^{172}Ir α decay (4.4 s) 1992Sc16,2004GoZZ

History

Type	Author	Citation	Literature Cutoff Date
Full Evaluation	Coral M. Baglin	NDS 111, 1807 (2010)	15-Jun-2010

Parent: ^{172}Ir: E=0.0; J^π=(3); $T_{1/2}$=4.4 s *3*; Q(α)=5996 *7*; %α decay≈2.0

^{172}Ir-%α decay: From 1992Sc16; <0.02 from 2004GoZZ.

2004GoZZ: ^{172}Ir sources from α-decay of ^{176}Au produced In ^{84}Sr bombardment of Mo; fragment mass analyzer and double-sided Si strip detector (for recoils and decay α particles) surrounded by 4 Ge detectors and a low-energy photon spectrometer; recoil decay tagging technique; measured Eα, Iα, recoil-α-γ coin, α(t), parent-daughter α correlations.

1992Sc16: sources from ^{141}Pr(^{36}Ar,5n), E(^{36}Ar)=234 MeV primary beam, helium-jet transport; monoisotopic targets; measured excitation functions (175 MeV to 204 MeV At target face), Eα, Eγ, Iα, Iγ, $\alpha\gamma$ coin, (α)(K x ray) coin.

^{168}Re Levels

E(level)[†]	J^π[‡]	Comments
0.0	(7^+)	
89.7[@] *4*		
226.0[@] *6*		J^π: (2,3,4) if 123γ is correctly placed. 2004GoZZ suggest a $K^\pi=2^+$ configuration of (π 9/2[514])-(ν 5/2[523]); however, higher than E2 multipolarity would then Be required for one of the 2 cascade gammas to a (7^+) g.s., inconsistent with measured I(K x ray).
349.2[#] *6*	(3)	

[†] From Eγ.

[‡] From Adopted Levels.

[#] 1992Sc16 report three γ rays in coincidence with each other and with their 5510-keV α group; observed I(Re K x ray)=24 *4* (on same intensity scale As Iγ) implies low multipolarities for all 3 γ-rays. 1992Sc16 deduce E(level)=349 by summing the cascade γ energies. 2004GoZZ observe a 123γ In coincidence with their 5520α, but find No evidence for the 90γ and 136γ reported by 1992Sc16; possibly, this can Be attributed to statistically inadequate data.

[@] E May differ from value shown because order of 90γ-123γ-136γ cascade has not been established.

α radiations

Eα	E(level)	Iα[‡]	HF[†]	Comments
5515 *7*	349.2	100	≈2.9	Eα: weighted average of 5510 *10* (1992Sc16) and 5520 *10* (2004GoZZ). this Eα implies Q(α)=5996 *7* (cf. 5850 *110* (SYST.; 2003Au03, 2009AuZZ). correlated with 6282α from ^{176}Au(low J) (2004GoZZ).

[†] If r_0=1.5580 *12*, unweighted average of r_0(^{166}W)=1.560 *6* (2008Ba14), r_0(^{168}W)=1.56 *2* and r_0(^{168}Os)=1.557 *4* (this evaluation), and r_0(^{170}Os)=1.555 *3* (2002Ba93) (weighted average is 1.5564 *22*). The measured Eα=5515 *7* to 349 level has been used for the calculation of HF; that Eα implies Q(α)=5996 *7* cf. 5850 *110* (SYST.; 2003Au03, 2009AuZZ).

[‡] For absolute intensity per 100 decays, multiply by ≈0.020.

γ(^{168}Re)

Other Eγ: 136.3 *5* from 2004GoZZ (table 5.1); however, origin of this Eγ is unclear since authors state that they do not observe the 136γ reported by 1992Sc16 for low-J ^{172}Ir decay and (apparently erroneously) associate a 136γ with high-J ^{172}Ir decay In table 5.1. No 136γ appears In α-γ coin spectra In fig. 6.12 or the decay schemes of fig. 6.4 where both high- and low-spin ^{172}Ir α decay data are presented by 2004GoZZ.

Continued on next page (footnotes at end of table)

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$\gamma(^{168}Re)$ (continued)

E_γ[†]	I_γ[†]	E_i(level)	J_i^π	E_f	J_f^π	Mult.	α[‡]	Comments
89.7 *4*	10 *3*	89.7		0.0	(7^+)			Mult.: E1 or E2(+M1) but not pure M1 based on observed I(Re K x ray) from 1992Sc16; if E2, Ti(90) is comparable to Ti(123).
123.2 *2*	54 *7*	349.2	(3)	226.0		(E1)	0.224	α(K)=0.183 *3*; α(L)=0.0314 *5*; α(M)=0.00718 *11*; α(N+..)=0.00200 *3* α(N)=0.00171 *3*; α(O)=0.000271 *4*; α(P)=1.444×10^{-5} *21* other Eγ: 122.7 *5* from 2004GoZZ. Mult.: I(Re K x ray)=24 *4* rules out M1 and favors E1 (1992Sc16); also, E1 is consistent with 2004GoZZ's non-observance of ce associated x-rays for this transition. note that the order of the 90γ-123γ-136γ cascade has not been determined, so it is equally likely that the 90γ or the 136γ deexcites this level instead of the 123γ.
136.3 *4*	10 *3*	226.0		89.7				Mult.: probably E1 or E2 based on observed I(Re K x ray) from 1992Sc16. However, In either case, Ti(136γ) will Be significantly lower than Ti(123γ).

[†] From 1992Sc16.
[‡] 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.

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Decay Scheme

Intensities: Per 100 α decays