Adopted Levels, Gammas

History

Type	Author	Citation	Literature Cutoff Date
Full Evaluation	Balraj Singh and Jun Chen	NDS 178, 41 (2021).	12-Nov-2021

Q(β^-)=9.35×10^3 *30*; S(n)=5.53×10^3 *31*; S(p)=1.919×10^4 *45*; Q(α)=−1.397×10^4 *38*   2021Wa16
Q(β^-n)=5180 *300*, S(2n)=8930 *300*, S(2p)=36020 *500* (syst) (2021Wa16).
1992We04: ^{64}Cr formed in fragmentation of ^{86}Kr beam with ^{9}Be target and its existence determined with zero-degree magnetic spectrometer at GSI.
1999So20 (also 1999Le67): ^{64}Cr formed in fragmentation of ^{86}Kr beam at 60.4 MeV/nucleon with ^{58}Ni target, β and γ spectroscopy at GANIL.
2005Ga01 (also 2003So02,2003So21): ^{64}Cr formed by fragmentation of ^{76}Ge beam at 61.8 MeV/nucleon with ^{58}Ni target at GANIL. Measured half-life, β and γ rays using four Ge detectors for γ rays and a Si detector for β rays.
2005NiZZ (also 2004NiZY): ^{64}Cr formed in fragmentation of ^{86}Kr beam at 63 MeV/nucleon with ^{9}Be target, measured half-life and Eβ.
2011Da08 (also 2002MaZN): ^{64}Cr produced in the fragmentation of 57.8 MeV/nucleon ^{86}Kr beam impinged on 50 mg/cm^2 thick tantalum target using LISE-2000 spectrometer at GANIL facility. Detector system included a three-element Si-detector telescope containing a double-sided silicon-strip detector (DSSSD) backed by a Si(Li) detector and surrounded by four clover type EXOGAM Ge detectors. Product identified by mass, atomic number, charge, energy loss and time of flight. Measured half-life from timing of β measurement.
2020Me06, 2016Me07: mass measurements by time-of-flight (TOF) method at NSCL-MSU. Mass excess values for ^{64}Cr are: −33640 *300* in 2020Me06 and −33480 *440* in 2016Me07.
Theory references for structure and other topics: 32 primary references in the NSR database at www.nndc.bnl.gov.
Additional information 1.

^{64}Cr Levels

Cross Reference (XREF) Flags

A	^{64}V β^- decay (15 ms)		D	^{9}Be(^{66}Fe,^{64}Crγ)
B	^{9}Be(^{64}Cr,^{64}Cr'γ)		E	Coulomb excitation
C	^{9}Be(^{65}Mn,^{64}Crγ)			

E(level)[†]	J$^\pi$	T$_{1/2}$	XREF	Comments
0	0$^+$	42.9 ms *10*	ABCDE	%β^-=100; %β^-n=?
				Only the β^- decay mode has been observed, thus 100% β^- decay is assigned by inference.
				Theoretical T$_{1/2}$=90.6 ms, %β^-n=3.0 (2019Mo01).
				Theoretical T$_{1/2}$=40.7 ms, %β^-n=0.6 (2016Ma12).
				T$_{1/2}$: weighted average of 44 ms *3* (2011Li50,from decay curves for γ rays); 42 ms *2* (2011Da08,2002MaZN) and 43 ms *1* (2005Ga01, 2003So21), and 44 ms *12* (1999So20, implant-β correlated decay curve). In 2011Da08 and 2005Ga01, values are from time correlation between implantation and β-ray events in the DSSSD, the fitting procedure included five parameters: β-detection efficiency, background rate, mother, daughter and granddaughter half-lives. Other: 61 ms +*60*−*19* (2004NiZY,2005NiZZ).
429 *2*	2$^+$	125 ps +*49*−*29*	ABC E	T$_{1/2}$: deduced from B(E2)↑=0.156 *40* (2013Cr02), determined in intermediate-energy Coulomb excitation.
				J$^\pi$: Coulomb excited state.
1139 *6*	(4$^+$)		BC	J$^\pi$: from systematics of even-even nuclides.
2101 *10*	(6$^+$)		C	J$^\pi$: 2156, first 6$^+$ predicted from shell-model calculations (2021Ga02), where the second 2$^+$ state is predicted at 1827 keV.

[†] From Eγ data.

Adopted Levels, Gammas (continued)

$\gamma(^{64}Cr)$

E_i(level)	J_i^π	E_γ	I_γ	E_f	J_f^π	Mult.	$\alpha^\dagger$	Comments
429	2^+	429 2	100	0	0^+	[E2]	0.00181 5	B(E2)(W.u.)=20 6
								E_γ: weighted average of 430 2 from ^{64}V β^- decay, 420 7 from $(^{64}Cr,^{64}Cr'\gamma)$, 423 6 from $(^{65}Mn,^{64}Cr)$.
1139	(4^+)	710 6	100	429	2^+			E_γ: weighted average of 711 9 from $(^{64}Cr,^{64}Cr'\gamma)$ and 710 6 from $(^{65}Mn,^{64}Cr)$.
2101	(6^+)	962 7	100	1139	(4^+)			E_γ: from summed γ-ray spectrum from all the three reactions. Others: 962 7 in $(^{65}Mn,^{64}Cr)$ reaction, and 964 8 in $(^{66}Fe,^{64}Cr)+(^{68}Co,^{64}Cr)$ (2021Ga02).

† 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.

Adopted Levels, Gammas

Level Scheme

Intensities: Relative photon branching from each level

$^{64}_{24}Cr_{40}$