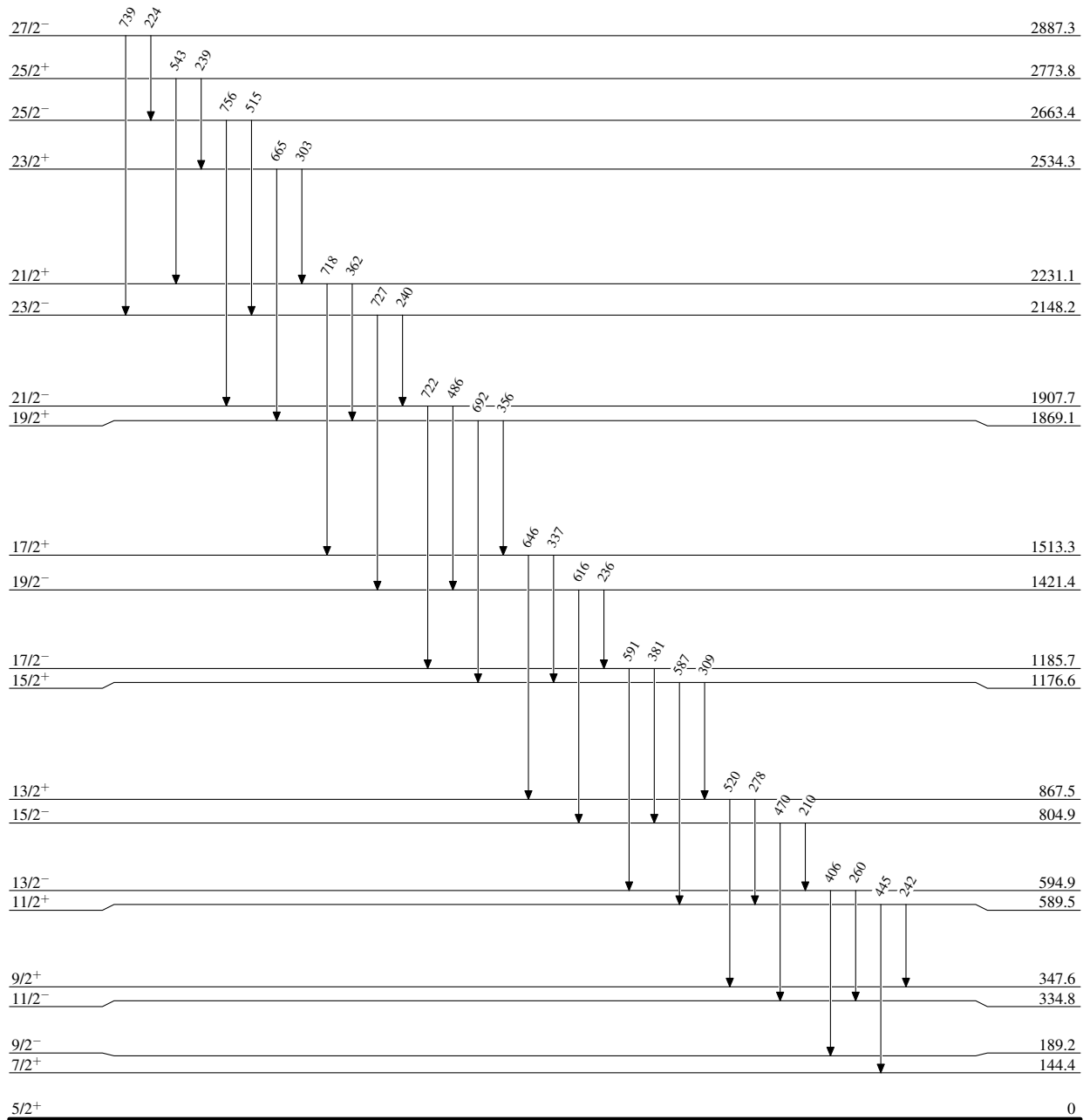
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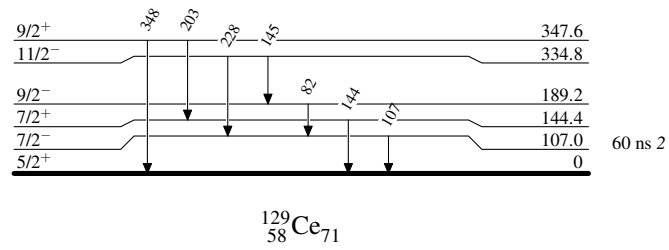
Level Scheme (continued)

 $^{129}_{58}\text{Ce}_{71}$

$^{104}\text{Pd}(^{28}\text{Si},2\text{pn}\gamma)$ 1996Ga13

Level Scheme (continued)



$^{104}\text{Pd}(^{28}\text{Si},2\text{pn}\gamma)$ **1996Ga13**Level Scheme (continued)

$^{104}\text{Pd}(^{28}\text{Si}, 2\text{pn}\gamma)$ 1996Ga13