^{124}Sn(^{45}Sc,4nγ) 1988Fr22

History

Type	Author	Citation	Literature Cutoff Date
Full Evaluation	Balraj Singh and Jun Chen	NDS 194,460 (2024)	31-Oct-2022

1988Fr22 (also 1986Fr14): E=203 MeV ^{45}Sc beam was produced from the accelerator of the Nuclear Structure Facility at Darebury Laboratory. Target was a stack of three thin foils of ^{124}Sn each of thickness 500 μg/cm^2. γ rays were detected using the TESSA3 array of twelve escape-suppressed Ge detectors. Measured Eγ, Iγ, $\gamma\gamma$-coin, $\gamma\gamma(\theta)$, Doppler-shift attenuation. Deduced high-spin levels, J^π, band structures, γ-ray multipolarities and mixing ratios, $T_{1/2}$, B(E2) and transition quadrupole moment ratios. Comparisons with available data.

2002Sc47: E=217 MeV ^{45}Sc beam was produced from the 88-inch cyclotron at LBNL. Target was a foil of 1 mg/cm^2 enriched ^{124}Sn on a gold backing. γ rays were detected with the Gammasphere of 100 Compton-suppressed Ge detectors. Measured Eγ, Iγ, $\gamma\gamma$-coin, Doppler-shift attenuation. Deduced average transition quadrupole moments of the triaxial superdeformed states. See ^{139}La(^{30}Si,4nγ) dataset for super-deformed bands.

The level scheme, for only the π9/2[514] band, is from 1988Fr22. In accordance with 1995Sc39, the lowest (9/2$^-$) level in 1988Fr22 is shown here at 235.0+x, decaying by a 211.3γ (from 1995Sc39) to a 23.5+x level.

^{165}Lu Levels

E(level)[†]	J$^\pi$[‡]	$T_{1/2}$[#]	Comments
23.5+x	(7/2$^+$)		Additional information 1. E(level): rounded value from the Adopted Levels. E(level): x≈20 keV; see the Adopted Levels for comments.
235.0+x[@] *2*	9/2$^-$		
335.4+x[&] *5*	11/2$^-$		
494.7+x[@] *5*	13/2$^-$		
662.6+x[&] *6*	15/2$^-$		
893.4+x[@] *6*	17/2$^-$		
1099.7+x[&] *6*	19/2$^-$		
1386.9+x[@] *7*	21/2$^-$		
1618.8+x[&] *7*	23/2$^-$		
1945.6+x[@] *8*	25/2$^-$		
2196.8+x[&] *8*	27/2$^-$		
2536.0+x[@] *8*	29/2$^-$		
2790.2+x[&] *9*	31/2$^-$		
3039.8+x[@] *9*	33/2$^-$		
3249.7+x[&] *9*	35/2$^-$		
3476.9+x[@] *9*	37/2$^-$		
3736.7+x[&] *10*	39/2$^-$		
4011.9+x[@] *10*	41/2$^-$		
4324.2+x[&] *10*	43/2$^-$		
4647.6+x[@] *10*	45/2$^-$		
4999.0+x[&] *11*	47/2$^-$	>0.19 ps	
5366.5+x[@] *11*	49/2$^-$		
5744.2+x[&] *11*	51/2$^-$	>0.13 ps	
6151.3+x[@] *11*	53/2$^-$	0.13 ps *2*	
6544.6+x[&] *12*	55/2$^-$		
6988.4+x[@] *13*	57/2$^-$		
7389.7+x[&] *14*	59/2$^-$		
7871.0+x[@] *14*	61/2$^-$		

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^{124}Sn(^{45}Sc,4nγ) 1988Fr22 (continued)

^{165}Lu Levels (continued)

E(level)[†]	Jπ[‡]
8275.7+x[&] *15*	63/2⁻
8801.4+x[@] *16*	65/2⁻
9195.5+x?[&] *17*	(67/2⁻)
9775.4+x?[@] *19*	(69/2⁻)

[†] From a least-squares fit to Eγ data, assuming ΔEγ=0.5 keV for Eγ stated to nearest tenth of a keV, and 1 keV otherwise.
[‡] Proposed in 1988Fr22 based on γγ(θ) data and band assignment. The assignments are consistent with those in the Adopted Levels, except that all are given in parentheses there due to lack of strong supporting arguments for low-lying levels.
[#] Deduced by evaluators from B(E2)(W.u.) values given and determined by 1988Fr22 from measured $T_{1/2}$ from DSAM which however is not listed by 1988Fr22.
[@] Band(A): π9/2[514] band, α=+1/2.
[&] Band(a): π9/2[514] band, α=−1/2.

γ(^{165}Lu)

E_i(level)	J_i^π	E_γ[†]	I_γ[†]	E_f	J_f^π	Mult.[#]	δ[#]	Comments
235.0+x	9/2⁻	211.5 *1*		23.5+x	(7/2⁺)			E_γ: from the Adopted Gammas.
335.4+x	11/2⁻	100.4		235.0+x	9/2⁻			
494.7+x	13/2⁻	159.3		335.4+x	11/2⁻			
		259.7		235.0+x	9/2⁻			
662.6+x	15/2⁻	167.9	100[‡]	494.7+x	13/2⁻	D+Q	+0.16 *3*	
		327.2	57[‡] *5*	335.4+x	11/2⁻			
893.4+x	17/2⁻	230.8	100[‡]	662.6+x	15/2⁻	D+Q	+0.25 *3*	
		398.7	91[‡] *9*	494.7+x	13/2⁻			
1099.7+x	19/2⁻	206.3	100[‡]	893.4+x	17/2⁻	D+Q	+0.16 *3*	
		437.1	140[‡] *10*	662.6+x	15/2⁻			
1386.9+x	21/2⁻	287.2	100[‡]	1099.7+x	19/2⁻	D+Q	+0.20 *3*	
		493.5	129[‡] *10*	893.4+x	17/2⁻			
1618.8+x	23/2⁻	231.9	100[‡]	1386.9+x	21/2⁻	D+Q	+0.11 *3*	
		519.1	310[‡] *30*	1099.7+x	19/2⁻			
1945.6+x	25/2⁻	326.8	100[‡]	1618.8+x	23/2⁻	D+Q	+0.09 *5*	
		558.7	134[‡] *10*	1386.9+x	21/2⁻			
2196.8+x	27/2⁻	251.2	100	1945.6+x	25/2⁻	D(+Q)	+0.01 *3*	
		578.0	410 *50*	1618.8+x	23/2⁻			
2536.0+x	29/2⁻	339.2	100	2196.8+x	27/2⁻	D+Q	+0.18 *3*	
		590.4	180 *20*	1945.6+x	25/2⁻			
2790.2+x	31/2⁻	254.2	100	2536.0+x	29/2⁻	D+Q	+0.18 *4*	
		593.4	270 *30*	2196.8+x	27/2⁻			
3039.8+x	33/2⁻	249.6	100	2790.2+x	31/2⁻	D+Q	+0.09 *3*	
		503.8	120 *10*	2536.0+x	29/2⁻			
3249.7+x	35/2⁻	210.0	100	3039.8+x	33/2⁻	D+Q	+0.07 *3*	
		459.6	93 *9*	2790.2+x	31/2⁻			
3476.9+x	37/2⁻	227.4	100	3249.7+x	35/2⁻	D+Q	+0.09 *2*	
		436.9	82 *8*	3039.8+x	33/2⁻			
3736.7+x	39/2⁻	260.0	100	3476.9+x	37/2⁻	D+Q		
		486.9	86 *9*	3249.7+x	35/2⁻			
4011.9+x	41/2⁻	275.4	100	3736.7+x	39/2⁻	D+Q	+0.06 *2*	
		534.9	101 *8*	3476.9+x	37/2⁻			

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^{124}Sn(^{45}Sc,4nγ) 1988Fr22 (continued)

$\gamma(^{165}Lu)$ (continued)

E_i(level)	J_i^π	E_γ[†]	I_γ[†]	E_f	J_f^π	Mult.[#]	δ[#]	Comments
4324.2+x	43/2$^-$	312.4	100	4011.9+x	41/2$^-$	D+Q	+0.19 *3*	
		587.3	116 *10*	3736.7+x	39/2$^-$			
4647.6+x	45/2$^-$	323.4	100	4324.2+x	43/2$^-$			
		635.9	156 *8*	4011.9+x	41/2$^-$			
4999.0+x	47/2$^-$	351.3	100	4647.6+x	45/2$^-$			
		674.7	156 *7*	4324.2+x	43/2$^-$			B(E2)(W.u.)<240 (DSA,1988Fr22).
5366.5+x	49/2$^-$	367.3	100	4999.0+x	47/2$^-$			
		719.1	185 *10*	4647.6+x	45/2$^-$			
5744.2+x	51/2$^-$	377.5	100	5366.5+x	49/2$^-$			
		745.1	198 *10*	4999.0+x	47/2$^-$			B(E2)(W.u.)<240 (DSA,1988Fr22).
6151.3+x	53/2$^-$	406.6	100	5744.2+x	51/2$^-$			
		784.9	200 *20*	5366.5+x	49/2$^-$			B(E2)(W.u.)=180 *+40−30* (DSA,1988Fr22).
6544.6+x	55/2$^-$	393.0	100	6151.3+x	53/2$^-$			
		800.8	196 *11*	5744.2+x	51/2$^-$			
6988.4+x	57/2$^-$	444	100	6544.6+x	55/2$^-$			
		837	245 *55*	6151.3+x	53/2$^-$			
7389.7+x	59/2$^-$	401	100	6988.4+x	57/2$^-$			
		845	261 *34*	6544.6+x	55/2$^-$			
7871.0+x	61/2$^-$	481	100	7389.7+x	59/2$^-$			
		883	147 *13*	6988.4+x	57/2$^-$			
8275.7+x	63/2$^-$	405[@]	100	7871.0+x	61/2$^-$			
		886	213 *30*	7389.7+x	59/2$^-$			
8801.4+x	65/2$^-$	526[@]	100	8275.7+x	63/2$^-$			
		930	284 *35*	7871.0+x	61/2$^-$			
9195.5+x?	(67/2$^-$)	394[@]		8801.4+x	65/2$^-$			
		920[@]		8275.7+x	63/2$^-$			
9775.4+x?	(69/2$^-$)	974[@]		8801.4+x	65/2$^-$			

[†] From 1988Fr22.
[‡] 1988Fr22 take value from 1984Jo05 in ^{153}Eu(^{16}O,4nγ) reaction.
[#] From $\gamma\gamma(\theta)$ in 1988Fr22, but values of A_2 and A_4 coefficients are not provided in 1988Fr22.
[@] Placement of transition in the level scheme is uncertain.

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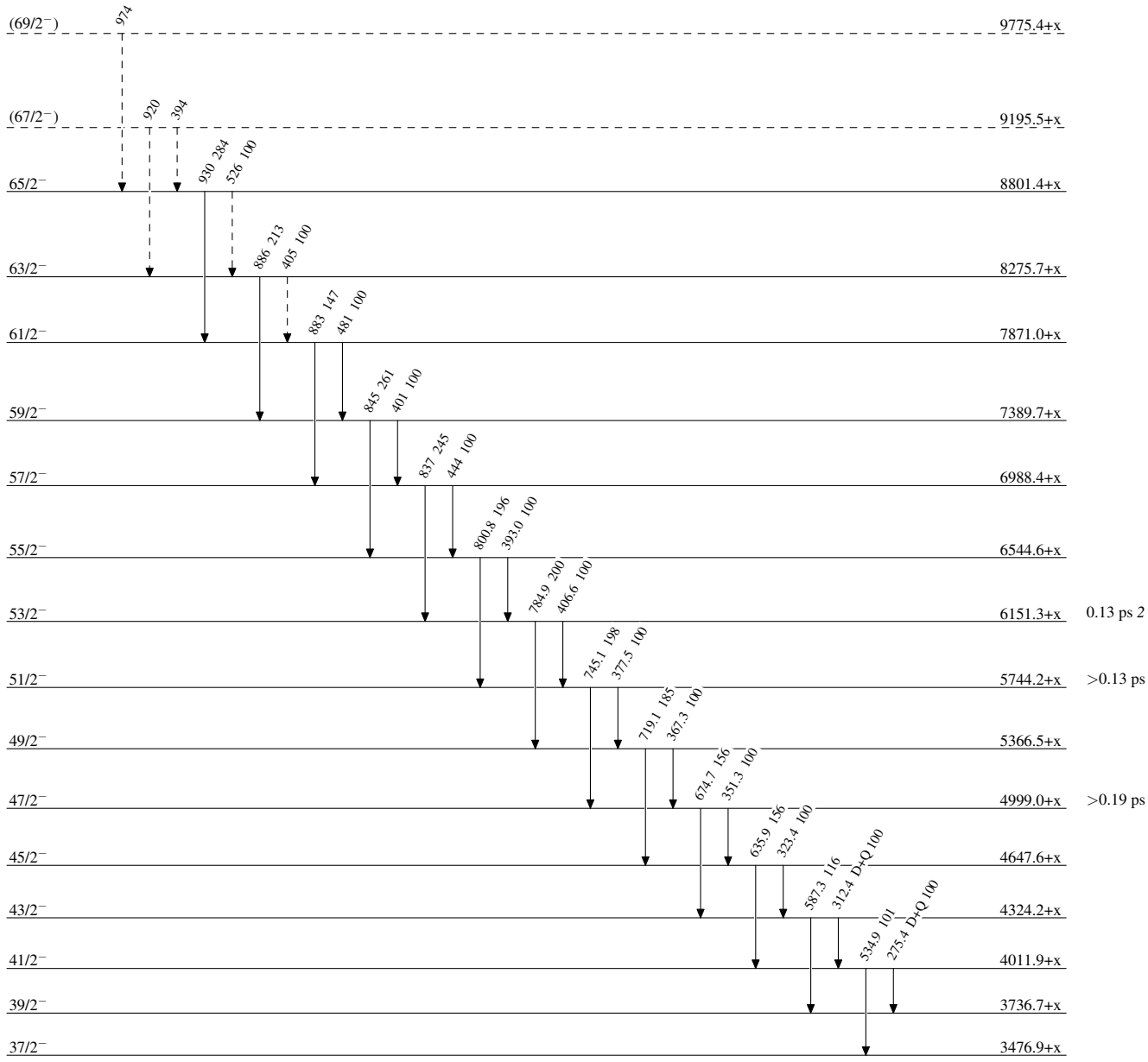
Legend

Level Scheme

Intensities: Relative photon branching from each level

γ Decay (Uncertain)

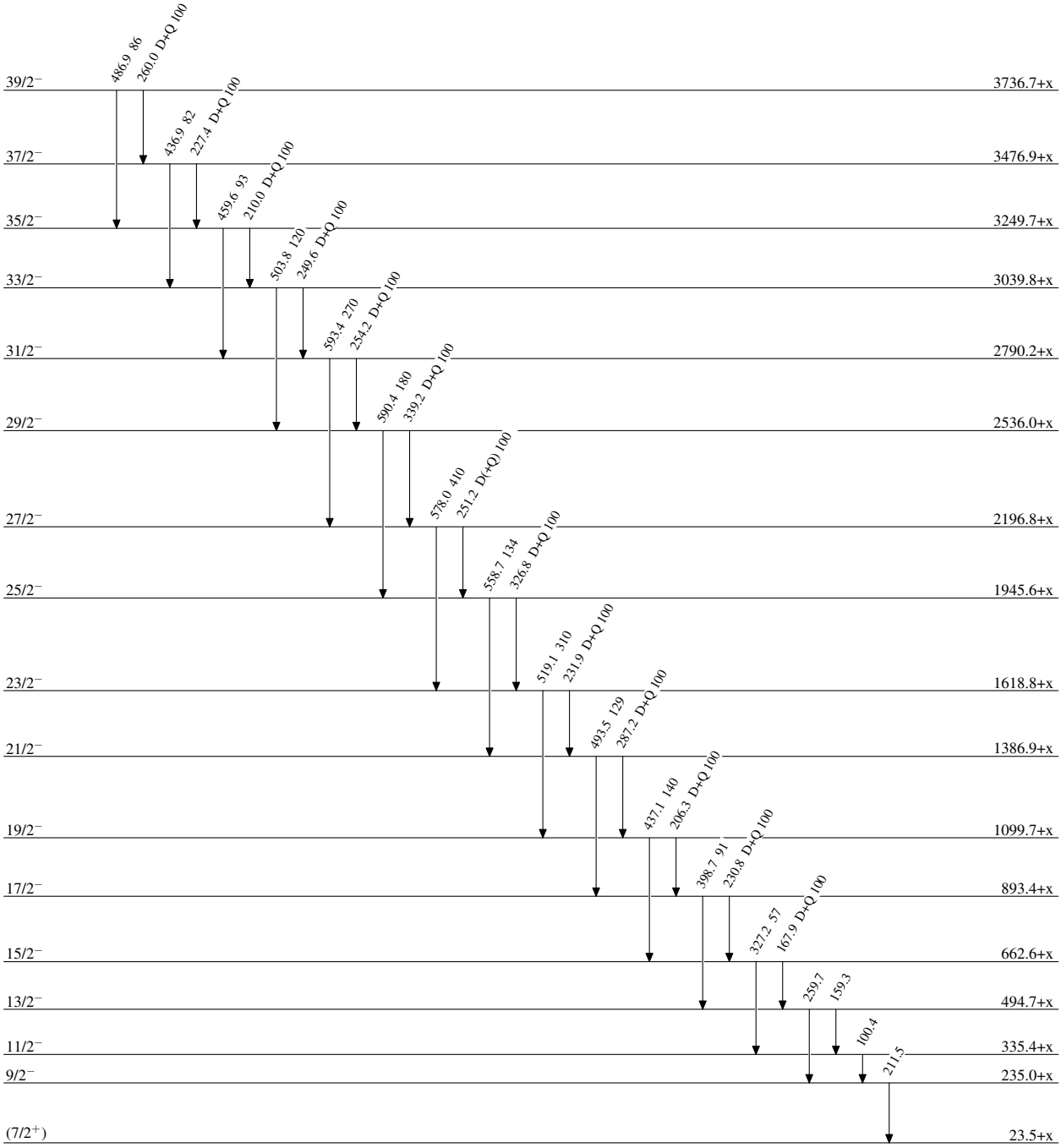


$^{165}_{71}Lu_{94}$

^{124}Sn(^{45}Sc,4nγ) 1988Fr22

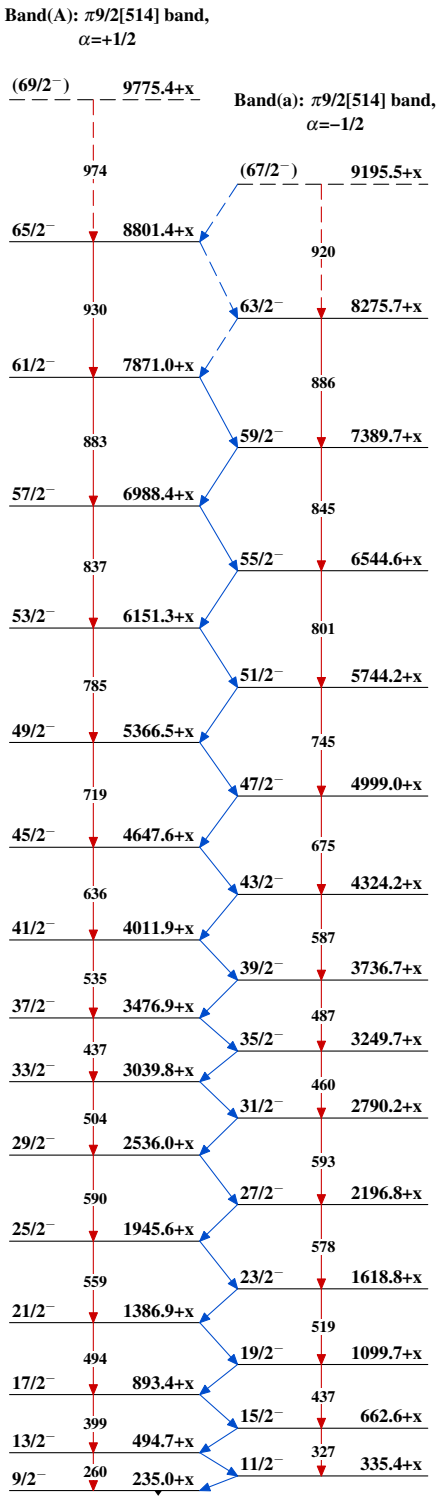
Level Scheme (continued)

Intensities: Relative photon branching from each level



$^{165}_{71}Lu_{94}$

^{124}Sn(^{45}Sc,4nγ) 1988Fr22



$^{165}_{71}Lu_{94}$