^{164}Ir α decay (70 μs) 2014Dr02

Type	Author	History Citation	Literature Cutoff Date
Full Evaluation	N. Nica	NDS 176, 1 (2021)	1-May-2021

Parent: ^{164}Ir: E=27×10^1 *10*; J$^\pi$=(9$^+$); T$_{1/2}$=70 μs *10*; Q(α)=697×10^1 *10*; %α decay=4 *2*

^{164}Ir-E: Tentatively estimated from the difference between the energy of the (9$^+$) isomer in ^{164}Ir (relative to ^{160}Re g.s.), E(9$^+$) = 7052 *10* + 184 *4* = 7236 *11* (the first term is calculated from Eα=6880 *10* from the (9$^+$) isomer of ^{164}Ir measured by 2014Dr02, and the second one is the energy of the (9$^+$) isomer in ^{160}Re); and Q(α) = 6970 *100* (2021Wa16). The value is tentative, among others, because of the tentative 50γ of the cascade that define the energy of the (9$^+$) isomer in ^{160}Re.

^{164}Ir-J$^\pi$: From Adopted Levels of ^{164}Ir.

^{164}Ir-T$_{1/2}$: From 2014Dr02, extracted from observed 100 ^{164}Ir proton-decay events using the Maximum Likelihood method. 69 μs *+41−29* was extracted from four α-decay events.

^{164}Ir-Q(α): From 2021Wa16 (based on syst).

^{164}Ir-%α decay: %α=4 *2* from 2014Dr02 based on observed ^{164}Ir α-decay yield (4 events) and proton-decay yield (≈100 events).

2014Dr02 was compiled by J. Chen (NSCL, MSU) and edited by B. Singh (McMaster).

2014Dr02: ^{164}Ir nuclei were produced in the fusion-evaporation reaction ^{92}Mo(^{78}Kr, p5n) with E=428, 435 and 450 MeV ^{78}Kr beams from the K130 cyclotron at the Accelerator Laboratory of the University of Jyvaskyla bombarding a isotopically enriched, self-supporting ^{92}Mo target foil of 500 μm/cm^2 thickness. Evaporation residues were separated and transported using the gas-filled separator ion transport unit (RITU) to the GREAT spectrometer. The ions passed through a multiwire proportional counter (MWPC) and were implanted into two adjacently mounted DSSDs. Measured Eα, Iα, E(p), I(p), recoil-decay correlations, decay time distribution. Deduced ^{164}Ir isomer half-life, decay branching ratios, decay widths, level energy of ^{160}Re isomer, Q(β^-)values. Comparisons with available data. Systematics of α-decay widths and Q(β^-)values.

About 100 ^{164}Ir (9$^+$) πh$_{11/2}$ isomer proton-decay events and 4 α-decay events were observed and identified from correlations with the α decay of daughter nuclei in 2014Dr02. No evidence was found for the proton decay of the ^{164}Ir πd$_{3/2}$ ground state.

Level scheme is that of 2014Dr02 for α decay combined with that of 2011Da01 for γ decay (see the IT decay dataset).

^{160}Re Levels

E(level)[†]	J$^\pi$[†]	T$_{1/2}$	Comments
0.0	(4$^-$)	612 μs *7*	T$_{1/2}$: adopted value (see Adopted Levels, Gammas dataset). configuration: possible πd$_{3/2}\otimes\nu$f$_{7/2}$ or πd$_{3/2}\otimes\nu$h$_{9/2}$ (2011Da01).
50 *1*	(6$^-$)		
88 *1*	(7$^+$)		
184 *1*	(9$^+$)	2.8 μs *1*	E(level): 166 keV *14* is deduced by 2014Dr02 from measured energies of ^{164}Ir isomer α-decay and proton-decay to this isomeric state in ^{160}Re combined with other known Q-values. T$_{1/2}$: from 2011Da01. configuration: possible πh$_{11/2}\otimes\nu$f$_{7/2}$ or πh$_{11/2}\otimes\nu$h$_{9/2}$ (2011Da01).

[†] Adopted values (originating from 2011Da01).

α radiations

Eα	E(level)	Iα[‡]	HF[†]	Comments
6880 *10*	184	100	2.7 *18*	Eα: measured in 2014Dr02.

[†] r$_0$(^{160}Re)=1.5538 *35*, taken as the mean value of the even-even neighboring nuclei r$_0$(^{160}W)=1.5477 *44*, r$_0$(^{158}W)=1.5597 *29*, r$_0$(^{162}Os)=1.554 *17* (2020Si16, value of r$_0$(^{160}Os) is not available).

[‡] For absolute intensity per 100 decays, multiply by 0.04 *2*.

^{164}Ir α decay (70 μs) 2014Dr02 (continued)

$\gamma(^{160}Re)$

E_γ[†]	E_i(level)	J_i^π	E_f	J_f^π	Mult.[†]	α[‡]
38 *1*	88	(7^+)	50	(6^-)	(E1)	1.02 *8*
50[#] *1*	50	(6^-)	0.0	(4^-)	[E2]	90 *10*
96 *1*	184	(9^+)	88	(7^+)	(E2)	4.86 *23*

[†] Adopted values (originating from 2011Da01).
[‡] 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.
[#] Placement of transition in the level scheme is uncertain.

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Decay Scheme