Coulomb excitation **2013Ce01,2009Mu06,2002Ke02**

History

Type	Author	Citation	Literature Cutoff Date
Full Evaluation	G. Gürdal, E. A. Mccutchan	NDS 136, 1 (2016)	1-Jul-2016

2013Ce01: ^{70}Zn(^{238}U,^{238}U′γ) with E(^{238}U)=6.76 MeV/nucleon. Measured Eγ, Iγ, particle-γ coincidences using segmented HPGe Clover detectors of the EXOGAM array. Target-like reaction products separated with the VAMOS spectrometer; deduced $T_{1/2}$ using Cologne plunger device and Recoil Distance Doppler Shift (RDDS) method.

2009Mu06: ^{nat}C(^{70}Zn,^{70}Zn′γ) with E(^{70}Zn)=180 and 200 MeV. Measured Eγ, Iγ, $\gamma(\theta)$, particle-γ coincidences using four HPGe Clover detectors and a Canberra PIPS Si detector; deduced g factor with transient field technique and $T_{1/2}$ with Doppler-shift Attenuation Method (DSAM). The g-factor data from 2009Mu06 is reanalyzed in 2010Mo14 using a technique which introduces less uncertainty in the background subtraction of spectra.

2002Ke02: ^{nat}C(^{70}Zn,^{70}Zn′γ) with E(^{70}Zn)=160 MeV. Measured Eγ, Iγ, $\gamma(\theta)$, particle-γ coincidences using BaF_2 scintillators and a Si detector; deduced g factor with transient field technique. Also measured $T_{1/2}$ with HPGe detector placed at 0° to the beam directions using the Doppler Shift Attenuation Method (DSAM). Earlier results in 2001KeZZ.

2002So03: ^{208}Pb(^{70}Zn,^{70}Zn′γ) with E(^{70}Zn)=65.9 MeV/nucleon. Measured Eγ, Iγ, particle-γ coincidences using four segmented HPGe Clover detectors and two annular Si detectors; deduced B(E2). Earlier results by same group: 2000LeZW, 1998Le02.

1998Si25: ^{70}Zn(p,p′γ) with E(p)=2.0 MeV to 4.5 MeV. Measured Eγ, Iγ using a Compton-suppressed Ge(Li) detector; deduced B(E2).

1979Fa06: ^{70}Zn(^{16}O,^{16}O′γ) with E(^{16}O)=36 MeV. Measured Eγ, Iγ, particle-γ coincidences using four NaI(Tl) detectors and an annular Si surface detector; deduced g factor of first 2^+ state with IMPAC.

1977HaZW, 1979BrZP: Measured Eγ, Iγ; deduced g factor with transient field technique.

1965Ro09: ^{70}Zn(α,α′γ) with E(α)=6-9 MeV. Measured Eγ of first 2^+ level using Ge(Li) detector.

1962St02: ^{70}Zn(p,p′γ) with E(p)=4-8 MeV. Measured Eγ, Iγ with NaI(Tl) detector; deduced B(E2).

^{70}Zn Levels

E(level)[†]	J$^\pi$[‡]	$T_{1/2}$[#]	Comments
0.0	0^+		
884.9	2^+	3.65 ps *21*	B(E2)↑=0.160 *14* (1962St02); g=+0.38 *2* (2009Mu06) $T_{1/2}$: weighted average of 3.67 ps *21* from DSAM (2002Ke02) and 3.60 ps *35* from RDDS (2013Ce01). Others: 3.3 ps *3* deduced from B(E2) (1962St02), 2.2 ps *2* deduced from B(E2) (1998Si25), and 3.3 ps *6* deduced from B(E2) (2002So03). B(E2)↑: other: 0.160 *28* (2002So03), 0.235 *25* (1998Si25). g: from transient field technique (2009Mu06), same result obtained in reanalysis of data in 2010Mo14. g: Others: +0.38 *4* from transient field technique (2002Ke02), 0.41 *10* from transient field technique (1979BrZP), 0.30 *8* from transient field technique (1977HaZW) and 0.30 *7* from IMPAC (1979Fa06).
1070.8	0^+		
1759.2	2^+	1.32 ps *21*	g=+0.47 *22* (2009Mu06) g: from transient field technique (2009Mu06). Other: +0.42 *19* (2010Mo14, reanalysis of transient field data).
1786.8	4^+	3.4 ps *8*	g=+0.37 *14* (2009Mu06) $T_{1/2}$: from RDDS in 2013Ce01. Other: 1.32 ps *14* from DSAM (2009Mu06). $T_{1/2}$: result from RDDS method is adopted here since 1) the DSAM results of 2009Mu06 cites difficulties in integrating the total 902γ peak shape due to a degeneracy with the 902γ from the 3^- state and 2) the RDDS method is consistent with the result from ^{238}U(^{76}Ge,Xγ). g: from transient field technique (2009Mu06). Other: +0.21 *13* (2010Mo14, reanalysis of transient field data).
1957.3	2^+		
2538.3	2^+		
2693.4	4^+		
2859.1	3^-	0.201 ps *14*	
2895.1	(6^+)		

Continued on next page (footnotes at end of table)

Coulomb excitation 2013Ce01,2009Mu06,2002Ke02 (continued)

^{70}Zn Levels (continued)

E(level)[†]	J$^{\pi}$[‡]	T$_{1/2}$[#]
2949.7	1$^+$,2$^+$,3$^+$	
2978.3	4$^+$	
3038.2	5$^-$	1.04 ps *7*

† Rounded values from the Adopted Levels.
‡ From the Adopted Levels.
# From DSAM in 2009Mu06, except where noted.

γ(^{70}Zn)

E$_\gamma$[†]	E$_i$(level)	J$_i^{\pi}$	E$_f$	J$_f^{\pi}$	Mult.	Comments
186	1070.8	0$^+$	884.9	2$^+$		
874	1759.2	2$^+$	884.9	2$^+$		
883.7 *7*	884.9	2$^+$	0.0	0$^+$	E2	E$_\gamma$: From 1962St02.
902[#‡]	1786.8	4$^+$	884.9	2$^+$		
902[#‡]	2859.1	3$^-$	1957.3	2$^+$		
1072[#‡]	1957.3	2$^+$	884.9	2$^+$		
1072[#‡]	2859.1	3$^-$	1786.8	4$^+$		
1101	2859.1	3$^-$	1759.2	2$^+$		
1108	2895.1	(6$^+$)	1786.8	4$^+$		
1192[#‡]	2949.7	1$^+$,2$^+$,3$^+$	1759.2	2$^+$		
1192[#‡]	2978.3	4$^+$	1786.8	4$^+$		
1252	3038.2	5$^-$	1786.8	4$^+$		
1654	2538.3	2$^+$	884.9	2$^+$		
1759	1759.2	2$^+$	0.0	0$^+$		
1809	2693.4	4$^+$	884.9	2$^+$		
1975	2859.1	3$^-$	884.9	2$^+$		
[x]2472						

† From 2009Mu06, except where noted.
‡ Multiple placement is deduced by 2009Mu06 based on observation of two different mean-decay velocities associated with these transitions.
# Multiply placed.
[x] γ ray not placed in level scheme.

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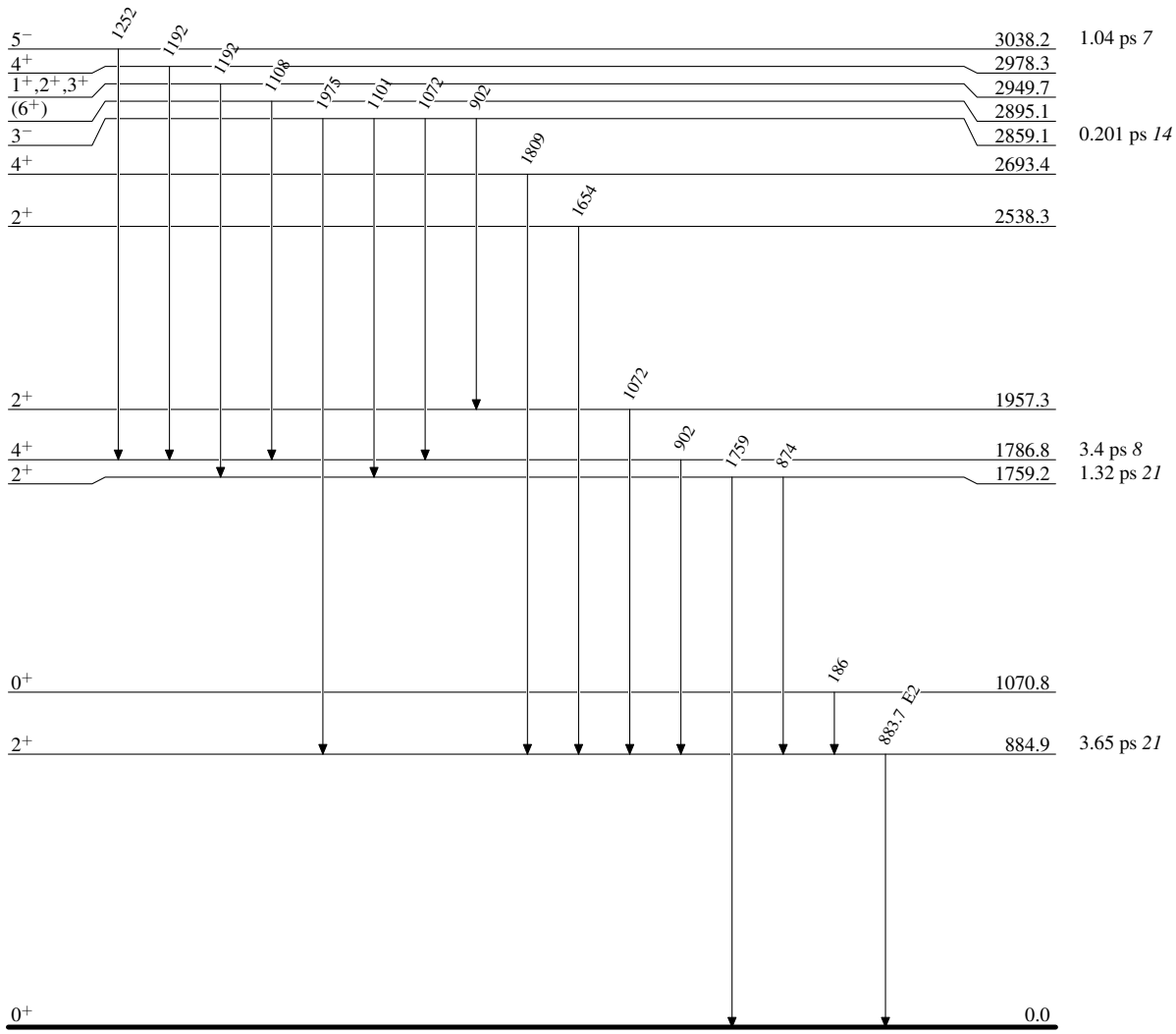
Level Scheme



$^{70}_{30}Zn_{40}$