

$^{96}\text{Zr}(^{48}\text{Ca},5n\gamma):E=180\text{ MeV}$  2013Va10

Type	Author	History	Citation	Literature Cutoff Date
Full Evaluation	P. K. Joshi, B. Singh, S. Singh, A. K. Jain		NDS 138, 1 (2016)	15-Oct-2016

E=180 MeV  $^{48}\text{Ca}$  beam from K130 cyclotron at JYFL facility with RITU recoil separator. Measured  $E\gamma$ ,  $I\gamma$ ,  $\gamma\gamma$  coin,  $\gamma\gamma(t)$ , (recoil) $\gamma$  coin using JUROGAM array (39 Compton-suppressed Ge detectors, 24 Clovers and 15 coaxial tapered detectors), and GREAT spectrometer (MWPC, DSSD detectors). Deduced lifetimes of isomers.

Level scheme is mainly from 2011Bh07. The  $23/2^+$  isomer is now connected to other levels in 2013Va10.

 $^{139}\text{Nd}$  Levels

E(level)	$J^{\pi\dagger}$	$T_{1/2}$	Comments
0.0	$3/2^+$		
231.0 <sup>#</sup> 10	$11/2^-$	5.50 h	$\% \epsilon + \% \beta^+ = 87.0$ 10; $\% \text{IT} = 13.0$ 10 $T_{1/2}$ and decay modes from Adopted Levels.
896.1 <sup>#</sup> 14	$15/2^-$		
1097.9 14	$13/2^-$		
1966.8 14	$17/2^-$		
2053.5 <sup>#</sup> 15	$19/2^-$		
2571.4 17	$19/2^+$		
2615.8 17	$23/2^+$	278 ns 2	$T_{1/2}$ : 605 $\gamma(t)$ (2013Va10). Configuration= $\nu h_{11/2}^{-2} \otimes \nu d_{3/2}^{-1}$ .
2622.8 16	$21/2^-$		
2711.6 <sup>#</sup> 16	$23/2^-$		
2843.1 <sup>‡</sup> 18	$21/2^-$		
3066.7 <sup>‡</sup> 19	$23/2^-$		
3300.7 <sup>‡</sup> 21	$25/2^-$		
3532.7 <sup>‡</sup> 23	$27/2^-$		
3823.8 17	$25/2^-$		
3839.3 17	$25/2^-$		
3969 <sup>‡</sup> 3	$29/2^-$		
3972.3 18	$25/2^-$		
3979.0 18	$27/2^-$		
4166.5 20	$27/2^-$		
4291.8 19	$29/2^-$		
4336 <sup>‡</sup> 3	$31/2^-$		
4715.6 <sup>&amp;</sup> 20	$31/2^-$		
4754.8 <sup>@</sup> 22	$31/2^-$		
5288.6 <sup>@</sup> 23	$33/2^-$		
5391.1 <sup>@</sup> 23	$33/2^-$		
5549.6 <sup>&amp;</sup> 22	$35/2^-$		
5694.3 <sup>@</sup> 24	$35/2^-$		
6069 <sup>@</sup> 3	$37/2^-$		
6137.6 <sup>&amp;</sup> 24	$37/2^-$		
6489 <sup>@</sup> 3	$39/2^-$		
6932 <sup>&amp;</sup> 3	$41/2^-$		
7001 <sup>@</sup> 3	$41/2^-$		
7718 <sup>&amp;</sup> 3	$45/2^-$		
8744 <sup>&amp;</sup> 3	$49/2^-$		

Continued on next page (footnotes at end of table)

$^{96}\text{Zr}(^{48}\text{Ca},5n\gamma):E=180\text{ MeV}$  **2013Va10** (continued) $^{139}\text{Nd}$  Levels (continued)

† As proposed by **2013Va10** based on band structures and earlier known assignments for low-lying levels.

‡ Band(A):  $\Delta J=1$  band based on  $21/2^-$ .

# Band(B):  $\gamma$  cascade based on  $11/2^-$ .

@ Band(C):  $\Delta J=1$  band based on  $31/2^-$ , 4756.

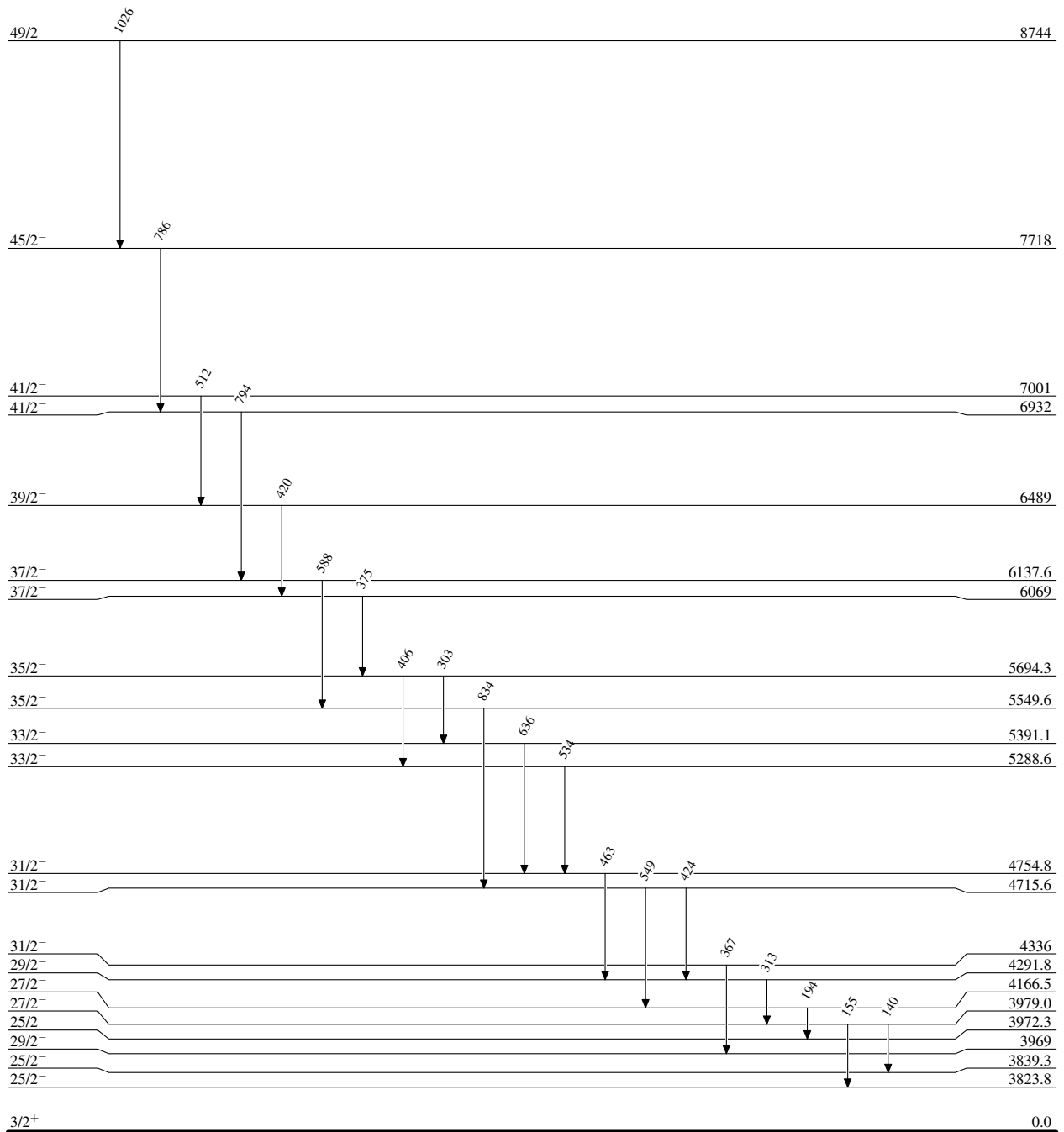
& Band(D):  $\Delta J=1$  band based on  $31/2^-$ , 4716.

 $\gamma(^{139}\text{Nd})$ 

$E_\gamma$	$E_i(\text{level})$	$J_i^\pi$	$E_f$	$J_f^\pi$	Mult.	Comments
89	2711.6	$23/2^-$	2622.8	$21/2^-$		
140	3979.0	$27/2^-$	3839.3	$25/2^-$		
155	3979.0	$27/2^-$	3823.8	$25/2^-$		
194	4166.5	$27/2^-$	3972.3	$25/2^-$		
224	3066.7	$23/2^-$	2843.1	$21/2^-$		
231	231.0	$11/2^-$	0.0	$3/2^+$	M4	Mult.: from Adopted Gammas.
232	3532.7	$27/2^-$	3300.7	$25/2^-$		
234	3300.7	$25/2^-$	3066.7	$23/2^-$		
272	2843.1	$21/2^-$	2571.4	$19/2^+$		
303	5694.3	$35/2^-$	5391.1	$33/2^-$		
313	4291.8	$29/2^-$	3979.0	$27/2^-$		
367	4336	$31/2^-$	3969	$29/2^-$		
375	6069	$37/2^-$	5694.3	$35/2^-$		
406	5694.3	$35/2^-$	5288.6	$33/2^-$		
420	6489	$39/2^-$	6069	$37/2^-$		
424	4715.6	$31/2^-$	4291.8	$29/2^-$		
436	3969	$29/2^-$	3532.7	$27/2^-$		
463	4754.8	$31/2^-$	4291.8	$29/2^-$		
512	7001	$41/2^-$	6489	$39/2^-$		
534	5288.6	$33/2^-$	4754.8	$31/2^-$		
549	4715.6	$31/2^-$	4166.5	$27/2^-$		
569	2622.8	$21/2^-$	2053.5	$19/2^-$		
588	6137.6	$37/2^-$	5549.6	$35/2^-$		
605	2571.4	$19/2^+$	1966.8	$17/2^-$		
636	5391.1	$33/2^-$	4754.8	$31/2^-$		
656	2622.8	$21/2^-$	1966.8	$17/2^-$		
658	2711.6	$23/2^-$	2053.5	$19/2^-$		
665	896.1	$15/2^-$	231.0	$11/2^-$		
786	7718	$45/2^-$	6932	$41/2^-$		
794	6932	$41/2^-$	6137.6	$37/2^-$		
834	5549.6	$35/2^-$	4715.6	$31/2^-$		
867	1097.9	$13/2^-$	231.0	$11/2^-$		
869	1966.8	$17/2^-$	1097.9	$13/2^-$		
906	3972.3	$25/2^-$	3066.7	$23/2^-$		
1026	8744	$49/2^-$	7718	$45/2^-$		
1071	1966.8	$17/2^-$	896.1	$15/2^-$		
1112	3823.8	$25/2^-$	2711.6	$23/2^-$		
1128	3839.3	$25/2^-$	2711.6	$23/2^-$		
1157	2053.5	$19/2^-$	896.1	$15/2^-$		
1208	3823.8	$25/2^-$	2615.8	$23/2^+$		
1216	3839.3	$25/2^-$	2622.8	$21/2^-$		
1224	3839.3	$25/2^-$	2615.8	$23/2^+$		
1356	3972.3	$25/2^-$	2615.8	$23/2^+$		

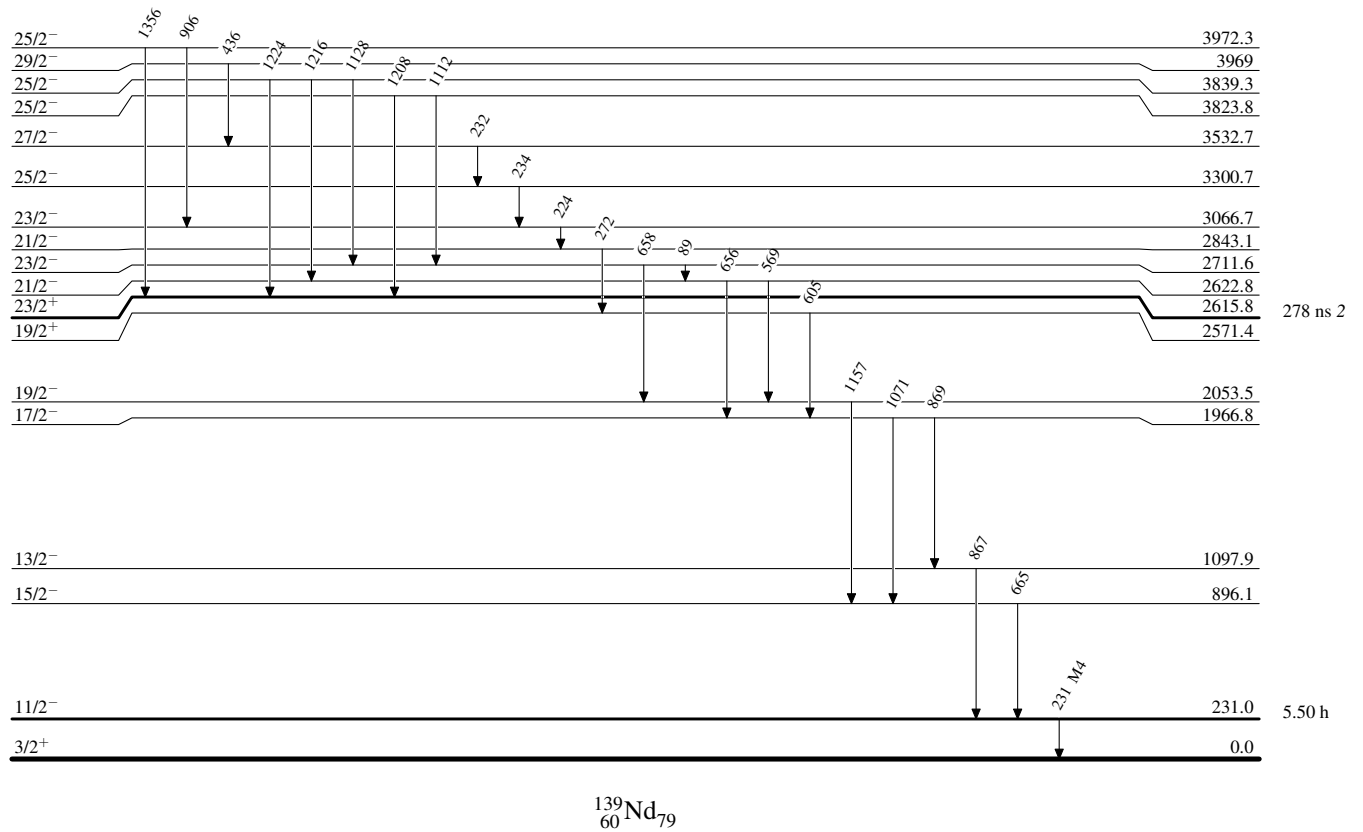
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## Level Scheme

 $^{139}_{60}\text{Nd}_{79}$

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Level Scheme (continued)



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