Adopted Levels, Gammas

History			
Type	Author	Citation	Literature Cutoff Date
Full Evaluation	Balraj Singh	ENSDF	14-Jan-2022

Q(β^-)=7890 *SY*; S(n)=5580 *SY*; S(p)=16150 *SY*; Q(α)=−9750 *SY* 2021Wa16

Estimated uncertainties (2021Wa16): 200 for Q(β^-), 480 for S(n), 450 for S(p), 360 for Q(α) (2021Wa16).

S(2n)=9070 *200*, S(2p)=30370 *540*, Q(β^-n)=3830 *200* (syst, 2021Wa16).

Mass measurement: 2016Kn03.

1998Do08: ^{208}Pb(^{238}U,X) E=750 MeV/nucleon. Fragment recoil separator (FRS) at GSI facility. Fragments separated by magnetic rigidity, mass and total kinetic energy distribution. Measured (fragment)(β and/or γ) coincidence. Tentative evidence for the formation of ^{118}Ru with a measured fractional yield of 0.003 *2*.

1994Be24 (from the same lab as 1998Do08): same reaction as in 1998Do08, measured σ=2 μb with three counts assigned to ^{118}Ru.

2006Mo07: identification and production of ^{118}Ru in ^{9}Be(^{136}Xe,X) reaction at E^{136}Xe=121.8 MeV/nucleon. The A1900 fragment separator at NSCL facility at MSU was used to separate nuclei of interest. The secondary beam was implanted into β-decay arrangement consisting of Si(PIN) detectors and Si strip detectors (DSSD) and single-sided Si strip detectors (SSSD). Implantation and decay events were time stamped and correlated. Measured half-life from β spectrum.

2015Lo04: measured half-life from ion-β correlations, isotope produced in ^{9}Be(^{238}U,F) reaction at E=345 MeV/nucleon at RIKEN facility.

2021Ha19: ^{118}Ru produced in ^{9}Be(^{238}U,F),E=345 MeV/nucleon at the RBIF-RIKEN accelerators. Identification of ^{118}Ru made on the basis of magnetic rigidity, time-of-flight and energy loss using the BigRIPS separator and ZeroDegree spectrometer. The separated nuclei were sent to the Advanced Implantation Detector Array (AIDA) for the detection of implanted ions and subsequent β^- and β^--delayed neutrons using six double-sided silicon-strip detector (DSSDs) for particles, and BRIKEN neutron counter array of 140 ^{3}He proportional counters embedded in a high-density polyethylene (HDPE) matrix. Measured (implanted ions)-β and (implanted ions)-β-n correlated events to deduce half-life of decay and delayed-neutron emission probability (%β^-n or (P_{1n}). Comparison of measured half-lives and P_n values with several theoretical calculations.

Production cross sections and yields of ^{118}Ru:

2021Su01: measured production cross section in ^{9}Be(^{238}U,F), E=345 MeV/nucleon at RIBF-RIKEN facility.

2020Su23: measured production cross section in ^{9}Be(^{132}Sn,X), E=278 MeV/nucleon at RIBF-RIKEN facility.

2019Pe09: measured production σ in ^{208}Pb(^{238}U,F), E=950 MeV/nucleon at GSI facility.

Additional information 1.

Theoretical calculations: 16 primary references (13 for structure and three for half-lives and decay modes) from the NSR database available at www.nndc.bnl.gov/nsr/ are listed in the 'document' records in this dataset.

^{118}Ru Levels

Bands are proposed by 2013So17 based on IBM-1 model calculations.

Cross Reference (XREF) Flags

A ^{118}Tc β^- decay (30 ms)

E(level)[†]	J$^\pi$[‡]	$T_{1/2}$	XREF	Comments
0.0[#]	0$^+$	99 ms *3*	A	%β^-=100; %β^-n<4.6 (2021Ha19) Theoretical $T_{1/2}$=173.9 ms, %β^-n=2 (2019Mo01). Theoretical $T_{1/2}$=130 ms; %β^-n=2.25, 2.63 (2021Mi17, %β^-n for four different fission barriers). $T_{1/2}$: weighted average of 98 ms *10* (2021Ha19) and 99 ms *3* (2015Lo04); both from (implanted ions)β-correlated decay curves at RIBF-RIKEN. Other: 123 ms *+48−35* (2006Mo07, from (ion)β decay curve). %β^-n or P_n measured by 2021Ha19 from (implanted ions)βn-correlated events.

Continued on next page (footnotes at end of table)

Adopted Levels, Gammas (continued)

^{118}Ru Levels (continued)

E(level)[†]	J$^{\pi}$[‡]	XREF
327.6[#] *3*	(2$^+$)	A
647.8[@] *4*	(2$^+$)	A
809.9[#] *4*	(4$^+$)	A
921.1[@] *4*	(3$^+$)	A
1180.5[@] *5*	(4$^+$)	A
1415.6[#] *5*	(6$^+$)	A

[†] From least-squares fit to Eγ values.
[‡] From Adopted Levels, based on systematics of even-even nuclei for the first 2$^+$ and 4$^+$ states, and from comparison with IBM-1 model calculations for higher states (2013So17).
[#] Band(A): g.s. band. Band assignment from 2013So17.
[@] Band(B): γ band. Band assignment from 2013So17 based on IBM-1 model calculations.

γ(^{118}Ru)

E$_i$(level)	J$_i^{\pi}$	E$_\gamma$	I$_\gamma$	E$_f$	J$_f^{\pi}$
327.6	(2$^+$)	327.64 *25*	100	0.0	0$^+$
647.8	(2$^+$)	320.24 *25*	100 *10*	327.6	(2$^+$)
		646.5[†] *4*	22 *9*	0.0	0$^+$
809.9	(4$^+$)	482.27 *26*	100	327.6	(2$^+$)
921.1	(3$^+$)	273.50 *32*	100 *31*	647.8	(2$^+$)
		593.35 *29*	35 *10*	327.6	(2$^+$)
1180.5	(4$^+$)	532.75 *28*	100	647.8	(2$^+$)
1415.6	(6$^+$)	605.68 *26*	100	809.9	(4$^+$)

[†] Placement of transition in the level scheme is uncertain.

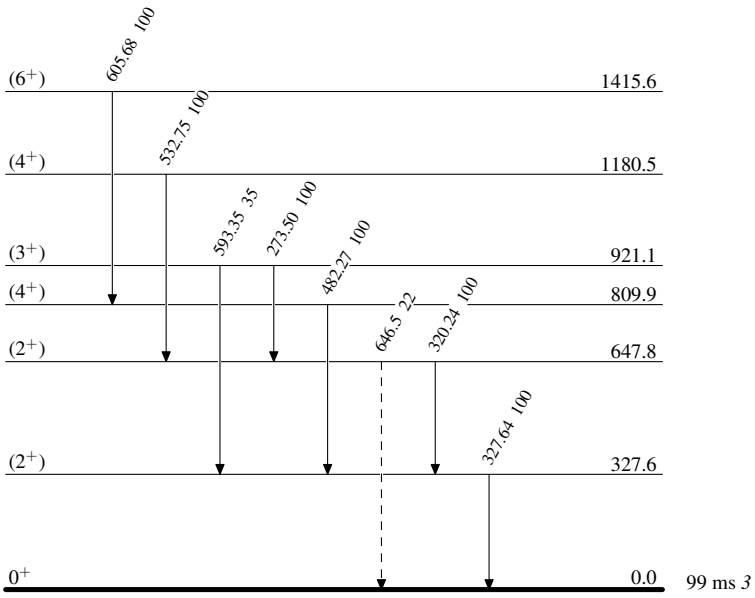
Adopted Levels, Gammas

Legend

Level Scheme

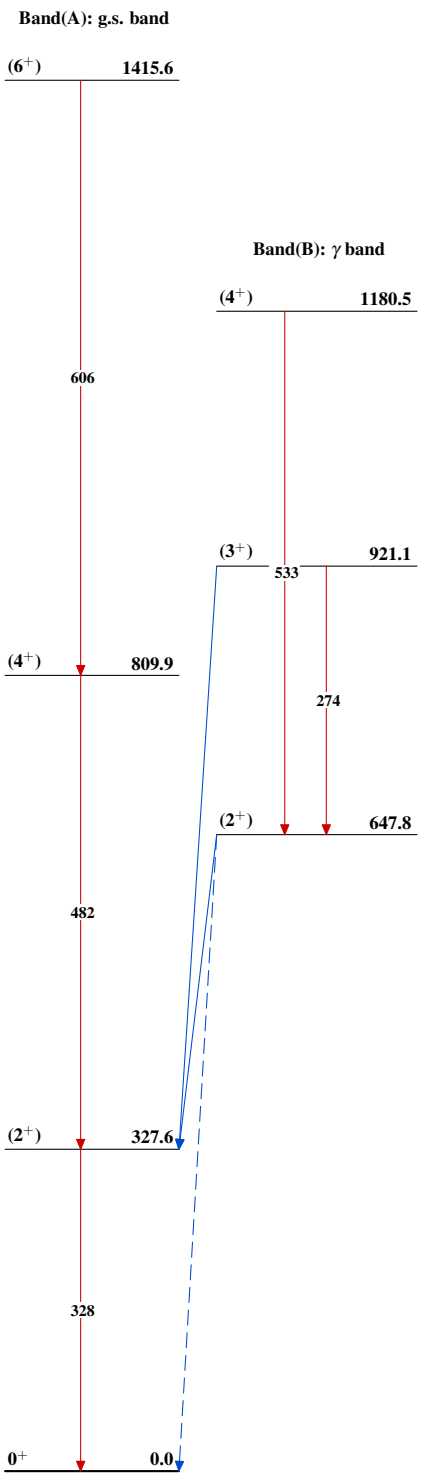
Intensities: Relative photon branching from each level

– – – – – – ► γ Decay (Uncertain)



$^{118}_{44}Ru_{74}$

Adopted Levels, Gammas



$^{118}_{44}Ru_{74}$