

¹⁹⁴Re β⁻ decay:mixed 2012AI05

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

Parent: ¹⁹⁴Re: E=0; J^π=(0⁺,1); T_{1/2}=5 s I; Q(β⁻)=5180 SY; %β⁻ decay≈100.0

Parent: ¹⁹⁴Re: E=285 40; J^π=(11⁻); T_{1/2}=25 s 8; Q(β⁻)=5180 SY; %β⁻ decay≈100.0

Parent: ¹⁹⁴Re: E=833 33; T_{1/2}=100 s I0; Q(β⁻)=5180 SY; %β⁻ decay≈100.0

¹⁹⁴Re(0)-Possible oblate state which feeds g.s. and first excited 0⁺ in ¹⁹⁴Os.

¹⁹⁴Re(0)-E: From the Adopted Levels of ¹⁹⁴Re. 0+x from 2012AI05.

¹⁹⁴Re(0)-T_{1/2}: Measured by 2012AI05 using βγ(implant) correlations. Other: 6 s I from (implant)β correlation. Decay spectrum for 478γ gives T_{1/2}=5 s I.

¹⁹⁴Re(0)-Q(β⁻): 5180 200 (syst,2021Wa16).

¹⁹⁴Re(0)-%β⁻ decay: Assumed %β⁻≈100.

¹⁹⁴Re(285)-Possible prolate state feeding the high-spin sequence: 554-349-194 in ¹⁹⁴Os.

¹⁹⁴Re(285)-E: From Adopted Levels of ¹⁹⁴Re. 0+y from 2012AI05.

¹⁹⁴Re(285)-T_{1/2}: Measured by 2012AI05 using βγ(implant) correlations. Decay spectra for 194γ, 349γ, 554γ give T_{1/2}=32 s 8, 25 s 8, 25 s 8, respectively.

¹⁹⁴Re(285)-Q(β⁻): 5180 200 (syst,2021Wa16).

¹⁹⁴Re(285)-%β⁻ decay: Assumed %β⁻≈100.

¹⁹⁴Re(833)-This isomer possibly feeds the 6⁺ state in ¹⁹⁴Os.

¹⁹⁴Re(833)-E: From Adopted Levels of ¹⁹⁴Re. 0+z from 2012AI05.

¹⁹⁴Re(833)-T_{1/2}: Measured by 2012AI05 using βγ(implant) correlations. Decay spectra for 218γ, 383γ, 530γ give T_{1/2}=40 s 8, 46 s 8, 100 s I0, respectively.

¹⁹⁴Re(833)-Q(β⁻): 5180 200 (syst,2021Wa16).

¹⁹⁴Re(833)-%β⁻ decay: Assumed %β⁻≈100.

2012AI05: ¹⁹⁴Re produced in fragmentation of 1 GeV/nucleon ²⁰⁸Pb beam from SIS-18 synchrotron at GSI on a ⁹Be target of thickness ≈2 g/cm². Reaction products were separated and identified by GSI Fragment Separator (FRS) set on ¹⁹⁰Ta, ¹⁹²Ta and ¹⁹⁴Re. The recoils were stopped in RISING active stopper. Measured Eγ, Iγ, γγ coin, (recoil)γ, βγ and (recoil)β correlations, half-lives using RISING array of 15 seven-element Cluster Ge detectors for γ rays and DSSSD, MUSIC detectors for particle detection. Recoil-decay tagging technique also used. Deduced isomers and levels in ¹⁹⁴Os. Comparison with TRS and HF mean-field calculations.

2012AI05 refer to several “to be published” studies: 1. GSI Storage Ring mass measurements reveal two long-lived isomers in ¹⁹⁴Re with excitation energies less than 1 MeV and with half-lives in seconds region (reference #40). 2. Details of the ¹⁹⁴Os level scheme from deep-inelastic scattering experiment (reference #41). 3. Details of ¹⁹⁴Os level scheme from ¹⁹⁴Re β⁻ decay (reference #44).

Note that in 2012AI05 as well as in 2012Re19, it was not possible to associate the isomers in ¹⁹⁴Re with specific half-lives, meaning that these could be interchanged.

¹⁹⁴Os Levels

E(level) [†]	J ^π	Comments
0.0	0 ⁺	
218.2 3	(2 ⁺) [‡]	
601.5 5	(4 ⁺) [‡]	
696.0 6	0 ⁺ [‡]	
1131.6 8	(6 ⁺) [‡]	
x [@]	#	E(level): x is above 1131.6 level.
193.6+x [@] 6	#	
542.6+x [@] 7	#	
1096.5+x [@] 7	#	

Continued on next page (footnotes at end of table)

^{194}Re β^- decay:mixed 2012AI05 (continued)

^{194}Os Levels (continued)

† Deduced from E_γ data.

‡ From the Adopted Levels.

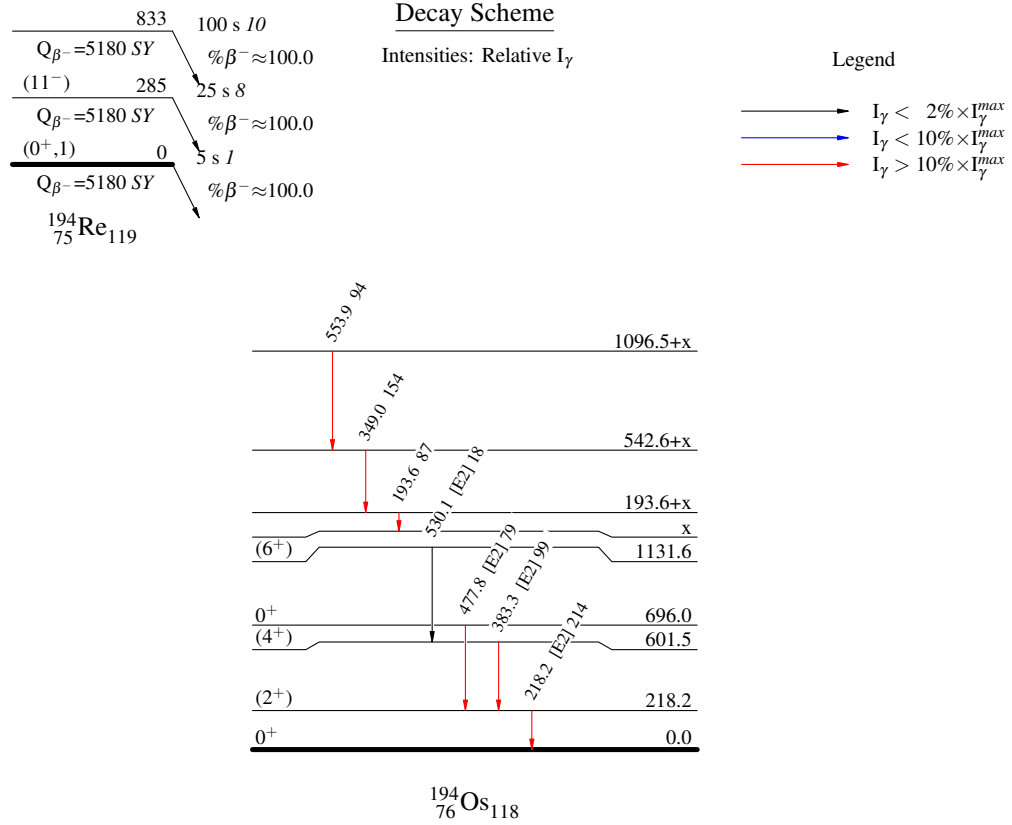
Expected to be high-spin ($J=10-12$), if each level is fed directly in β^- decay of ^{194}Re , (11^-).

@ Seq.(A): γ cascade.

								$\gamma(^{194}\text{Os})$		
E_γ †	I_γ †	$E_i(\text{level})$	J_i^π	E_f	J_f^π	Mult.	α^\ddagger	Comments		
193.6 6	87 23	193.6+x		x				$E_\gamma=193.4$ 3, $I_\gamma=83$ 20 for 0-10 s interval; $E_\gamma=193.6$ 3, $I_\gamma=65$ 33 for 40-440 s interval.		
218.2 3	214 37	218.2	(2 ⁺)	0.0	0 ⁺	[E2]	0.248	$\alpha(\text{K})=0.1351$ 20; $\alpha(\text{L})=0.0856$ 13; $\alpha(\text{M})=0.0215$ 4; $\alpha(\text{N})=0.00517$ 8; $\alpha(\text{O})=0.000787$ 12; $\alpha(\text{P})=1.285 \times 10^{-5}$ 19		
349.0 3	154 32	542.6+x		193.6+x				$E_\gamma=218.3$ 4, $I_\gamma=132$ 30 for 0-10 s interval; $E_\gamma=218.2$ 2, $I_\gamma=301$ 51 for 40-440 s interval.		
383.3 4	99 27	601.5	(4 ⁺)	218.2	(2 ⁺)	[E2]	0.0454	$E_\gamma=348.6$ 3, $I_\gamma=75$ 20 for 0-10 s interval; $E_\gamma=348.9$ 2, $I_\gamma=187$ 38 for 40-440 s interval.		
477.8 5	79 24	696.0	0 ⁺	218.2	(2 ⁺)	[E2]	0.0255	$E_\gamma=383.8$ 5, $I_\gamma=40$ 15 for 0-10 s interval; $E_\gamma=383.2$ 3, $I_\gamma=163$ 43 for 40-440 s interval.		
530.1 6	18 18	1131.6	(6 ⁺)	601.5	(4 ⁺)	[E2]	0.0198	$E_\gamma=477.6$ 4, $I_\gamma=70$ 24 for 0-10 s interval; $E_\gamma=477.9$ 6, $I_\gamma=68$ 40 for 40-440 s interval.		
553.9 3	94 27	1096.5+x		542.6+x				$E_\gamma=530.1$ 6, $I_\gamma=18$ 18 for 0-10 s interval; $E_\gamma=530.4$ 3, $I_\gamma=97$ 55 for 40-440 s interval.		
								$E_\gamma=554.1$ 2, $I_\gamma=50$ 20 for 0-10 s interval; $E_\gamma=553.9$ 3, $I_\gamma=69$ 32 for 40-440 s interval.		

† For 0-40 s interval. Energies and intensities for 0-10 s and 40-440 s intervals are given under comments.

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

^{194}Re β^- decay:mixed 2012AI05

$^{194}\text{Re} \beta^-$ decay:mixed 2012AI05