^{174}Ir α decay (5.01 s) 1992Sc16

History

Type	Author	Citation	Literature Cutoff Date
Full Evaluation	C. M. Baglin[1], E. A. Mccutchan[2], S. Basunia[1]	NDS 153, 1 (2018)	1-Oct-2018

Parent: ^{174}Ir: E=193 *11*; $J^\pi=(7^+)$; $T_{1/2}$=5.01 s *22*; Q(α)=5625 *10*; %α decay=2.5 *3*

^{174}Ir-$T_{1/2}$: Weighted average of 4.9 s *3* and 5.5 s *6* from 1992Sc16, and 5.0 s *4* from 1992Bo21.

^{174}Ir-%α decay: %α=2.5 *3* from 1992Sc16.

1992Sc16: source from ^{141}Pr(^{36}Ar,xn), E=175-204 MeV; measured α excit, Eα, Iα, Eγ, Iγ, I(K x ray), α-K x ray coin, $\alpha\gamma$ coin, α(t); deduced α branching; Si and Ge detectors.

1967Si02: sources produced by ^{169}Tm(^{16}O,11n), ^{164}Er(^{19}F,9n), and ^{162}Er(^{19}F,7n); measured Eα with a semiconductor detector. ^{174}Ir activity was assigned on the basis of cross bombardments and excitation functions.

^{170}Re Levels

E(level)†	J^π‡	Comments
0.0	(5^+)	
20.13 *23*	(6^-)	E(level): 20.1 or 190.2; order of 20.2γ and 190.2γ not established.
210.32 *19*	(7^+)	I(γ+ce) imbalance at the 210 level in 5316α-γ coin implies that additional transition(s) feed the 210 level.
370.1 *6*		See comment on 122γ multipolarity.

† From least-squares fit to Eγ.
‡ Adopted values.

α radiations

Eα	E(level)	Iα‡	HF†	Comments
5316 *10*	370.1	12 *1*	2.5 *5*	Eα,Iα: from 1992Sc16.
5478 *6*	210.32	88 *2*	1.9 *3*	Eα from 1967Si02. Iα from 1992Sc16.

† Using r_0=1.55 *1* (based on r_0=1.553 *14* from ^{174}Pt α decay and r_0=1.54 *3* from ^{174}Os α decay (1998Ak04)).
‡ For absolute intensity per 100 decays, multiply by 0.025 *3*.

$\gamma(^{170}Re)$

Intensities from $\alpha\gamma$ coin (1992Sc16):

Eγ	5478α-γ coin	5316α-γ coin
K x ray(Re)	9 1	5.6 8
20.2	2.6 10	-
122.2	-	1.3 3
159.8	-	1.2 4
190.2	17 2	1.5 5
210.3	63 5	5.9 11

Eγ	Iγ†@	E$_i$(level)	J_i^π	E$_f$	J_f^π	Mult.	α&	Comments
20.2 *4*	2.6 *10*	20.13	(6^-)	0.0	(5^+)	(E1)	5.7 *4*	α(L)=4.40 *25*; α(M)=1.05 *7*; α(N+..)=0.274 *16* α(N)=0.240 *14*; α(O)=0.0323 *18*; α(P)=0.00085 *4* Iγ: reported only in spectrum gated by 5478α but γ present also

Continued on next page (footnotes at end of table)

^{174}Ir α decay (5.01 s) 1992Sc16 (continued)

$\gamma(^{170}Re)$ (continued)

E_γ	I_γ[†][@]	E_i(level)	J_i^π	E_f	J_f^π	Mult.	α[&]	Comments
								in spectrum gated by 5316α. Mult.: intensity balance at 20 level requires mult(20γ)=E1 if mult(190γ)=E1, E2 or M1.
[x]122.2 *4*	1.7[#] *4*					[M1][‡]	2.91 *5*	α(K)=2.41 *4*; α(L)=0.387 *7*; α(M)=0.0885 *15*; α(N+..)=0.0253 *5* α(N)=0.0215 *4*; α(O)=0.00361 *6*; α(P)=0.000263 *5* I_γ: observed only in spectrum gated by 5316α.
159.8 *5*	1.6[#] *5*	370.1		210.32	(7$^+$)	[M1,E2][‡]	1.0 *4*	α(K)=0.7 *5*; α(L)=0.24 *6*; α(M)=0.058 *17*; α(N+..)=0.016 *5* α(N)=0.014 *4*; α(O)=0.0021 *5*; α(P)=7.E−5 *5* I_γ: observed only in spectrum gated by 5316α. However, if Ti(159.8)=I(5316α)=12 *1*, one would expect Iγ=5.7 *13*; possibly this is not the only transition deexciting the 370 level (see comment on 122γ multipolarity).
190.2 *2*	17 *2*	210.32	(7$^+$)	20.13	(6$^-$)	(E1)	0.0732	α(K)=0.0605 *9*; α(L)=0.00982 *14*; α(M)=0.00224 *4*; α(N+..)=0.000628 *9* α(N)=0.000536 *8*; α(O)=8.64×10^{-5} *13*; α(P)=5.07×10^{-6} *8* Mult.: intensity balance at 20 level (with mult(20γ)=E1) implies mult(190γ)=E1, but E2 cannot be ruled out.
210.3 *2*	63 *5*	210.32	(7$^+$)	0.0	(5$^+$)	(E2)	0.270	α(K)=0.1482 *21*; α(L)=0.0926 *14*; α(M)=0.0231 *4*; α(N+..)=0.00634 *10* α(N)=0.00552 *8*; α(O)=0.000811 *12*; α(P)=1.294×10^{-5} *19* Mult.: $\Delta\pi$=(no) from level scheme; E2 is consistent with I(K x ray), M1 is not.

[†] Photon intensities per 100 α decays; from 5478α-γ coin (1992Sc16), except as noted. The authors normalized intensities for 5478α-γ coin so Ti(190γ+210γ)≈100.

[‡] The 5316α-γ data and the adopted level scheme imply an intensity imbalance at the 210 level. This imbalance could be removed if the unplaced 122γ were assumed to be part of a 122γ-38γ cascade connecting the 370 and 210 levels, provided mult(122γ)=M1 and mult(160γ)=M1,E2; the implied 38 keV transition may be too highly converted for the 38γ to have been detected. M1 multipolarity for the 122γ would also increase the expected I(K x ray, Re) to a value consistent with the reported one.

[#] Iγ reported for 5316α-γ coin, scaled by evaluator so Ti(190γ+210γ)=12 for that spectrum, assuming adopted multipolarities for those transitions.

[@] For absolute intensity per 100 decays, multiply by 0.025 *3*.

[&] Total theoretical internal conversion coefficients, calculated using the BrIcc code (2008Ki07) with Frozen orbital approximation based on γ-ray energies, assigned multipolarities, and mixing ratios, unless otherwise specified.

[x] γ ray not placed in level scheme.

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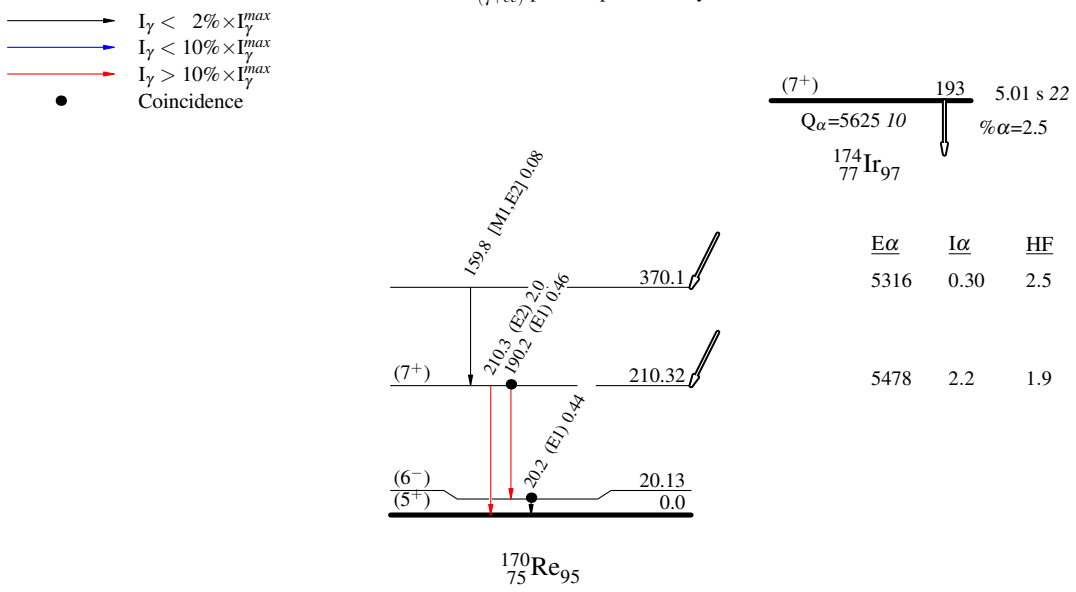
Decay Scheme

Intensities: $I_{(\gamma+ce)}$ per 100 parent decays



Eα	Iα	HF
5316	0.30	2.5
5478	2.2	1.9