Adopted Levels, Gammas

History

Type	Author	Citation	Literature Cutoff Date
Full Evaluation	Balraj Singh	ENSDF	25-Mar-2019

Q(β^-)=9245.6 *29*; S(n)=3659.3 *21*; S(p)=1655×10^1 *22*; Q(α)=−1100×10^1 *26* 2018Mo14,2017Wa10
Q(β^-n)=2400.1 *29*, S(2n)=10523.2 *19*, S(2p)=31565 *200* (syst) (2018Mo14,2017Wa10).
Q values and separation energies deduced by evaluator from measured mass excesses by 2018Mo14 for Cr isotopes, and mass excesses for other nuclei from 2017Wa10.
Mass excess(^{61}Cr)=−42496.5 keV *18* and −42503 keV *20* (2018Mo14), as compared to −42480 keV *100* in 2017Wa10 evaluation.
1985Gu14: first identification of ^{61}Cr from fragmentation of ^{86}Kr beam at 33 MeV/nucleon on tantalum and titanium targets using time-of-flight and ΔE-E measurements, LISE spectrometer at GANIL facility.
1992We04: ^{61}Cr formed in fragmentation of a 500 MeV/nucleon ^{86}Kr beam incident on a Be target and identified by a zero-degree magnetic spectrometer and separated by FRS at GSI facility. Determined production cross section.
1998Am04: ^{61}Cr formed in fragmentation of 500 MeV/nucleon ^{86}Kr beam incident on Be target, FRS spectrometer at GSI facility. Measured half-life of ^{61}Cr decay.
1999So20 (also 2001So07 and 1999Le67): ^{61}Cr produced in the fragmentation of 60.4 MeV/nucleon ^{86}Kr beam with ^{58}Ni target; LISE3 spectrometer at GANIL facility. Measured half-life of decay of ^{61}Cr.
2002MaZN (thesis): ^{61}Cr produced in fragmentation of 57.8 MeV/nucleon ^{86}Kr beam with tantalum target using LISE-2000 spectrometer at GANIL facility. Measured half-life of ^{61}Cr decay.
2009Cr02: ^{61}Cr produced in ^{9}Be(^{76}Ge,X) reaction at a beam energy of 130 MeV/nucleon. The ^{76}Ge beam was produced by the coupled cyclotrons at the National Superconducting Cyclotron Laboratory at Michigan State University. Fragments were separated using the A1900 fragment separator. The β and γ spectra were measured using the Beta Counting System and the Segmented Germanium Array, as well as three Si PIN detectors. Measured Eγ, Iγ, $\gamma\gamma$, β, $\beta\gamma$ coin, (fragment)β coin, half-life of the ^{61}Cr ground state.
Mass measurements: 2018Mo14, 2016Me07, 2015Xu14, 1994Se12, 1990Tu01.
2014Su07: shell-model calculations using GXPF1A and KB3G interactions. Predicted levels from GXPF1A calculation are: 0,1/2$^-$; 35,5/2$^-$; 139,3/2$^-$; 575,3/2$^-$; 895,5/2$^-$; 1107,9/2$^-$; 1115,7/2$^-$; 1197,7/2$^-$. Except for possible matching of 35, 5/2$^-$ level with ground state, none of the other levels can be easily matched with those deduced from experimental data in 2014Su07.
1995Ri05: Shell model calculations; predicted binding energy, and mass defect.
Theory references: consult the NSR database (www.nndc.bnl.gov/nsr/) for six references for structure calculations.

^{61}Cr Levels

No evidence was found for isomeric states in ^{61}Cr based on $\gamma\gamma$-coin data in ^{61}V decay study (2014Su07).

Cross Reference (XREF) Flags

A ^{61}V β^- decay (48.3 ms)

E(level)†	J$^\pi$	T$_{1/2}$	XREF	Comments
0.0	(5/2$^-$)	234 ms *11*	A	%β^-=100; %β^-n=? Theoretical T$_{1/2}$=703 ms, %β^-n=0.69 (2003Mo09). Theoretical T$_{1/2}$=365 ms, %β^-n=0.2 (2016Ma12). J$^\pi$: possible configuration=ν5/2[303] of f$_{5/2}$ orbital or ν1/2[301] of p$_{1/2}$ orbital. From likelihood of β feeding to the ground state, ν5/2[303] configuration is favored by 2005Ga01. 3/2$^+$ in theoretical calculations (1997Mo25). T$_{1/2}$: weighted average of 233 ms *11* (2009Cr02); 251 ms *22* (1999So20,1999Le67,2001So07, also 250 ms *110* in 2002MaZN thesis). Other: 0.27 s *2* (1998Am04).
70.8 *3*	(3/2,5/2,7/2)		A	J$^\pi$: dipole γ to (5/2$^-$).
97.41 *23*	(3/2,5/2,7/2)		A	J$^\pi$: dipole γ to (5/2$^-$).

Continued on next page (footnotes at end of table)

Adopted Levels, Gammas (continued)

^{61}Cr Levels (continued)

E(level)†	XREF	E(level)†	XREF	E(level)†	XREF	E(level)†	XREF
224.1 *4*	A	564.4 *5*	A	773.7 *4*	A	2061.9 *5*	A
401.8 *5*	A	631.7 *8*	A	1026.6 *3*	A	2261.4 *6*	A
450.6 *3*	A	715.9 *4*	A	1222.0 *5*	A		

† From least-squares fit to Eγ data.

γ(^{61}Cr)

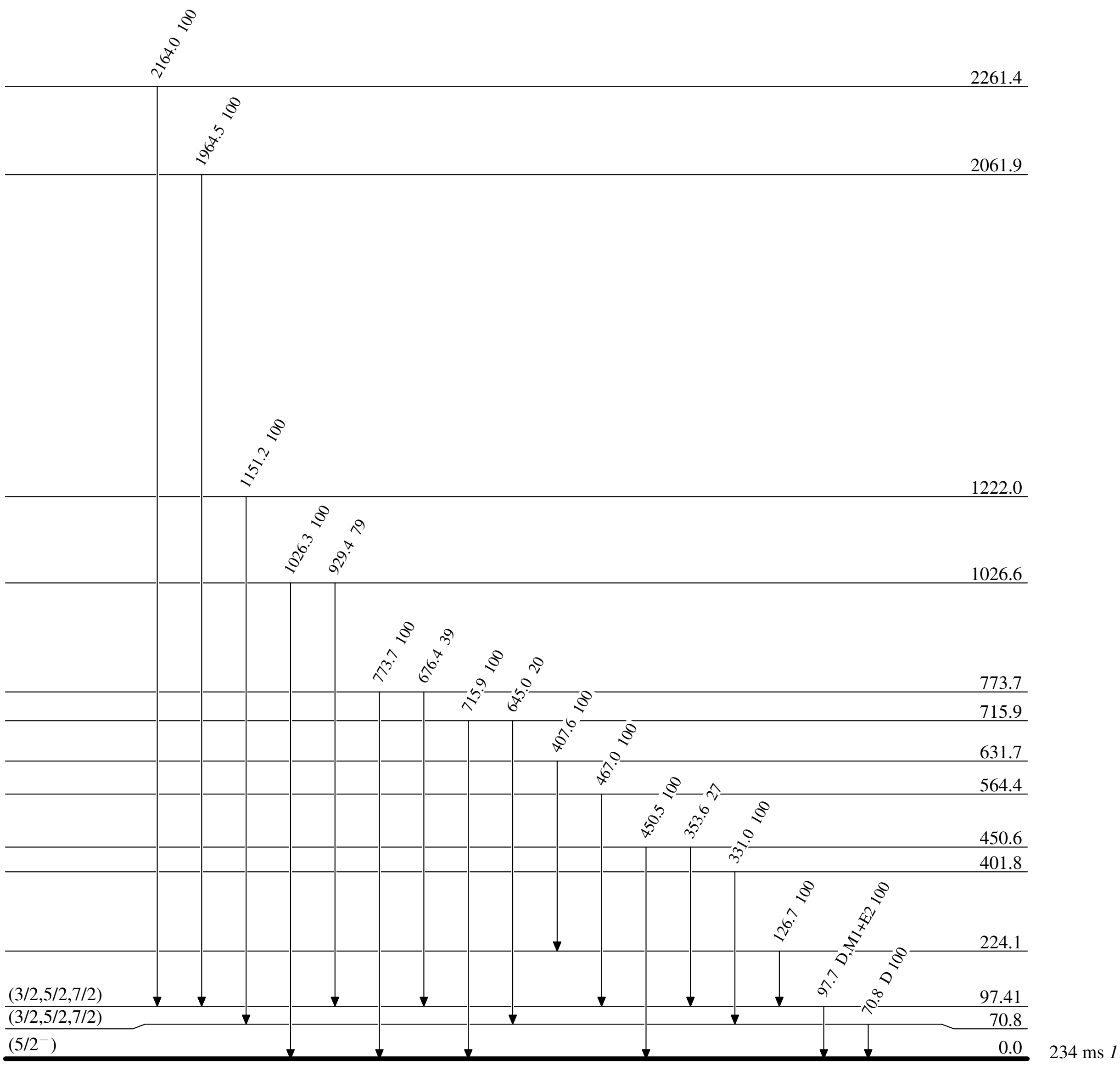
E_i(level)	J^π_i	E_γ	I_γ	E_f	J^π_f	Mult.	α†	Comments
70.8	(3/2,5/2,7/2)	70.8 *3*	100	0.0	(5/2$^-$)	D	0.083 *18*	Mult.: from Weisskopf estimates and non-observation of a long lifetime for 71-keV level (2014Su07).
97.41	(3/2,5/2,7/2)	97.7 *3*	100	0.0	(5/2$^-$)	D,M1+E2	0.24 *21*	Mult.: from Weisskopf estimates, and observation of no time delay between the 127- and 98-keV γ rays within the experimental detection limit of ≈150 ns (2014Su07).
224.1		126.7 *3*	100	97.41	(3/2,5/2,7/2)			
401.8		331.0 *4*	100	70.8	(3/2,5/2,7/2)			
450.6		353.6 *5*	27 *9*	97.41	(3/2,5/2,7/2)			
		450.5 *3*	100 *11*	0.0	(5/2$^-$)			
564.4		467.0 *4*	100	97.41	(3/2,5/2,7/2)			
631.7		407.6 *7*	100	224.1				
715.9		645.0 *8*	20 *8*	70.8	(3/2,5/2,7/2)			
		715.9 *4*	100 *12*	0.0	(5/2$^-$)			
773.7		676.4 *6*	39 *17*	97.41	(3/2,5/2,7/2)			
		773.7 *4*	100 *22*	0.0	(5/2$^-$)			
1026.6		929.4 *4*	79 *11*	97.41	(3/2,5/2,7/2)			
		1026.3 *4*	100 *13*	0.0	(5/2$^-$)			
1222.0		1151.2 *4*	100	70.8	(3/2,5/2,7/2)			
2061.9		1964.5 *4*	100	97.41	(3/2,5/2,7/2)			
2261.4		2164.0 *5*	100	97.41	(3/2,5/2,7/2)			

† 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



$^{61}_{24}Cr_{37}$