^{193}Ir(α,3nγ) 1982Ne05,1975La21

History

Type	Author	Citation	Literature Cutoff Date
Full Evaluation	Jun Chen and Balraj Singh	NDS 177, 1 (2021)	3-Sep-2021

1982Ne05: E=40 MeV α beam was produced from the Julich isochronous cyclotron JULIC. Target was metallic powder of 98% isotopically enriched ^{193}Ir. γ rays were detected with two large volume Ge(Li) detectors (≈65 cm^2). Measured Eγ, Iγ, γγ-coin, γ(θ). Deduced levels, J, π, γ-ray multipolarities. 1982Ne05 also measured γ(t) and ce in off-beam mode with pulsed beam for isomeric decays. See ^{194}Au IT decay datasets for more details. Also see 1979Ne01 from the same group.

1975La21: E=34 and 43 MeV α beams were produced from the Bonn cyclotron. Target was 100 mg/cm^2 natural Ir. γ rays were detected with an intrinsic Ge(Li) detector. Measured Eγ, γ(θ). Deduced levels, J, π.

Other reaction:

^{191}Ir(α,nγ): 1980RoZN, 1977Go15.

^{194}Au Levels

E(level)†	Jπ‡	T1/2#	Comments
0.0	1⁻		
35.5 *3*	(2)⁻		
81.0 *5*	(3)⁻		
107.9 *6*	(5⁺)	600 ms *50*	%IT=100
244.9 *6*	(7⁺)		
278.5 *6*	(6⁺)		
407.1 *6*	(8⁺)		
439.9 *7*	(9⁺)		
476.1 *7*	(11⁻)	420 ms *20*	
536.2 *7*	(9⁺)		
609.6 *7*	(9⁺)		
619.1 *8*	(12⁻)		
686.1 *7*	(10⁺)		
720.4 *7*	(9⁺)		
768.9 *8*	(10⁺)		
840.8 *8*	(13⁻)		
888.3 *8*	(10⁺)		
1033.6 *8*	(14⁻)		
1154.6 *7*	(11⁺)		
1285.2 *8*	(14⁻)		
1526.0 *8*	(15⁻)		
1748.7 *8*	(16⁻)		
1849.0 *8*	(13⁺)		
2091.9 *8*	(15⁺)		
2185.2 *10*	(17⁻)		Jπ: (16⁺) in Adopted Levels.

† From a least-squares fit to γ-ray energies, assuming ΔEγ=0.3 keV for values quoted to tenth keV and 1 keV for those quoted to keV if not given.

‡ As given by 1982Ne05, based on previous assignments, and γ(θ) data in their experiment. Most assignments are the same in the Adopted Levels, except that many are in parentheses when strong arguments seem lacking.

From γ(t) and pulsed beam (1982Ne05).

^{193}Ir(α,3nγ) 1982Ne05,1975La21 (continued)

γ(^{194}Au)

The transitions 128.6γ, 136.9γ, 162.1γ, 170.7γ, 194.9γ, 364.5γ assigned to ^{192}Au and unassigned transitions 231.8γ, 291.3γ, 313.2γ, 414.4γ, 436.5γ in 1975La21 should belong to ^{194}Au based on comparisons with results from other γ spectroscopy studies.

A_2 and A_4 under comments are from 1982Ne05, unless otherwise noted.

E_γ[†]	I_γ[†]	E_i(level)	J^π_i	E_f	J^π_f	Mult.[#]	Comments
26.9		107.9	(5$^+$)	81.0	(3)$^-$	(M2)	Mult.: from the Adopted Gammas.
35.5		35.5	(2)$^-$	0.0	1$^-$		
45.5	21.6 *12*	81.0	(3)$^-$	35.5	(2)$^-$		A_2=−0.10 *10* (1975La21) E_γ,I_γ: from 1975La21.
69.0 *3*		476.1	(11$^-$)	407.1	(8$^+$)	(E3)	Mult.: from ce data (1982Ne05).
128.6 *3*	106 *6*	407.1	(8$^+$)	278.5	(6$^+$)	(E2)	A_2=+0.06 *1*; A_4=−0.02 *2* A_2=+0.03 *6* (1975La21) E_γ: other: 128.6 (1975La21). I_γ: weighted average of 110 *5* (1975La21) and 97 *8* (1982Ne05). Mult.: E2 in 1982Ne05.
137.0 *3*	100 *8*	244.9	(7$^+$)	107.9	(5$^+$)	(E2)	A_2=+0.13 *1*; A_4=−0.04 *2* A_2=+0.11 *6* (1975La21) E_γ: other: 136.9 (1975La21). I_γ: other: 100 in 1975La21. Mult.: E2 in 1982Ne05.
143.0 *3*	41.2 *20*	619.1	(12$^-$)	476.1	(11$^-$)	D	A_2=−0.16 *3*; A_4=0.00 *5* A_2=−0.33 *11* (1975La21) E_γ: other: 142.8 (1975La21). I_γ: weighted average of 40.8 *20* (1975La21) and 42 *3* (1982Ne05). Mult.: M1/E2 in 1982Ne05.
162.2 *3*	40.1 *20*	407.1	(8$^+$)	244.9	(7$^+$)	D	A_2=−0.14 *3*; A_4=+0.01 *5* A_2=−0.27 *13* (1975La21) E_γ: other: 162.1 (1975La21). I_γ: weighted average of 40.5 *20* (1975La21) and 36 *6* (1982Ne05). Mult.: M1 in 1982Ne05.
170.6 *3*	117 *7*	278.5	(6$^+$)	107.9	(5$^+$)	D	A_2=−0.13 *1*; A_4=−0.01 *2* A_2=−0.14 *7* (1975La21) E_γ: other: 170.7 (1975La21). I_γ: weighted average of 121 *5* (1975La21) and 106 *8* (1982Ne05). Mult.: M1 in 1982Ne05.
193.0 *3*	41 *10*	1033.6	(14$^-$)	840.8	(13$^-$)	D	A_2=−0.17 *3*; A_4=0.00 *5* A_2=−0.20 *13* (1975La21) E_γ: other: 192.9 (1975La21). I_γ: unweighted average of 51.3 *22* (1975La21) and 31 *6* (1982Ne05). Mult.: M1/E2 in 1982Ne05.
195.0 *3*	18.9 *12*	439.9	(9$^+$)	244.9	(7$^+$)	(E2)	A_2=+0.32 *4*; A_4=−0.01 *6* A_2=+0.35 *17* (1975La21) E_γ: other: 194.9 (1975La21). I_γ: weighted average of 18.9 *12* (1975La21) and 19 *5* (1982Ne05).
202.5 *3*	6 *3*	609.6	(9$^+$)	407.1	(8$^+$)	D	A_2=−0.15 *5*; A_4=+0.04 *7* Mult.: M1 in 1982Ne05.
221.7 *5*	42[‡] *6*	840.8	(13$^-$)	619.1	(12$^-$)	D	A_2=−0.27 *2*; A_4=+0.01 *3* A_2=−0.32 *14* (1975La21)

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^{193}Ir(α,3nγ) 1982Ne05,1975La21 (continued)

γ(^{194}Au) (continued)

E_γ[†]	I_γ[†]	E_i(level)	J^π_i	E_f	J^π_f	Mult.[#]	Comments
							E_γ: other: 221.5 (1975La21). I_γ: other: 58 *3* in 1975La21 could be for the doublet. Mult.: M1/E2 in 1982Ne05. $\gamma(\theta)$ for the doublet.
222.6 *5*	8[‡] *3*	1748.7	(16$^-$)	1526.0	(15$^-$)	D	Mult.: M1/E2 in 1982Ne05.
232.7 *3*	5.6 *7*	768.9	(10$^+$)	536.2	(9$^+$)	D	A_2=−0.08 *6*; A_4=+0.01 *9* E_γ: other: 231.8 (not assigned by 1975La21). I_γ: weighted average of 5.6 *7* (1975La21) and 6 *3* (1982Ne05).
279.0 *3*	6 *3*	686.1	(10$^+$)	407.1	(8$^+$)	(E2)	A_2=+0.22 *6*; A_4=−0.08 *9* In (^{7}Li,5nγ), this γ is placed from 888, (10$^+$) level to 609, 9$^+$ level, which is inconsistent with ΔJ=2, quadrupole from 279$\gamma(\theta)$ data.
291.3 *3*	11.5 *13*	536.2	(9$^+$)	244.9	(7$^+$)	(E2)	A_2=+0.31 *6*; A_4=+0.05 *9* E_γ: other: 291.3 (not assigned by 1975La21). I_γ: weighted average of 12.0 *11* (1975La21) and 8 *3* (1982Ne05).
313.3 *3*	15.0 *15*	720.4	(9$^+$)	407.1	(8$^+$)	D	A_2=−0.35 *5*; A_4=+0.10 *7* E_γ: other: 313.2 (not assigned by 1975La21). I_γ: weighted average of 15.2 *15* (1975La21) and 14 *3* (1982Ne05).
343.2 *5*	3[‡] *3*	2091.9	(15$^+$)	1748.7	(16$^-$)		A_2=+0.25 *9*; A_4=+0.12 *12* $\gamma(\theta)$ for a superimposed line, as it is inconsistent with ΔJ=1,(E1) in 1982Ne05.
364.6 *5*	53[‡] *8*	840.8	(13$^-$)	476.1	(11$^-$)	(E2)	A_2=+0.30 *2*; A_4=−0.10 *3* A_2=+0.29 *15* (1975La21) E_γ: other: 364.5 (not assigned by 1975La21). I_γ: other: 58 *4* in 1975La21 could be for the doublet. Mult.: E2 in 1982Ne05. $\gamma(\theta)$ for 364.8+364.6.
364.8 *5*	22[‡] *8*	609.6	(9$^+$)	244.9	(7$^+$)	(E2)	A_2=+0.30 *2*; A_4=−0.10 *3* Mult.: E2 in 1982Ne05. $\gamma(\theta)$ for the doublet.
414.5 *3*	14 *3*	1033.6	(14$^-$)	619.1	(12$^-$)	Q	A_2=+0.32 *5*; A_4=−0.10 *7* E_γ: other: 414.4 (not assigned by 1975La21). I_γ: unweighted average of 10.4 *17* (1975La21) and 17 *3* (1982Ne05). Mult.: E2 in 1982Ne05.
436.5 *5*	11.8[‡] *22*	2185.2	(17$^-$)	1748.7	(16$^-$)	D+Q	A_2=+0.43 *6*; A_4=−0.06 *9* E_γ: other: 436.5 (not assigned by 1975La21). I_γ: weighted average of 13.0 *17* (1975La21) and 8 *3* (1982Ne05). $\gamma(\theta)$ for a superimposed line, as it is inconsistent with ΔJ=1, M1+E2 in 1982Ne05.
481.2 *5*	17[‡] *3*	888.3	(10$^+$)	407.1	(8$^+$)	Q	A_2=+0.30 *5*; A_4=−0.02 *7*
492.7 *3*	14 *3*	1526.0	(15$^-$)	1033.6	(14$^-$)	D	A_2=−0.14 *5*; A_4=+0.01 *7* Mult.: M1/E2 in 1982Ne05.
545.0 *3*	14 *3*	1154.6	(11$^+$)	609.6	(9$^+$)	Q	A_2=+0.35 *5*; A_4=−0.07 *7* Mult.: E2 in 1982Ne05.
666.1 *3*	14 *3*	1285.2	(14$^-$)	619.1	(12$^-$)	(Q)	A_2=+0.32 *5*; A_4=−0.08 *7* Mult.: (E2) in 1982Ne05.
685.0 *3*	17 *3*	1526.0	(15$^-$)	840.8	(13$^-$)	Q	A_2=+0.35 *5*; A_4=−0.08 *7* Mult.: E2 in 1982Ne05.
694.4 *3*	6 *3*	1849.0	(13$^+$)	1154.6	(11$^+$)	Q	A_2=+0.20 *10*; A_4=+0.16 *15* Mult.: E2 in 1982Ne05.

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^{193}Ir(α,3nγ) 1982Ne05,1975La21 (continued)

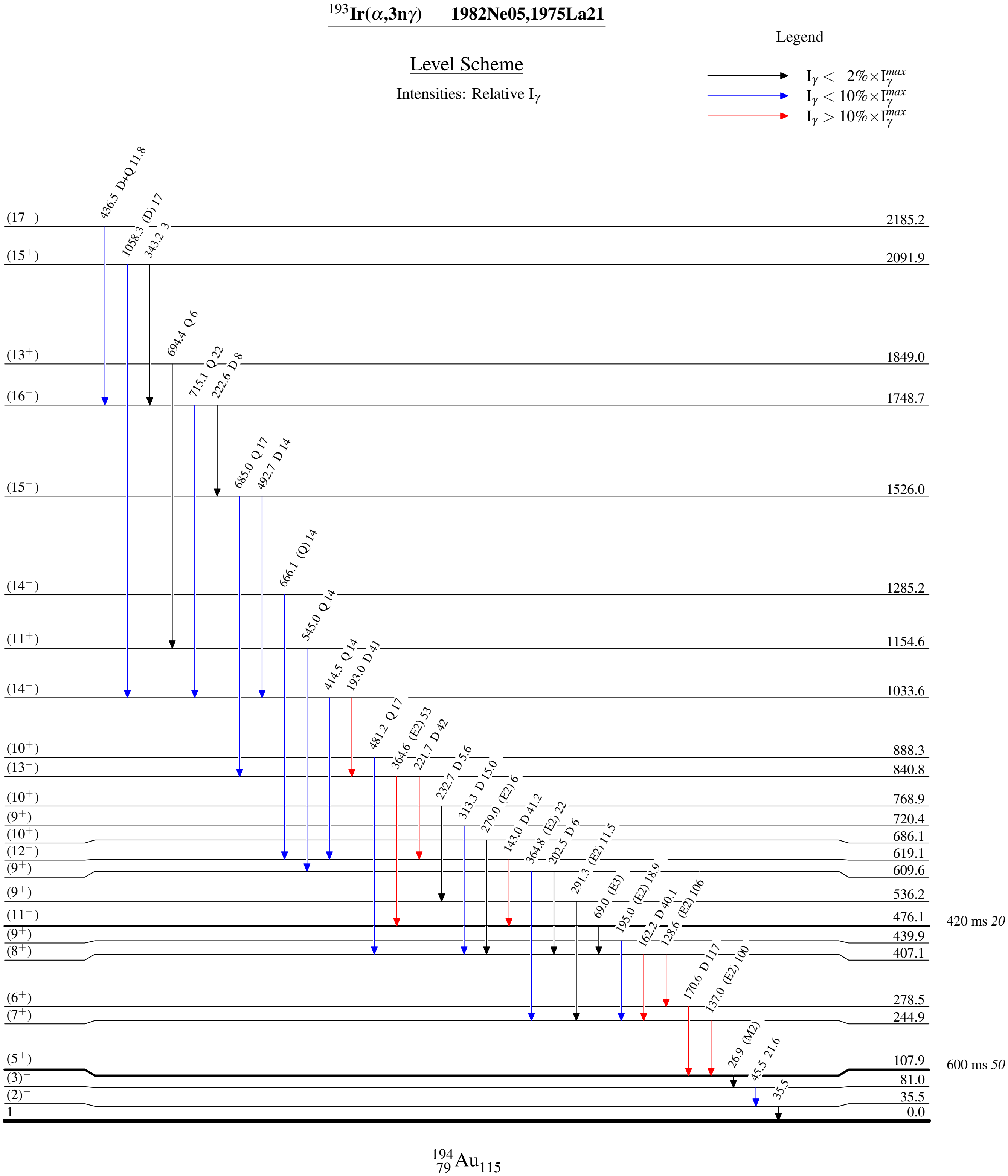
γ(^{194}Au) (continued)

E_γ †	I_γ †	E_i(level)	J^π_i	E_f	J^π_f	Mult.#	Comments
715.1 *3*	22 *6*	1748.7	(16$^-$)	1033.6	(14$^-$)	Q	A_2=+0.31 *4*; A_4=−0.14 *6* Mult.: E2 in 1982Ne05.
1058.3 *3*	17 *3*	2091.9	(15$^+$)	1033.6	(14$^-$)	(D)	A_2=−0.24 *6*; A_4=−0.03 *9*

† From 1982Ne05, unless otherwise noted. Original Iγ values in 1982Ne05 have been re-normalized to I(137γ)=100 by evaluators.

‡ From γγ-coin data (1982Ne05).

\# 1982Ne05 assigned E2, M1, (E1) and M1+E2 based on their γ(θ) data. Evaluators assign D for ΔJ=1 transitions, and Q for ΔJ=2 transitions of Eγ>400 keV, whereas (E2) is assigned for ΔJ=2 transitions of Eγ<400 keV, assuming level half-lives are less than few ns from observation of the γ rays in γγ-coin with a resolving time of few tens of ns. Authors′ assignments are listed in comments.



193Ir(α,3nγ) 1982Ne05,1975La21
Level Scheme
Intensities: Relative Iγ
Legend
Iγ < 2%×Iγmax
Iγ < 10%×Iγmax
Iγ > 10%×Iγmax
(17−) 2185.2
(15+) 2091.9
(13+) 1849.0
(16−) 1748.7
(15−) 1526.0
(14−) 1285.2
(11+) 1154.6
(14−) 1033.6
(10+) 888.3
(13−) 840.8
(10+) 768.9
(9+) 720.4
(10+) 686.1
(12−) 619.1
(9+) 609.6
(9+) 536.2
(11−) 476.1
420 ms 20
(9+) 439.9
(8+) 407.1
(6+) 278.5
(7+) 244.9
(5+) 107.9
600 ms 50
(3)− 81.0
(2)− 35.5
1− 0.0
436.5 D+Q 11.8
1058.3 (D) 17
343.2 3
694.4 Q 6
715.1 Q 22
222.6 D 8
685.0 Q 17
492.7 D 14
666.1 (Q) 14
545.0 Q 14
414.5 Q 14
193.0 D 41
481.2 Q 17
364.6 (E2) 53
221.7 D 42
232.7 D 5.6
313.3 D 15.0
279.0 (E2) 6
143.0 D 41.2
364.8 (E2) 22
202.5 D 6
291.3 (E2) 11.5
69.0 (E3)
195.0 (E2) 18.9
162.2 D 40.1
128.6 (E2) 106
170.6 D 117
137.0 (E2) 100
26.9 (M2)
45.5 21.6
35.5
194 79Au115