

¹⁹²Re IT decay (85 μs) 2011St21,2009A130,2005Ca02

Type	Author	History Citation	Literature Cutoff Date
Full Evaluation	Coral M. Baglin	NDS 113, 1871 (2012)	15-Jun-2012

Parent: ¹⁹²Re: E=160.1+x 2; T_{1/2}=85 μs 10; %IT decay=100.0

Others: 2012A105, 2009A116, 2008StZY, 2001Ca13, 2000PoZY.

2009A130: isomer produced following projectile fragmentation of 1 GeV/nucleon ²⁰⁸Pb beam striking a ⁹Be target; residues separated and identified event-by-event using GSI fragment separator operated in monochromatic mode with Al wedge degrader; ions implanted into RISING active stopper (a series of double-sided Si strip detectors) and surrounded by RISING γ spectrometer array (15 detectors); particle identification; measured E_γ, γ(t). See also 2012A105, 2009A116 and 2008StZY.

2011St21, 2008StZY: ¹⁹²Re from in-flight fragmentation of 1 GeV/nucleon ²⁰⁸Pb incident on 2.526 gm/cm² ⁹Be target backed by Nb foil; fragment separator (achromatic mode; Al degrader mid-focal plane, scintillator for tof and position measurement, Nb foil to maximize electron stripping); fragments stopped in plastic stopper at center of RISING γ spectrometer array; photons from metastable excited states of stopped fragments observed for half-lives ≈ 10 ns to 1 ms; measured E_γ, γ(t), isomer population ratio. the first author of this work also appears in the list of authors for 2012A105, 2009A116 and 2009A130.

2005Ca02: isomer from fragmentation of 1 GeV/nucleon ²⁰⁸Pb beam striking a ⁹Be target at entrance to fragment separator; two multi-wire proportional counters, for position measurements; two scintillation detectors, providing time-of-flight and position information and a further two scintillators and an ionization chamber (MUSIC) for energy loss measurements; fragments stopped in Al plate at focal plane between 4 clover Ge detectors (providing 16 independent Ge crystals); measured E_γ, I_γ, γγ coin, γγ(t). For each Ge crystal, the energy and time of the first γ-ray event was recorded after the arrival of a heavy ion, up to a maximum time of 75 μs. see also 2000PoZY, 2001Ca13.

¹⁹²Re Levels

E(level) [†]	T _{1/2}	Comments
0.0		
160.1? 2		
160.1+x? 2	85 μs 10	%IT=100 T _{1/2} : from K x ray-160γ(t) (2008StZY,2011St21). others: 93 μs 15 from 2009A130 based on time spectrum of delayed events associated with the isomer in a 3 μs to 350 μs time window; 120 μs +210-50, measured by 2005Ca02 at the final focus of the FRS for ions at rest. E(level): x ≤ 50 keV. This upper limit is based on energy threshold for the experimental arrangement used by 2005Ca02 and it is lower than K-shell binding energy for Re. isomeric state population ratio: 3% 1 (2011St21).

[†] From E_γ, except as noted.

γ(¹⁹²Re)

E _γ [†]	I _γ [†]	E _i (level)	E _f	Mult.	α [‡]	Comments
(x)		160.1+x?	160.1?			Mult.: possibly E1 (2005Ca02). I(K x ray, ¹⁹² Re) too low for transition to be M2 (2011St21).
160.1 2	526 40	160.1?	0.0	(M1)	1.353	α(K)=1.121 17; α(L)=0.179 3; α(M)=0.0410 6; α(N+...)=0.01173 17 α(N)=0.00994 15; α(O)=0.001670 25; α(P)=0.0001221 18 other E _γ : 159.3 (2011St21), 159 (2012A105). I _γ : Relative I _γ (arbitrary units) observed during the 75 μs recording interval. on this scale, I(Kα x ray)=550 45 (E _γ =60.6 2), I(Kβ x ray)=154 31 (E _γ =69.5 4). Mult.: the relative intensities of x- and γ-rays imply α(K)exp ≈ 1.4 if ω(K)=0.955 for Re and most or all I(K x ray) is associated with this transition. this suggests M1 multipolarity (α(K)=1.12). If the 160γ directly de-excited the isomer in ¹⁹² Re, this M1 transition would be strongly hindered (B(M1)(W.u.) ≈ 3 × 10 ⁻⁸), so 2005Ca02 suggest that it

Continued on next page (footnotes at end of table)

^{192}Re IT decay (85 μs) 2011St21,2009A130,2005Ca02 (continued) $\gamma(^{192}\text{Re})$ (continued)

E_γ [†]	$E_i(\text{level})$	Comments
		May instead depopulate a state that is fed by an unobserved low-energy transition (possibly E1) from the isomeric state.

[†] From 2005Ca02.

[‡] 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.

 ^{192}Re IT decay (85 μs) 2011St21,2009A130,2005Ca02Decay Scheme

Legend

Intensities: Relative I_γ
%IT=100.0

-----► γ Decay (Uncertain)

