

(HI,xnγ) **1988Mu22,1987Be22**

Type	Author	History	Citation	Literature Cutoff Date
Full Evaluation	E. Browne, J. K. Tuli		NDS 108,2173 (2007)	1-Oct-2006

Additional information 1.

Includes: (HI,xnpy).

¹¹⁴Cd(²⁷Al,4nγ) E=131 MeV (1987Be22), ¹²²Te(¹⁹F,4nγ) E=83 MeV and ¹⁰⁸Pd(³²S,p2nγ) E=152 MeV (1988Mu22).

Measured: γ, γγ coin, γ(θ) (1987Be22), γ, γ(t), γγ coin (1988Mu22).

Level scheme is from 1988Mu22. 1988Mu22 replaced 963γ (1987Be22) by 947γ in position (43/2⁻)-(39/2⁻) and 1296γ (1987Be22) by 930γ in position (35/2⁻)-(31/2⁻).

¹³⁷Pm Levels

E(level)	J ^π ‡	T _{1/2} †	E(level)	J ^π ‡	T _{1/2} †	E(level)	J ^π ‡	T _{1/2} †
0.0 [#]	11/2 ⁻		2286.8 ^{&}	23/2 ⁽⁺⁾	13.9 ps 26	3843.6 [@]	(31/2 ⁻)	
337.5 [#]	15/2 ⁻	34 ps 2	2491.7 ^a	25/2 ⁽⁺⁾	5.8 ps 8	3859.0 ^a	33/2 ⁽⁺⁾	<1.4 ps
976.5 [#]	19/2 ⁻	8.0 ps 10	2711.9 ^b	(23/2 ⁺)		4222.4 ^c	(29/2 ⁺)	
1057.1 ^b	(15/2 ⁺)		2799.5 [#]	27/2 ⁻	<1.4 ps	4430.4 ^{&}	(35/2 ⁺)	
1507.8 ^c	(17/2 ⁺)		2819.0 ^{&}	27/2 ⁽⁺⁾	7.4 ps 10	4456.9 [#]	35/2 ⁻	
1790.8 ^b	(19/2 ⁺)		3054.6 ^a	29/2 ⁽⁺⁾	6.7 ps 8	4772.4 [@]	(35/2 ⁻)	
1812.0 ^{&}	19/2 ⁽⁺⁾	2.6 ps 5	3083.8			4841.9 ^b	(31/2 ⁺)	
1832.3 [#]	23/2 ⁻	1.0 ps 2	3233.6 ^c	(25/2 ⁺)		4906.5 ^a	(37/2 ⁺)	
1991.7			3544.0 ^{&}	31/2 ⁽⁺⁾	<1.4 ps	5078	(35/2 ⁻)	
2087.5 ^a	21/2 ⁽⁺⁾	3.3 ps 6	3697.1 [#]	31/2 ⁻		5336.7 [#]	39/2 ⁻	
2270.6 ^c	(21/2 ⁺)		3732.9 ^b	(27/2 ⁺)		6283.8 [#]	43/2 ⁻	

† From 1988Mu22.

‡ From Adopted Levels.

Band(A): yrast band α=-1/2, [541]3/2⁻.

@ Band(B): possible one-quasiproton band.

& Band(C): π=+ sideband-1 Configuration=((π g_{7/2})(π h_{11/2})²).

^a Band(D): π=+ sideband-2 Configuration=((π g_{7/2})(π h_{11/2})²).

^b Band(E): π=+ sideband-3 possible Configuration=((π d_{5/2})(π h_{11/2})²).

^c Band(F): π=+ sideband-4 possible Configuration=((π d_{5/2})(π h_{11/2})²).

γ(¹³⁷Pm)

Unless given otherwise, E_γ, I_γ are from 1988Mu22. γ(θ) data are from 1987Be22,

E _γ	I _γ	E _i (level)	J _i ^π	E _f	J _f ^π	Mult.	α [‡]	Comments
199.0 ^{†#}	5	<1 [†]	2286.8	23/2 ⁽⁺⁾	2087.5	21/2 ⁽⁺⁾		
205.5 ^{†#}	5	<1 [†]	2491.7	25/2 ⁽⁺⁾	2286.8	23/2 ⁽⁺⁾		
236.0 ^{†#}	5	<1 [†]	3054.6	29/2 ⁽⁺⁾	2819.0	27/2 ⁽⁺⁾		
315 ^{†#}	1	<1 [†]	3859.0	33/2 ⁽⁺⁾	3544.0	31/2 ⁽⁺⁾		
326.0 ^{†#}	5	<1 [†]	2819.0	27/2 ⁽⁺⁾	2491.7	25/2 ⁽⁺⁾		
337.5	1	100	337.5	15/2 ⁻	0.0	11/2 ⁻	E2	0.0378 B(E2)(W.u.)=87 6 α(K)=0.0301 5; α(L)=0.00602 9; α(M)=0.001325 19; α(N+..)=0.000337 5

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(HI,xn γ) **1988Mu22,1987Be22** (continued)

$\gamma(^{137}\text{Pm})$ (continued)

<u>E_{γ}</u>	<u>I_{γ}</u>	<u>E_i(level)</u>	<u>J_i^{π}</u>	<u>E_f</u>	<u>J_f^{π}</u>	<u>Mult.</u>	<u>α^{\ddagger}</u>	<u>Comments</u>
404.2	9 2	2491.7	25/2 ⁽⁺⁾	2087.5	21/2 ⁽⁺⁾	E2	0.0222	$\alpha(\text{N})=0.000294$ 5; $\alpha(\text{O})=4.13\times 10^{-5}$ 6; $\alpha(\text{P})=1.667\times 10^{-6}$ 24 Mult.: A ₂ =+0.314 30, A ₄ =-0.005 30. B(E2)(W.u.)=70 20 $\alpha(\text{K})=0.0180$ 3; $\alpha(\text{L})=0.00329$ 5; $\alpha(\text{M})=0.000719$ 10; $\alpha(\text{N}+..)=0.000184$ 3 $\alpha(\text{N})=0.0001598$ 23; $\alpha(\text{O})=2.28\times 10^{-5}$ 4; $\alpha(\text{P})=1.022\times 10^{-6}$ 15 Mult.: A ₂ =+0.386 82, A ₄ =+0.00.
451.2	4 2	1507.8	(17/2 ⁺)	1057.1	(15/2 ⁺)			
454.4	16 2	2286.8	23/2 ⁽⁺⁾	1832.3	23/2 ⁻	[E1]	0.00514	B(E1)(W.u.)=9.0 $\times 10^{-5}$ 22 $\alpha(\text{K})=0.00440$ 7; $\alpha(\text{L})=0.000581$ 9; $\alpha(\text{M})=0.0001230$ 18; $\alpha(\text{N}+..)=3.20\times 10^{-5}$ 5 $\alpha(\text{N})=2.76\times 10^{-5}$ 4; $\alpha(\text{O})=4.12\times 10^{-6}$ 6; $\alpha(\text{P})=2.52\times 10^{-7}$ 4 Mult.: A ₂ =+0.480 98, A ₄ =-0.05 10.
474.8	18 2	2286.8	23/2 ⁽⁺⁾	1812.0	19/2 ⁽⁺⁾	E2	0.01413	B(E2)(W.u.)=21 5 $\alpha(\text{K})=0.01161$ 17; $\alpha(\text{L})=0.00198$ 3; $\alpha(\text{M})=0.000431$ 6; $\alpha(\text{N}+..)=0.0001105$ 16 $\alpha(\text{N})=9.60\times 10^{-5}$ 14; $\alpha(\text{O})=1.383\times 10^{-5}$ 20; $\alpha(\text{P})=6.71\times 10^{-7}$ 10 Mult.: A ₂ =+0.130 47, A ₄ =-0.094 66.
489.0 ^{†#} 6	<1 [†]	3544.0	31/2 ⁽⁺⁾	3054.6	29/2 ⁽⁺⁾			
532.2	15 2	2819.0	27/2 ⁽⁺⁾	2286.8	23/2 ⁽⁺⁾	Q		Mult.: A ₂ =+0.229 51, A ₄ =+0.582 68.
562.9	23 2	3054.6	29/2 ⁽⁺⁾	2491.7	25/2 ⁽⁺⁾			
639.0 1	74 2	976.5	19/2 ⁻	337.5	15/2 ⁻	[E2]	0.00655	B(E2)(W.u.)=15.8 20 $\alpha(\text{K})=0.00548$ 8; $\alpha(\text{L})=0.000844$ 12; $\alpha(\text{M})=0.000182$ 3; $\alpha(\text{N}+..)=4.70\times 10^{-5}$ 7 $\alpha(\text{N})=4.07\times 10^{-5}$ 6; $\alpha(\text{O})=5.96\times 10^{-6}$ 9; $\alpha(\text{P})=3.24\times 10^{-7}$ 5
659.9	18 2	2491.7	25/2 ⁽⁺⁾	1832.3	23/2 ⁻	[E1]	0.00225	B(E1)(W.u.)=9.9 $\times 10^{-5}$ 21 $\alpha(\text{K})=0.00193$ 3; $\alpha(\text{L})=0.000250$ 4; $\alpha(\text{M})=5.29\times 10^{-5}$ 8; $\alpha(\text{N}+..)=1.379\times 10^{-5}$ 20 $\alpha(\text{N})=1.189\times 10^{-5}$ 17; $\alpha(\text{O})=1.786\times 10^{-6}$ 25; $\alpha(\text{P})=1.119\times 10^{-7}$ 16 Mult.: A ₂ =-0.028 74, A ₄ =+0.09 10.
719.6	4 1	1057.1	(15/2 ⁺)	337.5	15/2 ⁻			
725.0	18 2	3544.0	31/2 ⁽⁺⁾	2819.0	27/2 ⁽⁺⁾			
734.3	3 1	1790.8	(19/2 ⁺)	1057.1	(15/2 ⁺)			
759.9	9 3	4456.9	35/2 ⁻	3697.1	31/2 ⁻			
762.8	6 2	2270.6	(21/2 ⁺)	1507.8	(17/2 ⁺)			
804.4	7 2	3859.0	33/2 ⁽⁺⁾	3054.6	29/2 ⁽⁺⁾			
814.3	5 1	1790.8	(19/2 ⁺)	976.5	19/2 ⁻			
835.5	16 2	1812.0	19/2 ⁽⁺⁾	976.5	19/2 ⁻	[E1]	1.39 $\times 10^{-3}$	B(E1)(W.u.)=0.00017 4 $\alpha(\text{K})=0.001194$ 17; $\alpha(\text{L})=0.0001533$ 22; $\alpha(\text{M})=3.24\times 10^{-5}$ 5; $\alpha(\text{N}+..)=8.45\times 10^{-6}$ 12 $\alpha(\text{N})=7.29\times 10^{-6}$ 11; $\alpha(\text{O})=1.097\times 10^{-6}$ 16; $\alpha(\text{P})=6.97\times 10^{-8}$ 10 Mult.: A ₂ =+0.33 12, A ₄ =+0.18 18.

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(HI,xn γ) 1988Mu22,1987Be22 (continued) $\gamma(^{137}\text{Pm})$ (continued)

E_γ	I_γ	$E_i(\text{level})$	J_i^π	E_f	J_f^π	Mult.	α^\ddagger	Comments
855.8	48 2	1832.3	23/2 ⁻	976.5	19/2 ⁻	E2	0.00331	B(E2)(W.u.)=29 6 $\alpha(\text{K})=0.00280$ 4; $\alpha(\text{L})=0.000402$ 6; $\alpha(\text{M})=8.59\times 10^{-5}$ 12; $\alpha(\text{N+..})=2.23\times 10^{-5}$ 4 $\alpha(\text{N})=1.93\times 10^{-5}$ 3; $\alpha(\text{O})=2.86\times 10^{-6}$ 4; $\alpha(\text{P})=1.675\times 10^{-7}$ 24 Mult.: $A_2=+0.338$ 22, $A_4=+0.025$ 34.
879.8	3 2	5336.7	39/2 ⁻	4456.9	35/2 ⁻			
886.3	8 3	4430.4	(35/2 ⁺)	3544.0	31/2 ⁽⁺⁾			
897.6	6 2	3697.1	31/2 ⁻	2799.5	27/2 ⁻	[E2]	0.00298	$\alpha(\text{K})=0.00253$ 4; $\alpha(\text{L})=0.000359$ 5; $\alpha(\text{M})=7.66\times 10^{-5}$ 11; $\alpha(\text{N+..})=1.99\times 10^{-5}$ 3 $\alpha(\text{N})=1.720\times 10^{-5}$ 24; $\alpha(\text{O})=2.56\times 10^{-6}$ 4; $\alpha(\text{P})=1.511\times 10^{-7}$ 22 Mult.: $A_2=+0.22$ 10, $A_4=+0.00$.
921.1	3 1	2711.9	(23/2 ⁺)	1790.8	(19/2 ⁺)			
929.8	21 3	4772.4	(35/2 ⁻)	3843.6	(31/2 ⁻)			
947.1	2 1	6283.8	43/2 ⁻	5336.7	39/2 ⁻			
963.0 [#]	≥ 1	3233.6?	(25/2 ⁺)	2270.6	(21/2 ⁺)			
967.2	18 2	2799.5	27/2 ⁻	1832.3	23/2 ⁻	Q		Mult.: $A_2=+0.192$ 63, $A_4=+0.017$ 98.
988.8 [#]	> 1	4222.4	(29/2 ⁺)	3233.6?	(25/2 ⁺)			
1015.2	2 1	1991.7		976.5	19/2 ⁻			
1021.0	3 2	3732.9	(27/2 ⁺)	2711.9	(23/2 ⁺)			
1044.1	16 3	3843.6	(31/2 ⁻)	2799.5	27/2 ⁻			
1047.5	5 2	4906.5	(37/2 ⁺)	3859.0	33/2 ⁽⁺⁾			
1109.0 [#]	> 1	4841.9	(31/2 ⁺)	3732.9	(27/2 ⁺)			
1111.0	10 2	2087.5	21/2 ⁽⁺⁾	976.5	19/2 ⁻	[E1]	8.11×10^{-4}	B(E1)(W.u.)= 5.6×10^{-5} 11 $\alpha(\text{K})=0.000696$ 10; $\alpha(\text{L})=8.85\times 10^{-5}$ 13; $\alpha(\text{M})=1.87\times 10^{-5}$ 3; $\alpha(\text{N+..})=8.01\times 10^{-6}$ 12 $\alpha(\text{N})=4.20\times 10^{-6}$ 6; $\alpha(\text{O})=6.34\times 10^{-7}$ 9; $\alpha(\text{P})=4.08\times 10^{-8}$ 6; $\alpha(\text{IPF})=3.13\times 10^{-6}$ 5 Mult.: $A_2=-0.227$ 48, $A_4=+0.126$ 72.
1170.3	3 1	1507.8	(17/2 ⁺)	337.5	15/2 ⁻			
1236 [†] 11	$< 1^\dagger$	5078	(35/2 ⁻)	3843.6	(31/2 ⁻)			
1251.5	≥ 1	3083.8		1832.3	23/2 ⁻			
1403.1 [#]		3233.6?	(25/2 ⁺)	1832.3	23/2 ⁻			





[†] From 1987Be22.[‡] Total theoretical internal conversion coefficients, calculated using the BrIcc code (2008Ki07) with Frozen orbital approximation based on γ -ray energies, assigned multiplicities, and mixing ratios, unless otherwise specified.[#] Placement of transition in the level scheme is uncertain.

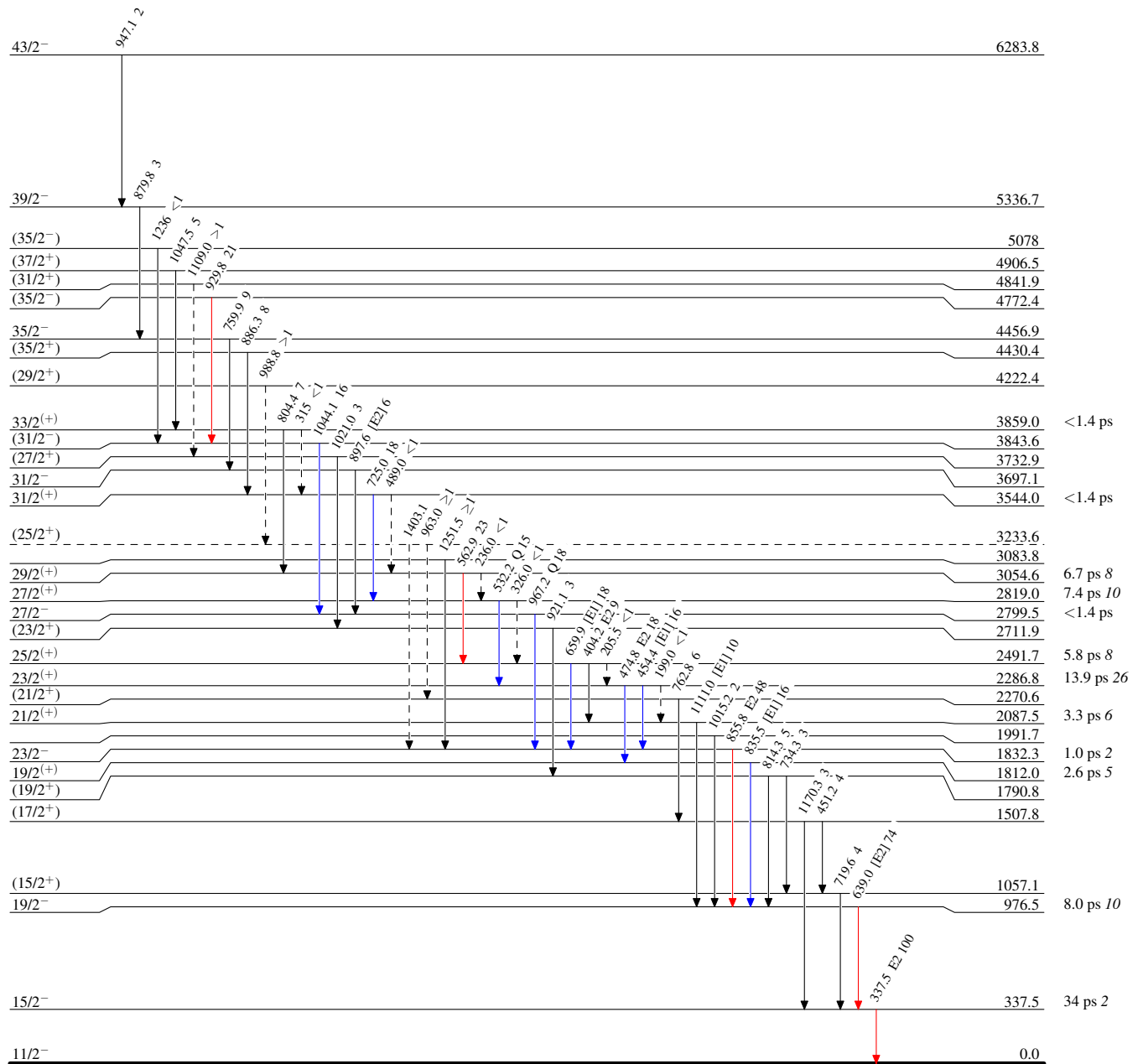
(HI,xn γ) 1988Mu22,1987Be22

Legend

Level Scheme

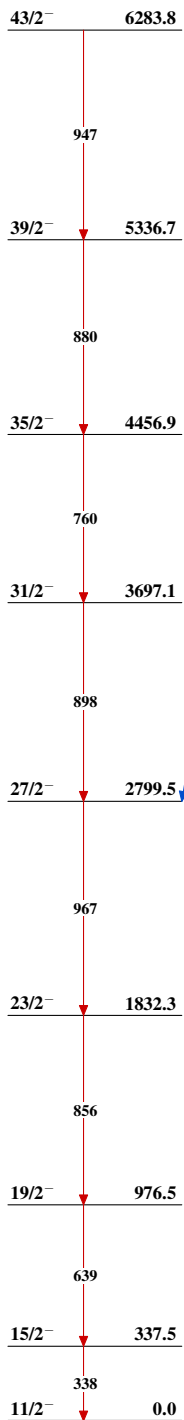
Intensities: Relative I_γ

-  $I_\gamma < 2\% \times I_\gamma^{max}$
-  $I_\gamma < 10\% \times I_\gamma^{max}$
-  $I_\gamma > 10\% \times I_\gamma^{max}$
-  γ Decay (Uncertain)

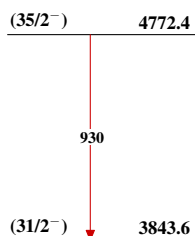


(HI,xn γ) 1988Mu22,1987Be22

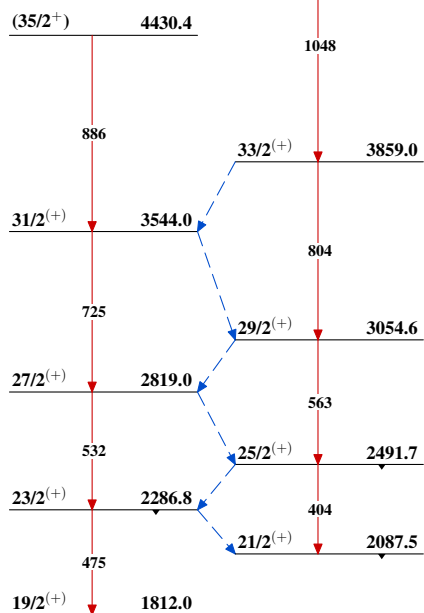
Band(A): Yrast band
 $\alpha=-1/2, [541]3/2^-$



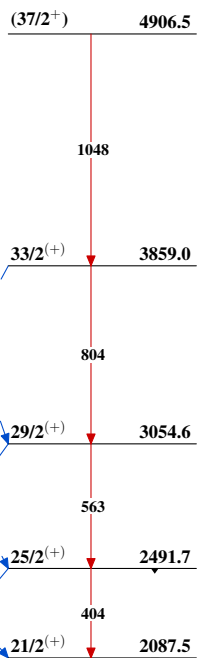
Band(B): Possible one-quasiproton band



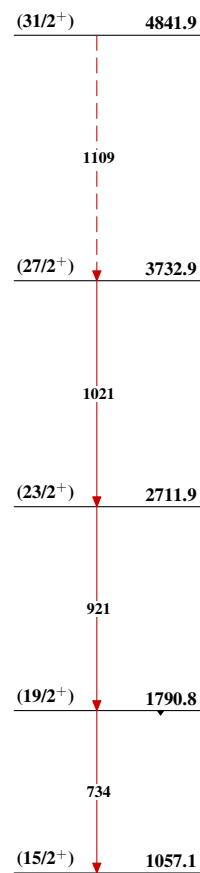
Band(C): $\pi=+$ sideband-1
 Configuration= $((\pi g_{7/2})(\pi h_{11/2})^2)$



Band(D): $\pi=+$ sideband-2
 Configuration= $((\pi g_{7/2})(\pi h_{11/2})^2)$



Band(E): $\pi=+$ sideband-3
 possible Configuration= $((\pi d_{5/2})(\pi h_{11/2})^2)$



Band(F): $\pi=+$ sideband-4
 possible Configuration= $((\pi d_{5/2})(\pi h_{11/2})^2)$

