^{208}Pb(^{22}Ne,4nγ) 1998Gr19

History			
Type	Author	Citation	Literature Cutoff Date
Full Evaluation	B. Singh and S. Singh	ENSDF	31-Mar-2014

1998Gr19: E(^{22}Ne)=112 MeV beam from K-130 cyclotron at JYFL facility. Target=250 μg/cm^2 thick ^{208}Pb. RITU separator used to separate fragments. Measured Eγ, Iγ, Eα, (recoil)$\alpha\gamma$- and (recoil)$\alpha\gamma\gamma$-coincidence spectra. Deduced yrast positive-parity band, octupole band, and ratios of intrinsic dipole to quadrupole moments from E1/E2 branching ratios using rotational model formulae from 1991Bu10. Recoil-decay tagging technique used to determine yrast positive-parity and negative-parity structures in ^{226}U. Evidence was found for strong octupole deformation, and behavior of alignment properties with increasing rotational frequencies.

2004Hu11: E=112 MeV. Measured ce, ce(α) coin with electron spectrometer SACRED coupled to gas-filled recoil separator RITU at JYFL facility. Recoil-decay tagging technique. Data obtained for 81.3- and 167.8-keV transitions.

Level scheme is tentative according to 1998Gr19, but first two excited states have been verified through the detection of internal conversion electrons.

^{226}U Levels

D_0/Q_0 values here are given in units of $b^{1/2}$ for dipole moment and units of b for quadrupole moment. In 1998Gr19, corresponding units are fm and fm^2, respectively.

E(level)[†]	J$^\pi$	T$_{1/2}$	Comments
0.0[‡]	0$^+$	260 ms *10*	T$_{1/2}$: measured by 1998Gr19 from α decay with Eα=7565 *5*.
81.3[‡] *6*	(2$^+$)		
249.4[‡] *8*	(4$^+$)		
446.5[#] *8*	(5$^-$)		
482.6[‡] *8*	(6$^+$)		
668.5[#] *8*	(7$^-$)		Magnitude of D_0/Q_0=5.5E−3 *11*.
765.8[‡] *9*	(8$^+$)		Magnitude of D_0/Q_0=6.9E−3 *13*.
950.0[#] *9*	(9$^-$)		Magnitude of D_0/Q_0=8.7E−3 *21*.
1091.0[‡] *9*	(10$^+$)		Magnitude of D_0/Q_0=10.5E−3 *12*.
1282.2[#] *9*	(11$^-$)		Magnitude of D_0/Q_0=9.0E−3 *18*.
1453.2[‡] *9*	(12$^+$)		Magnitude of D_0/Q_0=8.2E−3 *17*.
1655.7[#] *10*	(13$^-$)		Magnitude of D_0/Q_0=8.6E−3 *15*.
1846.4?[‡] *12*	(14$^+$)		

[†] From least-squares fit to Eγ data.
[‡] Band(A): The g.s. band.
[#] Band(B): Octupole band based on (5$^-$). Weighted averaged magnitude of D_0/Q_0=7.9E−3 *5* in $b_{1/2}$ units.

γ(^{226}U)

E$_\gamma$	I$_\gamma$	E$_i$(level)	J$_i^\pi$	E$_f$	J$_f^\pi$	Mult.[†]	α[#]	I$_{(\gamma+ce)}$[‡]	Comments
81.3 *6*	17 *6*	81.3	(2$^+$)	0.0	0$^+$	[E2]	36.9 *13*	64×10^1 *23*	α(L)=26.9 *9*; α(M)=7.46 *25*; α(N)=2.03 *7*; α(O)=0.465 *16*; α(P)=0.0758 *25*; α(Q)=0.000250 *8* I$_{(\gamma+ce)}$: 530 *190* in 1998Gr19. Measured Ice(L+M)=45 *9* (2004Hu04) for Eγ=81.3 *6*. Transition intensity=71 *18* per 100 recoils

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^{208}Pb(^{22}Ne,4nγ) 1998Gr19 (continued)

$\gamma(^{226}U)$ (continued)

E_γ	I_γ	E_i(level)	J_i^π	E_f	J_f^π	Mult.[†]	α[#]	$I_{(\gamma+ce)}$[‡]	Comments
									(2004Hu04). E_γ: from E(ceL)=60.8 *5* and E(ceM)=78.2 *7* (2004Hu11). Other: 80.5 *5* (1998Gr19, estimated from systematics of first 2^+ state in heavier U and Th isotopes).
97.5 *5*	60 *20*	765.8	(8^+)	668.5	(7^-)	(E1)	0.133 *3*	68 *23*	α(L)=0.1003 *20*; α(M)=0.0245 *5*; α(N)=0.00652 *13*; α(O)=0.00152 *3*; α(P)=0.000263 *5* $I_{(\gamma+ce)}$: 90 *30* in 1998Gr19 seems in error.
140.6 *3*	89 *9*	1091.0	(10^+)	950.0	(9^-)	(E1)	0.226	109 *11*	α(K)=0.174 *3*; α(L)=0.0388 *6*; α(M)=0.00945 *15*; α(N)=0.00252 *4*; α(O)=0.000593 *9*
168.1 *4*	170 *30*	249.4	(4^+)	81.3	(2^+)	[E2]	1.44 *3*	415 *73*	α(K)=0.197 *3*; α(L)=0.904 *19*; α(M)=0.250 *6*; α(N)=0.0678 *15*; α(O)=0.0156 *4*; α(P)=0.00260 *6* E_γ: weighted average of 168.7 *6* (1998Gr19, from γ-ray data), and 167.8 *4* (2004Hu11, from E(ceL)=148.2 *4* and E(ceM)=162.51 *6*). Measured I(ceL+ceM)=42 *9* (2004Hu04) for Eγ=167.8 *4*. Transition intensity=51 *11* per 100 recoils (2004Hu04).
171.0 *4*	33 *10*	1453.2	(12^+)	1282.2	(11^-)	(E1)	0.1422 *22*	38 *11*	α(K)=0.1109 *17*; α(L)=0.0236 *4*; α(M)=0.00573 *9*; α(N)=0.001529 *24*; α(O)=0.000361 *6*
184.4 *5*	120 *34*	950.0	(9^-)	765.8	(8^+)	(E1)	0.1191 *19*	134 *38*	α(K)=0.0932 *15*; α(L)=0.0195 *3*; α(M)=0.00474 *8*; α(N)=0.001265 *20*; α(O)=0.000299 *5*
185.7 *5*	160 *50*	668.5	(7^-)	482.6	(6^+)	(E1)	0.1172 *18*	179 *56*	α(K)=0.0917 *14*; α(L)=0.0192 *3*; α(M)=0.00466 *8*; α(N)=0.001243 *20*; α(O)=0.000294 *5*
191[@]		1846.4?	(14^+)	1655.7	(13^-)				
191.1 *4*	67 *12*	1282.2	(11^-)	1091.0	(10^+)	(E1)	0.1096 *17*	74 *13*	α(K)=0.0859 *13*; α(L)=0.0179 *3*; α(M)=0.00433 *7*; α(N)=0.001157 *18*; α(O)=0.000274 *4*
197.0 *2*	154 *14*	446.5	(5^-)	249.4	(4^+)	(E1)	0.1020	170 *15*	α(K)=0.0801 *12*; α(L)=0.01658 *24*; α(M)=0.00402 *6*; α(N)=0.001073 *16*; α(O)=0.000254 *4*
202.4 *4*	37 *6*	1655.7	(13^-)	1453.2	(12^+)	(E1)	0.0958	41 *7*	α(K)=0.0753 *11*; α(L)=0.01551 *23*; α(M)=0.00376 *6*; α(N)=0.001003 *15*; α(O)=0.000238 *4*
[x]212									E_γ: based on systematics, this transition may be from 3^- to 2^+.
221.7 *5*	10 *3*	668.5	(7^-)	446.5	(5^-)	[E2]	0.514 *9*	15 *5*	α(K)=0.1303 *19*; α(L)=0.280 *5*; α(M)=0.0769 *13*; α(N)=0.0209 *4*; α(O)=0.00483 *9*
233.3 *3*	149 *12*	482.6	(6^+)	249.4	(4^+)	[E2]	0.429	213 *17*	α(K)=0.1191 *17*; α(L)=0.227 *4*; α(M)=0.0621 *10*; α(N)=0.0169 *3*; α(O)=0.00390 *6*
281.0 *4*	10 *4*	950.0	(9^-)	668.5	(7^-)	[E2]	0.231	12 *5*	α(K)=0.0848 *12*; α(L)=0.1071 *17*; α(M)=0.0291 *5*; α(N)=0.00790 *12*; α(O)=0.00183 *3*

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^{208}Pb(^{22}Ne,4nγ) 1998Gr19 (continued)

γ(^{226}U) (continued)

E_γ	I_γ	E_i(level)	J_i^π	E_f	J_f^π	Mult.[†]	α[#]	$I_{(\gamma+ce)}$[‡]	Comments
283.6 *4*	60 *12*	765.8	(8^+)	482.6	(6^+)	[E2]	0.224	73 *15*	α(K)=0.0833 *12*; α(L)=0.1033 *16*; α(M)=0.0281 *5*; α(N)=0.00761 *12*; α(O)=0.00177 *3*
[x]314									
325.6 *4*	24 *5*	1091.0	(10^+)	765.8	(8^+)	[E2]	0.1470	28 *6*	α(K)=0.0643 *10*; α(L)=0.0607 *9*; α(M)=0.01638 *25*; α(N)=0.00444 *7*; α(O)=0.001034 *16*
332.3 *4*	11 *4*	1282.2	(11^-)	950.0	(9^-)	[E2]	0.1385	13 *5*	α(K)=0.0619 *9*; α(L)=0.0563 *9*; α(M)=0.01516 *23*; α(N)=0.00411 *6*; α(O)=0.000958 *14*
[x]338									
[x]350									
362.2 *4*	14 *5*	1453.2	(12^+)	1091.0	(10^+)	[E2]	0.1083	16 *6*	α(K)=0.0526 *8*; α(L)=0.0410 *6*; α(M)=0.01098 *16*; α(N)=0.00298 *5*; α(O)=0.000695 *11*
373.6 *4*	10 *3*	1655.7	(13^-)	1282.2	(11^-)	[E2]	0.0994	11 *3*	α(K)=0.0496 *7*; α(L)=0.0366 *6*; α(M)=0.00980 *15*; α(N)=0.00266 *4*; α(O)=0.000620 *9*
393[@]		1846.4?	(14^+)	1453.2	(12^+)				

[†] E1 assignments based on intensity balances (1998Gr19), E2 assignments are assumed based on band structures.
[‡] From Iγ and conversion coefficients.
[#] 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.
[@] Placement of transition in the level scheme is uncertain.
[x] γ ray not placed in level scheme.

^{208}Pb(^{22}Ne,4nγ) 1998Gr19

Level Scheme

Intensities: Relative I_γ

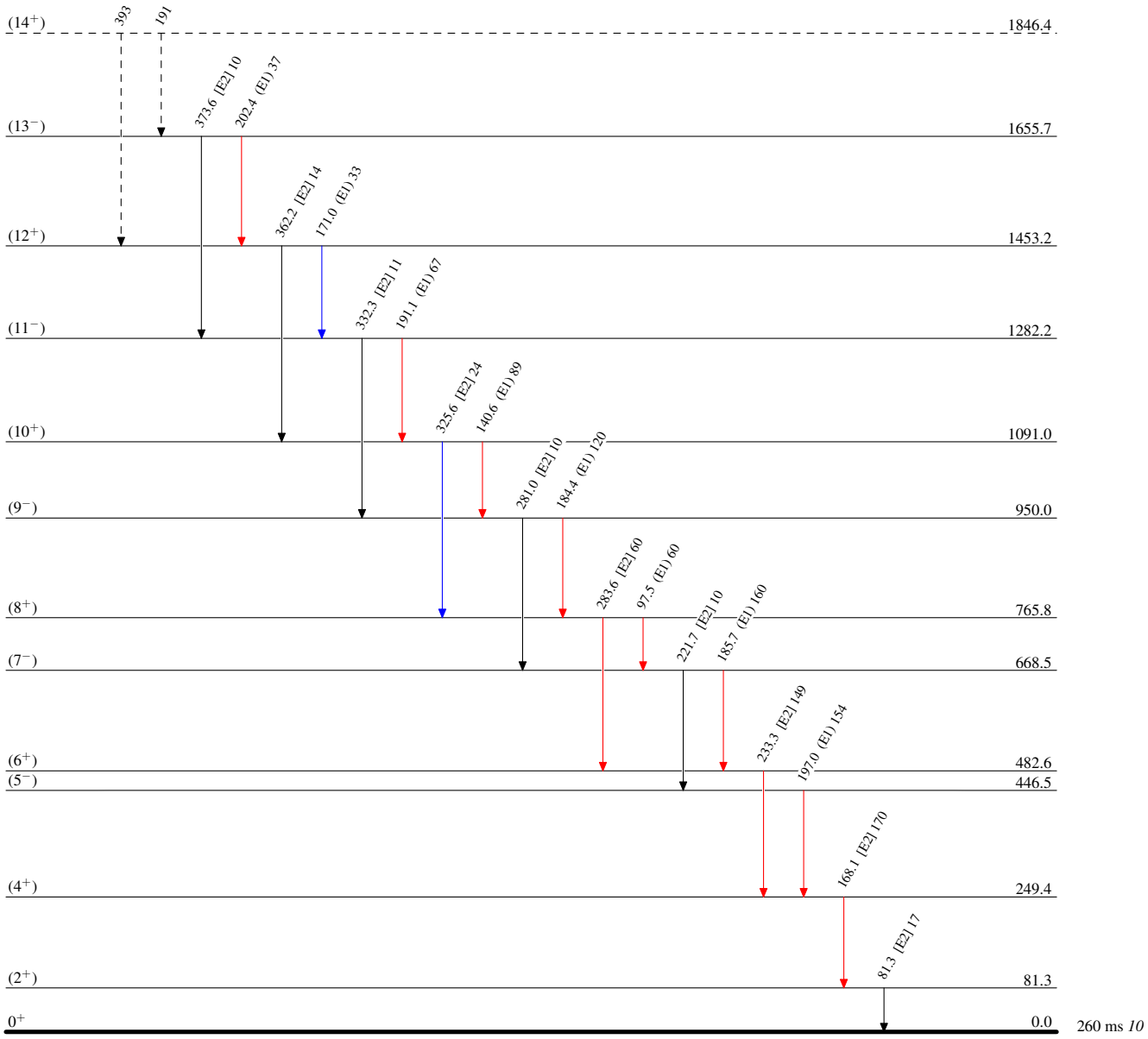
Legend

$I_\gamma < 2\% \times I_\gamma^{max}$

$I_\gamma < 10\% \times I_\gamma^{max}$

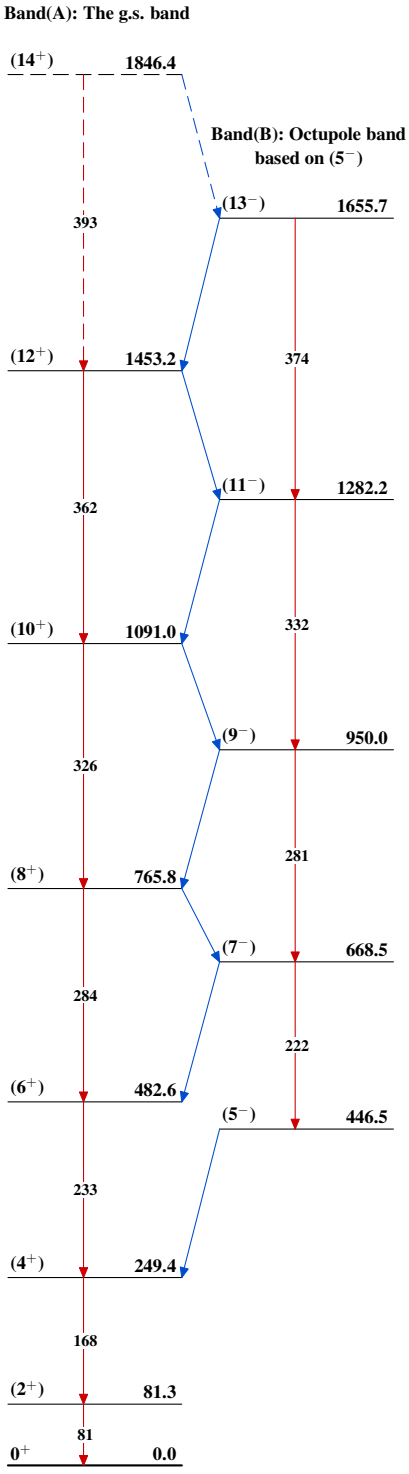
$I_\gamma > 10\% \times I_\gamma^{max}$

γ Decay (Uncertain)



$^{226}_{92}U_{134}$

^{208}Pb(^{22}Ne,4nγ) 1998Gr19



$^{226}_{92}U_{134}$