$^{130}Te(^{14}C,5n\gamma)$ **2015Ka06**

History

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

2015Ka06: E(^{14}C)=82 MeV beam provided by the tandem accelerator of IPN, Orsay. Target=2 mg/cm^2 ^{130}Te deposited on 120 mg/cm^2 thick Bi backing and 136 mg/cm^2 copper for thermal dissipation. Measured Eγ, Iγ, $\gamma\gamma$, $\gamma\gamma(\theta)$(DCO), $\gamma\gamma$(anisotropy ratios). Deduced levels, J, π, multipolarities, bands, magnetic-dipole rotational band, configuration. Comparison with realistic shell-model calculations.

^{139}Ce Levels

E(level)[†]	J$^{\pi}$[#]	T$_{1/2}$[‡]	Comments
0.0	3/2$^+$		Level not populated in this study, listed here for completeness.
754.24[@] *8*	11/2$^-$	57.58 s *32*	%IT=100 Decay mode from Adopted Levels.
2063.2 *3*	(11/2$^-$,13/2$^-$)		
2164.3 *5*	(13/2$^-$)		
2361.47[@] *21*	15/2$^-$		
2632.1[@] *3*	19/2$^-$	70 ns *5*	
2819.9[@] *4*	21/2$^-$		
3187.3 *4*	23/2$^-$		
3877.5[a] *5*	23/2$^-$		
4013.8[&] *5*	23/2$^+$		
4083.9[&] *5*	25/2$^+$		
4099.1[a] *5*	25/2$^-$		
4277.1[&] *5*	27/2$^+$		
4404.7[a] *5*	27/2$^-$		
4431.7 *11*			
4756.9[&] *5*	29/2$^+$		
4808.6[a] *5*	31/2$^-$		
5298.5 *6*	29/2$^+$		
5533.0[&] *5*	31/2$^+$		
5697.9[b] *7*	31/2$^-$		
5737.6 *7*	31/2$^+$		
5822.8 *6*	(33/2$^-$)		
5884.3[a] *6*	35/2$^-$		
5916.4[b] *5*	33/2$^-$		
6031.3 *7*	33/2$^+$		
6077.1 *6*	(35/2$^-$)		
6142.4[b] *6*	35/2$^-$		
6155.4[c] *6*	35/2$^-$		
6331.8[c] *6*	37/2$^-$		
6488.2[b] *6*	37/2$^-$		
6797.7[c] *7*	39/2$^-$		
6844.8[b] *8*	39/2$^-$		
6966.9 *8*			
7165.2 *8*			
7308.6[c] *8*	(41/2$^-$)		
7333.1[b] *8*	41/2$^-$		
7449.8 *12*			
7571.8 *12*			
7856.1[c] *10*	(43/2$^-$)		

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^{130}Te(^{14}C,5nγ) 2015Ka06 (continued)

^{139}Ce Levels (continued)

E(level)[†]	J$^{\pi}$[#]
7987.4[b] *10*	43/2$^-$
8001.1 *10*	

[†] From least-squares fit to Eγ data.
[‡] From Adopted Levels.
[#] As proposed in 2015Ka06 based on $\gamma\gamma(\theta)$ data and band structures.
[@] Band(A): γ cascade based on 11/2$^-$.
[&] Band(B): γ cascade based on 23/2$^+$. Parity reversed in the present work.
[a] Band(C): γ cascade based on 23/2$^-$, 3876.7.
[b] Band(D): Magnetic-dipole rotational band based on 31/2$^-$.
[c] Band(E): Band based on 35/2$^-$.

γ(^{139}Ce)

DCO(1) for gate on ΔJ=1, dipole transitions; DCO(2) for gate on ΔJ=2, quadrupole transition. Expected DCO(1) values are 2.0 and 1.0; and DCO(2) values are 1.0 and 0.6 for stretched quadrupole and stretched dipole transitions, respectively.

E$_\gamma$	I$_\gamma$	E$_i$(level)	J$^\pi_i$	E$_f$	J$^\pi_f$	Mult.[†]	Comments
61.0 *5*	1.0 *5*	5884.3	35/2$^-$	5822.8	(33/2$^-$)		
70.1 *2*	6.4 *19*	4083.9	25/2$^+$	4013.8	23/2$^+$		
166.0[‡] *5*	3.7 *11*	5697.9	31/2$^-$	5533.0	31/2$^+$		
176.4 *5*	2.7 *3*	6331.8	37/2$^-$	6155.4	35/2$^-$	D+Q	DCO(1)=1.24 *20*; DCO(2)=0.86 *30* R(θ)(1)=1.19 *19*.
187.8 *2*	82.9 *33*	2819.9	21/2$^-$	2632.1	19/2$^-$	D+Q	DCO(1)=1.15 *14*; DCO(2)=0.76 *12* R(θ)(1)=1.33 *32*.
192.8 *2*	5.6 *5*	6077.1	(35/2$^-$)	5884.3	35/2$^-$		
193.2 *2*	27.0 *8*	4277.1	27/2$^+$	4083.9	25/2$^+$	D+Q	DCO(1)=1.53 *1*; DCO(2)=0.74 *4* R(θ)(1)=1.38 *12*.
197.0 *5*	4.5 *9*	2361.47	15/2$^-$	2164.3	(13/2$^-$)		
206.4 *5*	3.7 *5*	4083.9	25/2$^+$	3877.5	23/2$^-$		
218.6 *5*	3.3 *2*	5916.4	33/2$^-$	5697.9	31/2$^-$	D+Q	DCO(1)=1.30 *70*; DCO(2)=0.42 *20* R(θ)(2)=0.63 *30*.
221.7 *5*	3.5 *3*	4099.1	25/2$^-$	3877.5	23/2$^-$		
226.0 *2*	6.0 *4*	6142.4	35/2$^-$	5916.4	33/2$^-$	D+Q	DCO(1)=1.46 *8*; DCO(2)=0.53 *16* R(θ)(1)=1.11 *18*.
234.7 *5*	3.0 *3*	5533.0	31/2$^+$	5298.5	29/2$^+$	D+Q	DCO(1)=1.10 *16*; DCO(2)=0.62 *5* R(θ)(1)=1.09 *30*, R(θ)(2)=1.08 *30*.
239.0 *2*	6.1 *5*	6155.4	35/2$^-$	5916.4	33/2$^-$	D+Q	DCO(1)=1.23 *30*; DCO(2)=0.61 *7* R(θ)(1)=1.07 *17*.
253.0[‡] *10*	0.8 *2*	6331.8	37/2$^-$	6077.1	(35/2$^-$)		
270.6 *2*	100.0 *30*	2632.1	19/2$^-$	2361.47	15/2$^-$	E2	DCO(1)=1.68 *4*; DCO(2)=0.86 *20* R(θ)(1)=1.39 *30*.
293.7 *2*	5.8 *5*	6031.3	33/2$^+$	5737.6	31/2$^+$	D+Q	DCO(1)=1.01 *20*; DCO(2)=0.54 *20* R(θ)(1)=1.02 *10*, R(θ)(2)=0.84 *14*.
298.3 *2*	6.7 *7*	2361.47	15/2$^-$	2063.2	(11/2$^-$,13/2$^-$)	D+Q	DCO(1)=1.52 *18*
305.5 *2*	25.3 *13*	4404.7	27/2$^-$	4099.1	25/2$^-$	D+Q	DCO(1)=1.10 *30*; DCO(2)=0.51 *11* R(θ)(1)=0.90 *16*, R(θ)(2)=0.81 *19*.
345.8 *2*	5.2 *4*	6488.2	37/2$^-$	6142.4	35/2$^-$	D+Q	DCO(1)=0.89 *10*; DCO(2)=0.44 *5* R(θ)(2)=0.75 *12*.

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^{130}Te(^{14}C,5nγ) 2015Ka06 (continued)

γ(^{139}Ce) (continued)

E_γ	I_γ	E_i(level)	J^π_i	E_f	J^π_f	Mult.†	Comments
356.6 *5*	4.5 *2*	6844.8	39/2$^-$	6488.2	37/2$^-$	(D+Q)	R(θ)(1)=0.68 *30*.
367.2 *2*	57.8 *23*	3187.3	23/2$^-$	2819.9	21/2$^-$	D+Q	DCO(2)=0.47 *17* R(θ)(2)=0.74 *30*.
383.4 *2*	7.8 *5*	5916.4	33/2$^-$	5533.0	31/2$^+$	D	DCO(1)=1.05 *40*; DCO(2)=0.40 *3* R(θ)(1)=0.74 *12*.
403.9 *2*	29.9 *15*	4808.6	31/2$^-$	4404.7	27/2$^-$	Q	DCO(1)=2.02 *30* R(θ)(1)=1.21 *40*.
439.1 *5*	3.5 *3*	5737.6	31/2$^+$	5298.5	29/2$^+$	D+Q	DCO(1)=1.01 *16*
447.4 *2*	5.5 *4*	6331.8	37/2$^-$	5884.3	35/2$^-$	(D+Q)	R(θ)(1)=0.71 *30*.
465.5 *5*	1.2 *2*	6797.7	39/2$^-$	6331.8	37/2$^-$	D+Q	R(θ)(1)=0.44 *13*.
479.8 *2*	15.5 *8*	4756.9	29/2$^+$	4277.1	27/2$^+$	D+Q	DCO(1)=0.94 *19*; DCO(2)=0.41 *14* R(θ)(1)=0.72 *9*.
488.3 *2*	5.8 *6*	7333.1	41/2$^-$	6844.8	39/2$^-$	D+Q	R(θ)(1)=0.28 *17*.
510.9 *5*	3.0 *3*	7308.6	(41/2$^-$)	6797.7	39/2$^-$		
547.5 *5*	2.2 *2*	7856.1	(43/2$^-$)	7308.6	(41/2$^-$)		
642.7 *5*	3.0 *4*	6797.7	39/2$^-$	6155.4	35/2$^-$		
654.3 *5*	4.3 *5*	7987.4	43/2$^-$	7333.1	41/2$^-$	(D+Q)	DCO(1)=0.95 *30* R(θ)(1)=0.52 *15*.
754.24 *8*		754.24	11/2$^-$	0.0	3/2$^+$	M4	E_γ,Mult.: from Adopted dataset.
776.1 *2*	5.3 *5*	5533.0	31/2$^+$	4756.9	29/2$^+$	D+Q	DCO(2)=0.52 *11* R(θ)(1)=0.58 *12*.
835.9 *5*	3.6 *6*	8001.1		7165.2			
889.8 *5*	3.1 *5*	6966.9		6077.1	(35/2$^-$)		
896.5 *2*	28.1 *25*	4083.9	25/2$^+$	3187.3	23/2$^-$	D	DCO(1)=0.49 *17*; DCO(2)=0.91 *14*
911.6 *2*	6.0 *9*	4099.1	25/2$^-$	3187.3	23/2$^-$	D+Q	DCO(2)=0.54 *14*
1013.6 *5*	3.7 *5*	5822.8	(33/2$^-$)	4808.6	31/2$^-$		
1021.6 *5*	4.2 *5*	5298.5	29/2$^+$	4277.1	27/2$^+$	D+Q	R(θ)(1)=0.35 *11*, R(θ)(2)=0.25 *11*.
1057.7 *5*	8.0 *22*	3877.5	23/2$^-$	2819.9	21/2$^-$	D+Q	R(θ)(2)=0.35 *17*.
1076.0 *5*	12.7 *13*	5884.3	35/2$^-$	4808.6	31/2$^-$	Q	DCO(1)=1.60 *40* R(θ)(2)=1.07 *17*.
1088.0 *5*	3.6 *6*	7165.2		6077.1	(35/2$^-$)		
1108.1 *5*	10.6 *11*	5916.4	33/2$^-$	4808.6	31/2$^-$	D+Q	DCO(2)=0.35 *8* R(θ)(1)=0.66 *7*, R(θ)(2)=0.60 *20*.
1118.0 *10*	0.20 *2*	7449.8		6331.8	37/2$^-$		
1160.1‡ *10*	1.5 *3*	5916.4	33/2$^-$	4756.9	29/2$^+$		
1194.3 *5*	10.1 *13*	4013.8	23/2$^+$	2819.9	21/2$^-$	D	R(θ)(1)=0.56 *16*, R(θ)(2)=0.72 *41*.
1214.4 *10*	3.1 *4*	5298.5	29/2$^+$	4083.9	25/2$^+$		
1217.5 *5*	11.6 *31*	4404.7	27/2$^-$	3187.3	23/2$^-$	Q	DCO(1)=1.84 *30*; DCO(2)=1.02 *7*
1240.0 *10*	0.30 *3*	7571.8		6331.8	37/2$^-$		
1244.4 *10*	7.1 *14*	4431.7		3187.3	23/2$^-$		
1256.5 *10*	5.5 *6*	5533.0	31/2$^+$	4277.1	27/2$^+$	Q	DCO(2)=0.99 *40*
1280.3 *5*	15.1 *17*	4099.1	25/2$^-$	2819.9	21/2$^-$	Q	DCO(2)=0.94 *30* R(θ)(2)=0.95 *50*.
1293.3 *10*	2.1 *2*	5697.9	31/2$^-$	4404.7	27/2$^-$		
1310.2 *10*	6.8 *8*	2063.2	(11/2$^-$,13/2$^-$)	754.24	11/2$^-$		
1409.4 *10*	5.5 *7*	2164.3	(13/2$^-$)	754.24	11/2$^-$	(D+Q)	DCO(1)=1.59 *60*
1460.6 *10*	3.5 *5*	5737.6	31/2$^+$	4277.1	27/2$^+$	Q	DCO(1)=1.62 *19* R(θ)(1)=1.27 *40*, R(θ)(2)=1.44 *12*.
1607.2 *2*	95.8 *38*	2361.47	15/2$^-$	754.24	11/2$^-$	Q	DCO(1)=1.87 *50* R(θ)(1)=1.33 *30*.

† 2015Ka06 assign E1 or M1+E2 for ΔJ=1, dipole or dipole+quadrupole transitions, and E2 for ΔJ=2, quadrupole transitions. In the absence of parity-sensitive measurements, but in consideration of timing resolution of ≈50 ns in $\gamma\gamma$-coin measurement and

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^{130}Te(^{14}C,5nγ) 2015Ka06 (continued)

γ(^{139}Ce) (continued)

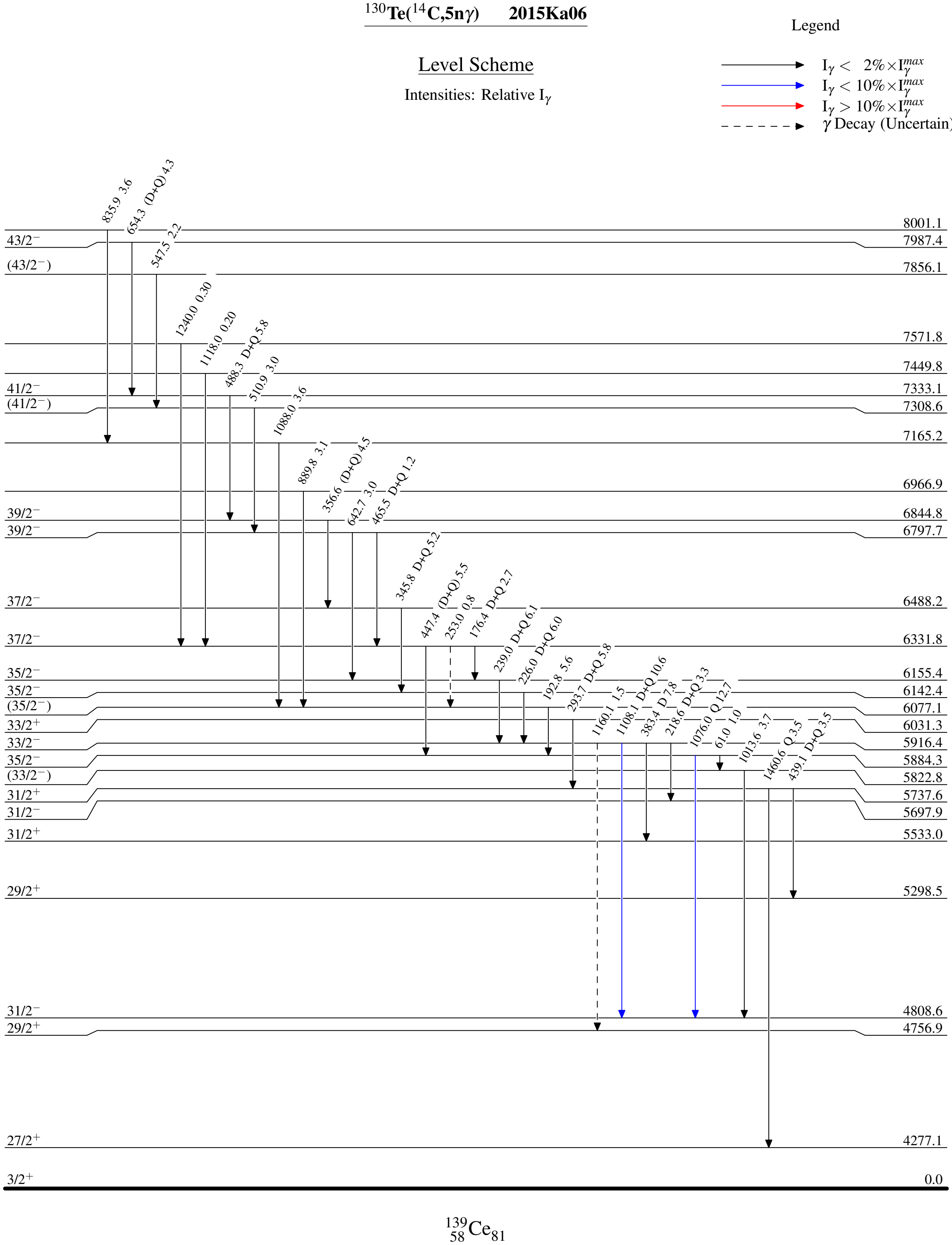
RUL for E2 and M2 transitions, evaluators assign (M1+E2) and (E2) for Eγ<500 keV, and D, D+Q or Q for higher energy transitions.

‡ Placement of transition in the level scheme is uncertain.

^{130}Te(^{14}C,5nγ) 2015Ka06

Level Scheme

Intensities: Relative I_γ



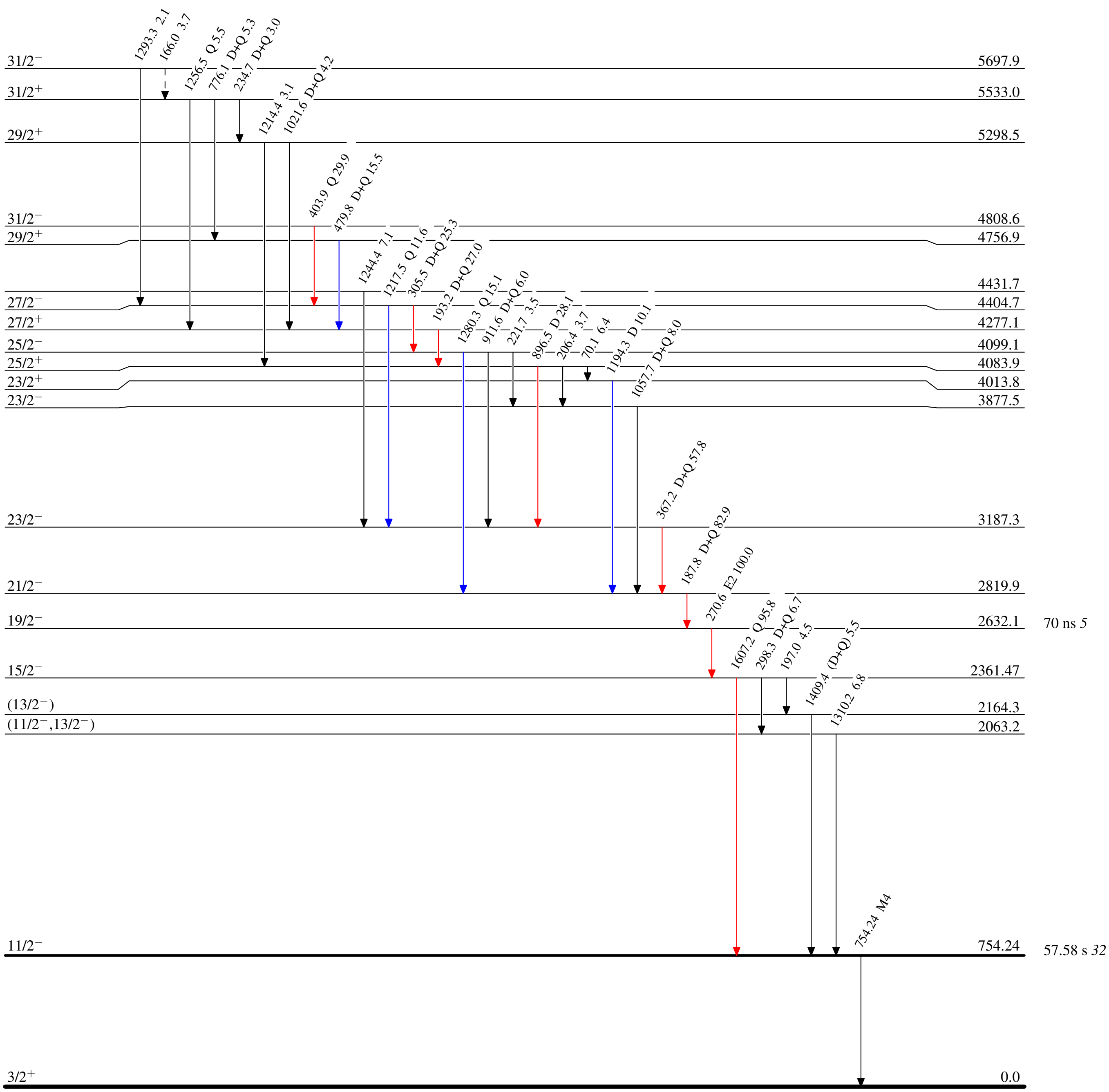
^{130}Te(^{14}C,5nγ) 2015Ka06

Level Scheme (continued)

Intensities: Relative I_γ

Legend

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



$^{139}_{58}Ce_{81}$

^{130}Te(^{14}C,5nγ) 2015Ka06