^{94}Zr(d,p),(d,pγ),(α,^{3}He) 1973Bi04,2003So23

History

Type	Author	Citation	Literature Cutoff Date
Full Evaluation	S. K. Basu, G. Mukherjee, A. A. Sonzogni	NDS 111, 2555 (2010)	30-Jun-2009

All experiments except for 1970Li22 employed magnetic spectrometers with emulsions and performed DWBA calculations.
1963Co10: E(d)=15 MeV. Measured σ(θ=9°, 17°, 30°, 40 '). FWHM≈75 to 100 keV. See also (d,t).
1970Li22: E(d)=7.0 MeV. Measured p′s (mag spect, Si(Li)) and γ′s (Ge(Li)). See also ^{94}Zr(p,p),(p,p′) IAR.
1973Bi04: E(d)=33.3 MeV, Eα=65.7 MeV. Measured σ(θ(d)=12.5° to 42.5°, 5° steps; θ(α)=15°, 20°). FWHM(d)≈25 keV, FWHM(α)=55 keV.
1986Fr05: E(d)=15 MeV. Measured σ(θ=30°, 34°, 52°, 60°). FWHM≈13 keV.
2003So23: E(d)E=22 MeV. Measured cross sections at 30° and 70°; Q3D magnetic spectrograph; FWHM=7 keV. No evidence found for a 23 keV state proposed earlier.
2007Sz05: ^{40}Ca + ^{96}Zr, E(^{40}Ca)E=152 MeV; PRISMA magnetic spectrometer plus CLARA γ array; measured mass and charge yields in coincidence with γ transitions of binary partners, total kinetic energy losses.

^{95}Zr Levels

Cross sections at 70° and 30° are given under comments (from 2003So23).

E(level)[e]	Jπ[‡]	L[f]	S[†]	Comments
0.0	5/2$^+$	#	#	dσ/dω (30°)=615 μb/sr;dσ/dω (70°)=56 μb/sr.
≈23?		#	#	Observed only by 1986Fr05; not confirmed in 2003So23, strength less than 1% of that for ground state population.
953.9[@] *3*	1/2$^+$	0	0.99	E(level): from 2003So23. dσ/dω (30°)=667 μb/sr;dσ/dω (70°)=142 μb/sr.
1324.0[@&] *7*	3/2$^+$	2	0.044	E(level): from 2003So23. dσ/dω (30°)=41 μb/sr;dσ/dω (70°)=4 μb/sr.
1618.6[a] *3*	3/2$^+$&7/2$^+$	2+4	0.54+0.48	E(level): from 2003So23. dσ/dω (30°)=647 μb/sr;dσ/dω (70°)=64 μb/sr.
1624.7 *3*				E(level): observed only in 2003So23. dσ/dω (30°)=612 μb/sr;dσ/dω (70°)=34 μb/sr.
1722.0[&] *3*	3/2$^+$		0.060	E(level): from 2003So23. dσ/dω (30°)=95 μb/sr;dσ/dω (70°)=8 μb/sr.
1793.4 *5*				E(level): observed only in 2003So23. dσ/dω (30°)=7 μb/sr;dσ/dω (70°)=2 μb/sr.
1892.9[&] *3*	3/2$^+$		0.084	E(level): from 2003So23. dσ/dω (30°)=92 μb/sr;dσ/dω (70°)=10 μb/sr.
1902.8 *3*				E(level): observed only in 2003So23. dσ/dω (30°)=64 μb/sr;dσ/dω (70°)=5 μb/sr.
1939.9 *4*				E(level): observed only in 2003So23. dσ/dω (30°)=7 μb/sr;dσ/dω (70°)=2 μb/sr.
1955.7 *4*				E(level): observed only in 2003So23. dσ/dω (30°)=6 μb/sr;dσ/dω (70°)=1 μb/sr.
2022.0 *3*	11/2$^-$		0.130	E(level): from 2003So23. dσ/dω (30°)=230 μb/sr;dσ/dω (70°)=43 μb/sr. L,S: L=4,S(7/2$^+$)=0.106 (1963Co10).
2291[&] *10*	3/2$^+$	2	0.148	L,S: L=(1), S(3/2$^-$)=0.124 (1963Co10).
2376[&] *10*	3/2$^+$	2	0.144	
2450 *10*	7/2$^+$	4	0.101	L,S: L=(1), S(3/2$^-$)=0.024 (1963Co10).
2625[a] *10*	3/2$^+$&11/2$^-$	2+5	0.05+0.155	
2724 *10*	7/2$^+$	4	0.312	
2834[a] *10*	3/2$^+$&11/2$^-$	2+5	0.12+0.046	
2948[b] *10*				

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^{94}Zr(d,p),(d,pγ),(α,^{3}He) 1973Bi04,2003So23 (continued)

^{95}Zr Levels (continued)

E(level)[e]	Jπ‡	L[f]	S†	Comments
2996[&] *10*	3/2+	2	0.044	
3062[&] *10*	3/2+	2	0.132	
3117 *10*	11/2−	5	0.033	
3205 *10*	3/2+	2[c]	0.027[c]	
3300?[ac] *10*	1/2+	0[c]	0.109[c]	
3330 *10*	11/2−	5	0.101	
3420[&] *10*	11/2−	5	0.033	L,S: L=(4), S(7/2+)=0.039 (1963Co10).
3528[&] *10*	3/2+	2	0.088	
3579[&b] *10*				
3662 *10*	11/2−	5	0.047	L,S: L=2+3 for states at 3.62 MeV and 3.68 MeV with S(3/2+ and 7/2−)=0.030+0.024 and 0.016+0.014, respectively (1963Co10).
3810[b] *10*		*d*	*d*	
3855 *10*		*d*	*d*	L,S: L=[2,]S(3/2+)=0.031 (1963Co10).
3960?[c] *10*	1/2+	0[c]	0.083[c]	
4068[b] *10*	7/2+	(4)	0.03	

† From 1973Bi04, from DWBA fits to σ(θ) for (d,p) and (α,^{3}He). The agreement with 1963Co10 is generally good. Discrepancies, mainly in the determination of higher L-values, are noted. Excitation energies from 1970Li22 generally appear to be 15 keV too high. Others: 1980HeZS; see 1983Lu03 for additional references.

‡ Assumed for the extraction of S.

L=2 and S(5/2+)=0.321 *5* or S(3/2+)=0.567 *15* for the doublet (1986Fr05). S(5/2+)=0.34 adopted by 1973Bi04.

@ From Eγ.

& Not observed in (α,^{3}He).

a Probable doublet.

b Not reported by 1963Co10.

c From 1963Co10.

d L=[5,]Sα(11/2−)=0.076.

e From 1973Bi04, except as noted.

f From 1973Bi04.

γ(^{95}Zr)

All data are from 1970Li22.

Eγ	Ei(level)	Jiπ	Ef	Jfπ
950 *2*	953.9	1/2+	0.0	5/2+
1324 *2*	1324.0	3/2+	0.0	5/2+

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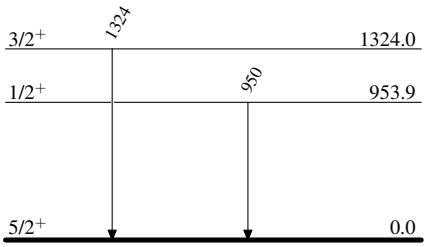
Level Scheme



$^{95}_{40}Zr_{55}$