

$^{96}\text{Zr}(^{19}\text{F},6n\gamma)$ 2012Ne03

Type	Author	History	Citation	Literature Cutoff Date
Full Evaluation	S. Kumar(a), J. Chen(b) and F. G. Kondev		NDS 137, 1 (2016)	31-May-2016

2012Ne03: E(^{19}F) beam at 105 MeV, 15UD Pelletron Accelerator at the Inter University Accelerator Centre (IUAC). Target=1.0 mg/cm² of ^{96}Zr , 10.0 mg/cm² backing of Pb; Indian National Gamma Array (INGA) consist of 14 Compton-suppressed Ge clover detectors; Measured: E γ , I γ , $\gamma\gamma$ -coin, $\gamma\gamma(\theta)$, DCO ratio. Deduced: J, π , bands configurations, and multipolarity. Comparison with Tilted Axis Cranking (TAC) calculations. Systematics of angular momentum as a function of rotational frequency for In isotopes.

Other: **2007ZhZX**, using $^{96}\text{Zr}(^{20}\text{Ne},1p6n\gamma)$ at RIKEN and GRAPE array comprising of 17 detectors.

All data are from **2012Ne03**, unless otherwise noted.

 ^{109}In Levels

E(level) [†]	J $\pi^{\ddagger}$	T _{1/2}	Comments
0.0	9/2 ⁺		
1026.2 4	11/2 ⁺		
1428.4 4	13/2 ⁺		
1900.2 7			
2101.6 7	19/2 ⁺	210.0 ms 9	%IT=100 T _{1/2} : From Adopted Levels.
2102.2 ^b 6	17/2 ⁺		
2271.9 6	13/2 ⁻		
2532.3 & 6	15/2 ⁻		
2868.9 & 6	17/2 ⁻		
2957.8 & 7	19/2 ⁻		
2995.9 ^b 8			
3092.0 # 6	19/2 ⁻		
3122.4 & 8	21/2 ⁻		
3202.4 # 7	21/2 ⁻		
3410.4 # 8	23/2 ⁻		
3462.1 & 9	23/2 ⁻		E(level): 3800.5 in table I of 2012Ne03 .
3484.9 ^a 9	23/2		
3800.5 # 9	25/2 ⁻		
3861.3 ^b 10			
3982.1 ^a 11	25/2		J π : from figure 1 of 2012Ne03 , listed as 27/2 in table I.
4037.7 & 9	25/2 ⁻		
4436.5 @ 10	27/2 ⁽⁻⁾		
4475.0 ^a 12	27/2		J π : from figure 1 of 2012Ne03 , listed as 25/2 in table I.
4508.6 # 9	27/2 ⁽⁻⁾		
4686.4 ^a 13	29/2		
4833.0 # 10	29/2 ⁽⁻⁾		
5025.2 @ 11	29/2 ⁽⁻⁾		
5053.5 ^a 14	31/2		
5166.1 ^b 11			
5242.0 # 11	31/2 ⁽⁻⁾		
5408.3 ^a 15	33/2		
5580.6 @ 12	31/2 ⁽⁻⁾		
5796.7 # 12	33/2 ⁽⁻⁾		
5989.6 ^a 16	(35/2)		

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$^{96}\text{Zr}(^{19}\text{F},6n\gamma)$ **2012Ne03 (continued)** ^{109}In Levels (continued)

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

[‡] As given in **2012Ne03** based on deduced γ -ray transition multiplicities and band structure.

Band(A): Band 1: $\Delta J=1$ band based on $19/2^-$. Configuration= $\pi g_{9/2}^{-1} \otimes \nu [h_{11/2}, (d_{5/2}/g_{7/2})]$ before alignment and $\pi g_{9/2}^{-1} \otimes \nu [h_{11/2}, (d_{5/2}/g_{7/2})^3]$ after alignment around $\hbar\omega \approx 0.7$ MeV.

@ Band(B): Band 2: $\Delta J=1$ band based on $27/2^{(-)}$.

& Band(C): Band 3: $\Delta J=1$ band based on $15/2^-$.

^a Band(D): Band 4: $\Delta J=1$ band based on $23/2^-$.

^b Band(E): Band 5: band based on $17/2^+$.

 $\gamma(^{109}\text{In})$

E_γ [†]	I_γ	$E_i(\text{level})$	J_i^π	E_f	J_f^π	Mult. [‡]	Comments
88.9 5	64 4	2957.8	$19/2^-$	2868.9	$17/2^-$		
110.4 5	31.2 19	3202.4	$21/2^-$	3092.0	$19/2^-$	D	Mult.: DCO(D)=0.99 21 (2012Ne03).
164.6 5	54.2 25	3122.4	$21/2^-$	2957.8	$19/2^-$	D+Q	Mult.: DCO(Q)=0.78 8 (2012Ne03).
208.0 5	78 4	3410.4	$23/2^-$	3202.4	$21/2^-$	D+Q	Mult.: DCO(Q)=0.75 14 (2012Ne03).
211.4 5	19.9 12	4686.4	$29/2^-$	4475.0	$27/2^-$	D	Mult.: DCO(Q)=0.56 17, DCO(D)=1.15 20 (2012Ne03).
223.1 5	6.0 15	3092.0	$19/2^-$	2868.9	$17/2^-$		
244.6 5	35.2 17	3202.4	$21/2^-$	2957.8	$19/2^-$	D+Q	Mult.: DCO(Q)=0.70 10 (2012Ne03).
260.4 5	6.6 7	2532.3	$15/2^-$	2271.9	$13/2^-$		
288.0 5	8.4 10	3410.4	$23/2^-$	3122.4	$21/2^-$	D	Mult.: DCO(D)=1.0 3 (2012Ne03).
324.4 5	23.6 12	4833.0	$29/2^{(-)}$	4508.6	$27/2^{(-)}$	D+Q	Mult.: DCO(Q)=0.73 18 (2012Ne03).
336.6 5	100 4	2868.9	$17/2^-$	2532.3	$15/2^-$	D+Q	Mult.: DCO(Q)=0.69 4 (2012Ne03).
338.4 5	9.7 13	3800.5	$25/2^-$	3462.1	$23/2^-$	D	Mult.: DCO(Q)=0.56 5 for 339.7+338.4 (2012Ne03).
339.7 5	34 4	3462.1	$23/2^-$	3122.4	$21/2^-$	D	Mult.: DCO(Q)=0.56 5 for 339.7+338.4 (2012Ne03).
354.8 5	8.8 9	5408.3	$33/2^-$	5053.5	$31/2^-$	D+Q	Mult.: DCO(D)=1.2 4 (2012Ne03).
362.5 5	32.6 13	3484.9	$23/2^-$	3122.4	$21/2^-$	D+Q	Mult.: DCO(Q)=0.63 10 (2012Ne03).
367.1 5	13.8 9	5053.5	$31/2^-$	4686.4	$29/2^-$	D	Mult.: DCO(D)=1.0 3 (2012Ne03).
390.1 5	74 4	3800.5	$25/2^-$	3410.4	$23/2^-$	D+Q	Mult.: DCO(Q)=0.61 8 (2012Ne03).
396.5 5	4.0 5	4833.0	$29/2^{(-)}$	4436.5	$27/2^{(-)}$		
402.2 5	26.0 18	1428.4	$13/2^+$	1026.2	$11/2^+$		
409.0 5	16.4 10	5242.0	$31/2^{(-)}$	4833.0	$29/2^{(-)}$	D	Mult.: DCO(D)=1.19 23 (2012Ne03).
470.9 5	9.9 10	4508.6	$27/2^{(-)}$	4037.7	$25/2^-$	D	Mult.: DCO(D)=0.93 14 (2012Ne03).
492.9 5	22.6 13	4475.0	$27/2^-$	3982.1	$25/2^-$	D+Q	E_γ : Transition shown from 25/2 to 23/2 in table I of 2012Ne03 . Mult.: DCO(D)=1.20 22 (2012Ne03).
497.2 5	28.7 15	3982.1	$25/2^-$	3484.9	$23/2^-$	D	E_γ : 497.1 listed in figure 1 of 2012Ne03 . Transition shown from 27/2 to 25/2 in table I of 2012Ne03 . Mult.: DCO(D)=1.03 16 (2012Ne03).
554.7 5	3.1 15	5796.7	$33/2^{(-)}$	5242.0	$31/2^{(-)}$	D	Mult.: DCO(D)=0.9 3 for 555.4+554.7 (2012Ne03).
555.4 5	7.4 12	5580.6	$31/2^{(-)}$	5025.2	$29/2^{(-)}$	D	Mult.: DCO(D)=0.9 3 for 555.4+554.7 (2012Ne03).
575.6 5	14.8 8	4037.7	$25/2^-$	3462.1	$23/2^-$	D	Mult.: DCO(D)=1.04 17 (2012Ne03).
581.3 5	8.8 9	5989.6	$(35/2^-)$	5408.3	$33/2^-$	D	Mult.: DCO(D)=1.1 4 (2012Ne03).
588.7 5	11.0 10	5025.2	$29/2^{(-)}$	4436.5	$27/2^{(-)}$	D	Mult.: DCO(D)=1.0 5 (2012Ne03).
636.0 5	26.0 13	4436.5	$27/2^{(-)}$	3800.5	$25/2^-$		Mult.: DCO(D)=0.97 21 (2012Ne03).
673.2		2101.6	$19/2^+$	1428.4	$13/2^+$		E_γ : delayed transition not seen in 2012Ne03 .
673.8 5	59 3	2102.2	$17/2^+$	1428.4	$13/2^+$	Q	Mult.: DCO(Q)=1.13 14 (2012Ne03).
708.1 5	24.4 9	4508.6	$27/2^{(-)}$	3800.5	$25/2^-$	D+Q	Mult.: DCO(D)=1.28 19 (2012Ne03).
856.2 5	12.7 8	2957.8	$19/2^-$	2101.6	$19/2^+$		Initial level=2868.9 listed in table I of 2012Ne03 seems in error.
865.4 [#] 5	17.1 12	3861.3?		2995.9?			
874.0 5	9.9 8	1900.2		1026.2	$11/2^+$		
893.7 5	18.8 15	2995.9?		2102.2	$17/2^+$		

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$^{96}\text{Zr}(^{19}\text{F},6\text{n}\gamma)$ **2012Ne03 (continued)** $\gamma(^{109}\text{In})$ (continued)

E_γ [†]	I_γ	$E_i(\text{level})$	J_i^π	E_f	J_f^π	Mult. [‡]	Comments
989.8 5	9.6 11	3092.0	19/2 ⁻	2102.2	17/2 ⁺		
990.4 5	26 5	3092.0	19/2 ⁻	2101.6	19/2 ⁺		
1026.2 5	70 3	1026.2	11/2 ⁺	0.0	9/2 ⁺		
1100.8 5	16.5 8	3202.4	21/2 ⁻	2101.6	19/2 ⁺		
1103.8 5	100.0	2532.3	15/2 ⁻	1428.4	13/2 ⁺	D	Mult.: DCO(Q)=0.50 5 (2012Ne03).
1245.7 5	8.3 8	2271.9	13/2 ⁻	1026.2	11/2 ⁺		
1304.8 5	10.6 11	5166.1?		3861.3?			
1428.4 5	133 8	1428.4	13/2 ⁺	0.0	9/2 ⁺		

[†] $\Delta E_\gamma=0.5$ keV was assumed by evaluators.

[‡] Based on measured DCO ratios. DCO(Q) for gate on $\Delta J=2$, quadrupole transition; DCO(D) for gate on $\Delta J=1$, dipole transition.

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

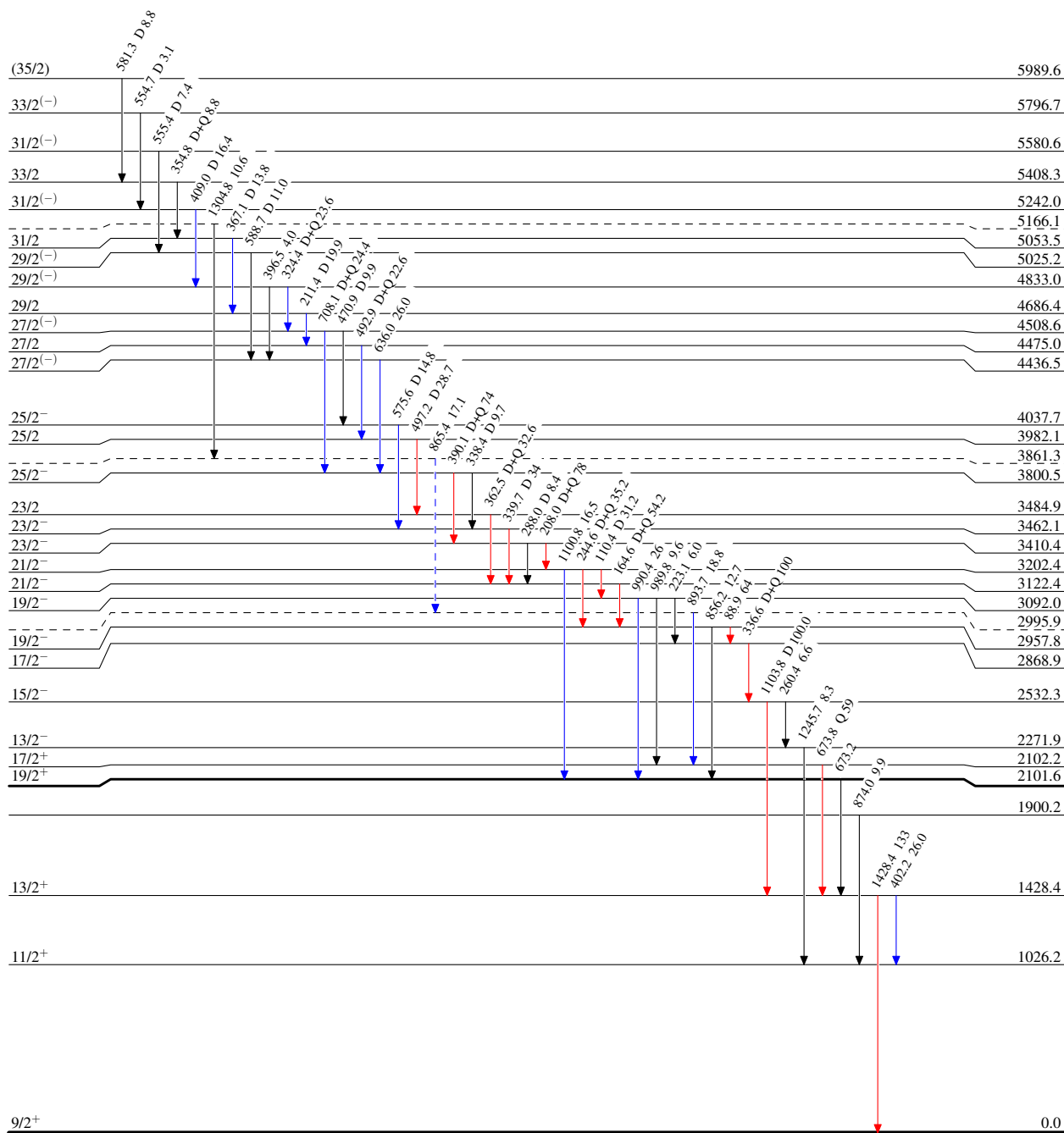
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Legend

Level Scheme

Intensities: Relative I_γ

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



210.0 ms 9

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