^{191}Ir(n,n′γ) 1987Pr10

Type	Author	History Citation	Literature Cutoff Date
Full Evaluation	M. S. Basunia	NDS 195,368 (2024)	1-Dec-2023

Others: 2009Fo07, 1987PrZX, 1968Bo28.

1987Pr10: 84.7% enriched ^{191}Ir target. Reactor fast-neutron beam. Measured Eγ, Iγ at 90° from neutron beam. Detector: Ge(Li), FWHM=2.0 keV at 1332 keV. Deduced level populations from transition intensity balances. Also in 1987PrZX.

2009Fo07: ^{191}Ir(n,n′γ), E<20 MeV; measured Eγ feeding the 11/2$^-$ isomers using GEANIE array. Deduced Eγ partial cross sections and comparison of measured partial σ with predictions from FKK-GNASH reaction model.

1968Bo28: ^{191}Ir(n,n′), E=2.8 MeV; measured σ, deduced isomeric $T_{1/2}$.

^{191}Ir Levels

The rotational band configurations were assigned simultaneously with J^π, see comment on J.

E(level)†	Jπ‡	$T_{1/2}$	Comments
0.0#	3/2$^+$		
82.29@ 12	1/2$^+$		
129.409# 16	5/2$^+$		
171.268b 11	11/2$^-$	4.9 s 5	Additional information 1. E(level): From Adopted Level. $T_{1/2}$: From 1968Bo28.
179.16@ 5	3/2$^+$		
343.39# 4	7/2$^+$		
351.36@ 5	5/2$^+$		
390.93a 3	7/2$^-$		
502.86# 4	9/2$^+$		
504.34@ 11	7/2$^+$		
539.19& 7	3/2$^+$		
556.81b 8	13/2$^-$		
588.21 10	5/2$^+$		Jπ: Adopted: 3/2$^+$,5/2$^+$.
591.39b 15	15/2$^-$		
624.28& 12	1/2$^+$		
654.14a 7	9/2$^-$		
659.05c 6	3/2$^-$		
686.43 9	7/2$^+$		
748.20& 11	5/2$^+$		
762.64 8	3/2$^+$		
800.28c 13	5/2$^-$		
812.19@ 12	9/2$^+$		
816.92 14	9/2$^-$		Jπ: Not adopted.
825.39 15	(7/2$^+$)		Jπ: Adopted: (7/2$^+$,9/2$^+$).
832.51# 17	11/2$^+$		
878.10 11	(9/2$^+$)		Jπ: Adopted: (9/2$^-$,11/2$^+$).
918.88a 16	11/2$^-$		
928.1& 3	(7/2$^+$)		Jπ: This level fits better the γ-decay pattern expected from the band member in ^{192}Ir(p,2nγ),(d,3nγ) reaction, and has population rate in (n,n′γ) similar to 935.7 level, assigned by 1987Pr10 as the 7/2$^+$ member of 1/2[411] band.
935.70 13	(7/2$^+$)		Jπ: Adopted: (1/2$^+$,3/2,5/2$^+$). 1987Pr10 suggests this level as the (7/2$^+$) member of 1/2[411] band, but it was not seen in ^{192}Ir(p,2nγ),(d,3nγ).

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^{191}Ir(n,n′γ) 1987Pr10 (continued)

^{191}Ir Levels (continued)

E(level)[†]	J$^{\pi}$[‡]	Comments
945.05 *20*	9/2$^+$	J$^{\pi}$: Adopted: (5/2$^+$,7/2$^+$,9/2$^+$).
977.62[c] *14*	7/2$^-$	
991.8[@] *5*	11/2$^+$	γ rays which deexcite this level are masked by background radiation.
1004.1[#] *3*	13/2$^+$	
1036.59[b] *25*	(17/2$^-$)	
1053.17 *13*	(9/2$^+$)	
1134.93 *24*	11/2$^-$	J$^{\pi}$: Adopted: (7/2$^-$,9/2,11/2$^-$).
1207.11 *18*	11/2$^+$	J$^{\pi}$: Adopted: (7/2,9/2,11/2)$^+$.
1207.60[c] *23*	(9/2$^-$)	
1210.15 *25*	11/2$^-$	J$^{\pi}$: Adopted: (9/2,11/2).
1297.89 *20*		
1398.7[@] *4*	13/2$^+$	
1419.0 *4*	15/2$^+$	

[†] Deduced by evaluator from a least-squares fit to γ-ray energies, assuming ΔEγ=0.5 keV if not given.
[‡] The given spin and parity were assigned by 1987Pr10, along with the rotational band configurations, from the comparison between experimental level populations deduced from transition intensity balance and theoretical level populations from statistical model calculations in the Hauser-Feshbach theoretical framework, and γ-ray decay patterns. Notes added in comments section, if adopted spin differs from that in 1987Pr10.
[#] Band(A): 3/2[402].
[@] Band(B): 1/2[400].
[&] Band(C): 1/2[411].
[a] Band(D): 7/2[523].
[b] Band(E): 11/2[505].
[c] Band(F): 3/2[532].

γ(^{191}Ir)

E$_{\gamma}$[†]	I$_{\gamma}$[‡]	E$_i$(level)	J$_i^{\pi}$	E$_f$	J$_f^{\pi}$	Comments
82.3 *3*	160 *50*	82.29	1/2$^+$	0.0	3/2$^+$	
96.52	94 *8*	179.16	3/2$^+$	82.29	1/2$^+$	
129.400 *16*	1000 *60*	129.409	5/2$^+$	0.0	3/2$^+$	
141.15 *19*	41 *8*	800.28	5/2$^-$	659.05	3/2$^-$	
153.0 *3*	24 *5*	504.34	7/2$^+$	351.36	5/2$^+$	
[x]153.8 *3*	17 *4*					
159.47 *2*	13 *4*	502.86	9/2$^+$	343.39	7/2$^+$	
161.2	127 *13*	504.34	7/2$^+$	343.39	7/2$^+$	
172.16 *4*	80 *16*	351.36	5/2$^+$	179.16	3/2$^+$	
177.35 *5*	61 *9*	977.62	7/2$^-$	800.28	5/2$^-$	
179.16 *8*	53 *9*	179.16	3/2$^+$	0.0	3/2$^+$	
209.06 *9*	63 *6*	748.20	5/2$^+$	539.19	3/2$^+$	
213.88 *6*	310 *40*	343.39	7/2$^+$	129.409	5/2$^+$	
219.66 *3*	730 *70*	390.93	7/2$^-$	171.268	11/2$^-$	E$_{\gamma}$: Other: 219.2 (2009Fo07).
223.41 *6*	43 *10*	762.64	3/2$^+$	539.19	3/2$^+$	
229.98 *18*	40 *10*	1207.60	(9/2$^-$)	977.62	7/2$^-$	
[x]231.93 *13*	37 *11*					
[x]247.8 *3*	7.5 *24*					
263.22 *6*	150 *20*	654.14	9/2$^-$	390.93	7/2$^-$	
268.12 *5*	243 *22*	659.05	3/2$^-$	390.93	7/2$^-$	
269.0 *3*	86 *41*	351.36	5/2$^+$	82.29	1/2$^+$	
308.2 *2*	31 *13*	812.19	9/2$^+$	504.34	7/2$^+$	

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^{191}Ir(n,n′γ) 1987Pr10 (continued)

γ(^{191}Ir) (continued)

E_γ[†]	I_γ[‡]	E_i(level)	J_i^π	E_f	J_f^π	Comments
325.2	45 7	504.34	7/2+	179.16	3/2+	
343.51 6	358 26	343.39	7/2+	0.0	3/2+	
351.47 7	180 90	351.36	5/2+	0.0	3/2+	
360.22 11	58 10	539.19	3/2+	179.16	3/2+	
366.76 10	44 7	1053.17	(9/2+)	686.43	7/2+	
373.41 7	220 15	502.86	9/2+	129.409	5/2+	
375.04[@#] 14	100[@] 14	504.34	7/2+	129.409	5/2+	
375.04[@#] 14	95[@] 14	878.10	(9/2+)	502.86	9/2+	
385.54 8	48 11	556.81	13/2−	171.268	11/2−	E_γ: Other: 385.5 (2009Fo07).
406.9 3	23 11	1398.7	13/2+	991.8	11/2+	
409.49[@#] 18	128[@] 13	539.19	3/2+	129.409	5/2+	
409.49[@#] 18	52[@] 10	800.28	5/2−	390.93	7/2−	
411.48 26	30 13	762.64	3/2+	351.36	5/2+	
420.12 15	49 11	591.39	15/2−	171.268	11/2−	E_γ: Other: 420.1 (2009Fo07).
442.2 2	19 1	945.05	9/2+	502.86	9/2+	
445.2[@] 2	2[@] 1	624.28	1/2+	179.16	3/2+	
445.2[@] 2	32[@] 12	1036.59	(17/2−)	591.39	15/2−	
[x]449.01 24	33 11					
[x]454.95 28	23 9					
456.91 13	62 11	539.19	3/2+	82.29	1/2+	
458.79 13	60 11	588.21	5/2+	129.409	5/2+	
460.68 13	44 10	812.19	9/2+	351.36	5/2+	
482.5		654.14	9/2−	171.268	11/2−	E_γ: From 2009Fo07. Iγ=66 listed in Table I, relative scale was not mentioned.
489.12 16	26 8	832.51	11/2+	343.39	7/2+	
501.2 3	24 10	1004.1	13/2+	502.86	9/2+	
520.8 3	27 10	1207.11	11/2+	686.43	7/2+	
[x]524.62 25	22 10					
534.88 13	74 12	878.10	(9/2+)	343.39	7/2+	
539.05 11	172 14	539.19	3/2+	0.0	3/2+	
542.1 3	8.6 23	624.28	1/2+	82.29	1/2+	
550.1 3	10.3 24	1053.17	(9/2+)	502.86	9/2+	
556.01 24	55 19	1210.15	11/2−	654.14	9/2−	
557.10 13	130 25	686.43	7/2+	129.409	5/2+	
583.70 17	16 5	762.64	3/2+	179.16	3/2+	
586.5[@] 3	26[@] 10	977.62	7/2−	390.93	7/2−	
586.5[@] 3	2[@] 1	1398.7	13/2+	812.19	9/2+	
586.5[@] 3	2[@] 1	1419.0	15/2+	832.51	11/2+	
588.21 13	145 16	588.21	5/2+	0.0	3/2+	
[x]622.9 4	22 6					
624.20 15	43 10	624.28	1/2+	0.0	3/2+	
645.65 14	109 13	816.92	9/2−	171.268	11/2−	
686.40 14	92 15	686.43	7/2+	0.0	3/2+	
695.98 15	66 15	825.39	(7/2+)	129.409	5/2+	
704.2 2	21 6	1207.11	11/2+	502.86	9/2+	
744.00 23	26 9	1134.93	11/2−	390.93	7/2−	
747.6[@#] 3	3[@] 1	748.20	5/2+	0.0	3/2+	
[x]747.61[@] 16	38[@] 16					
747.61[@] 16	15[@] 4	918.88	11/2−	171.268	11/2−	
793.4 3	9 3	1297.89		504.34	7/2+	
798.7 3	26 3	928.1	(7/2+)	129.409	5/2+	
[x]811.8 7	9 3					

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^{191}Ir(n,n′γ) 1987Pr10 (continued)

γ(^{191}Ir) (continued)

E_γ [†]	I_γ [‡]	E_i(level)	J_i^π	E_f	J_f^π
815.5 *7*	14 *4*	945.05	$9/2^+$	129.409	$5/2^+$
[x]887.22 *18*	44 *7*				
[x]902.5 *7*	7 *2*				
935.70 *13*	44 *7*	935.70	$(7/2^+)$	0.0	$3/2^+$
946.64 *25*	21 *3*	1297.89		351.36	$5/2^+$

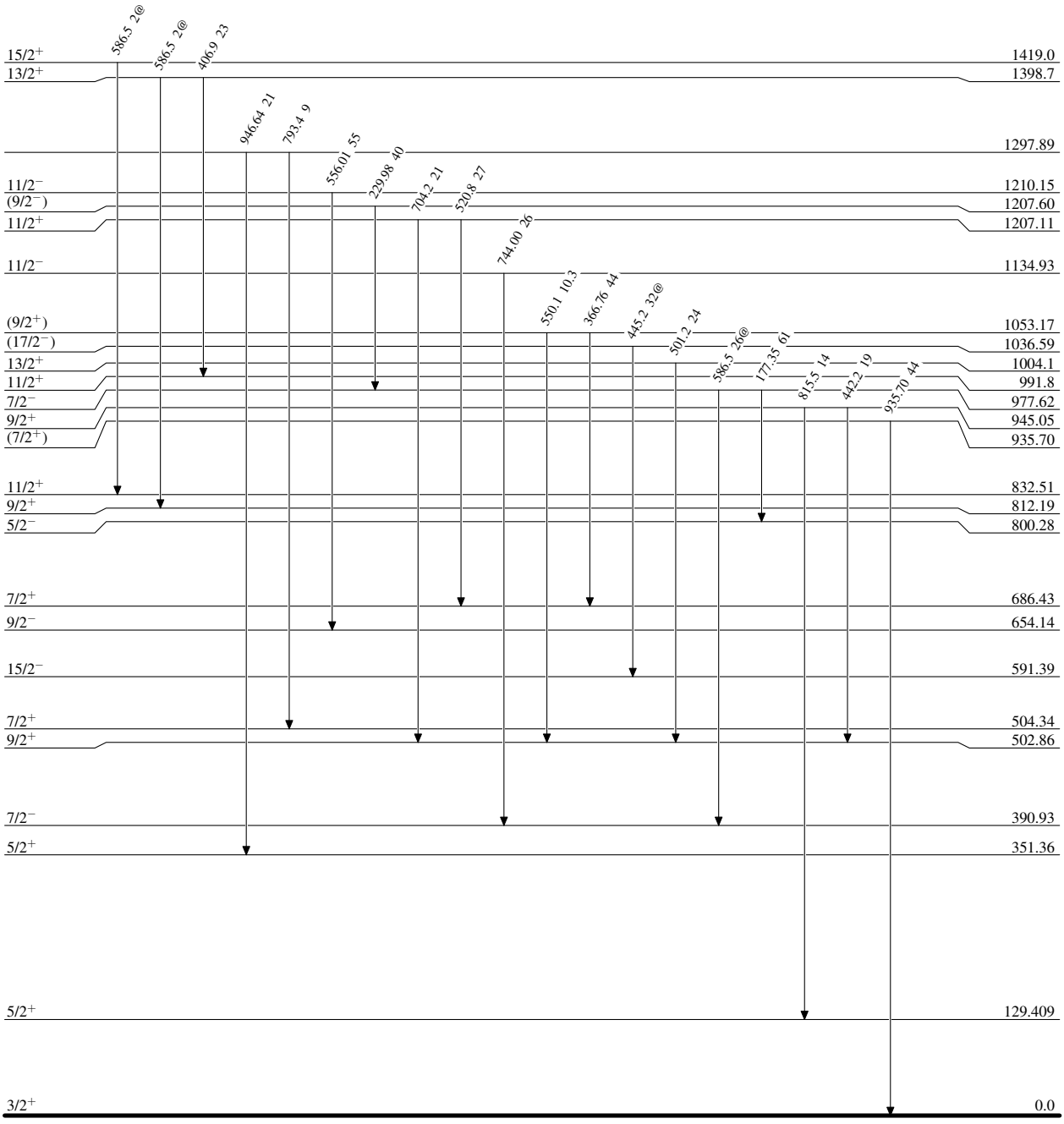
[†] From 1987Pr10.
[‡] From 1987Pr10; evaluator assigned uncertainties to the intensities of multiplet components (when not given by 1987Pr10) based on the uncertainty of multiplet intensity and typical values of uncertainties given in 1987Pr10.
[#] ΔEγ increased by a factor 2 − unresolved doublet with components of similar intensities or low intensity component of an unresolved doublet.
[@] Multiply placed with intensity suitably divided.
[x] γ ray not placed in level scheme.

^{191}Ir(n,n′γ) 1987Pr10

Level Scheme

Intensities: Relative I_γ
@ Multiply placed: intensity suitably divided

Legend
$I_\gamma < 2\% \times I_\gamma^{max}$
$I_\gamma < 10\% \times I_\gamma^{max}$
$I_\gamma > 10\% \times I_\gamma^{max}$



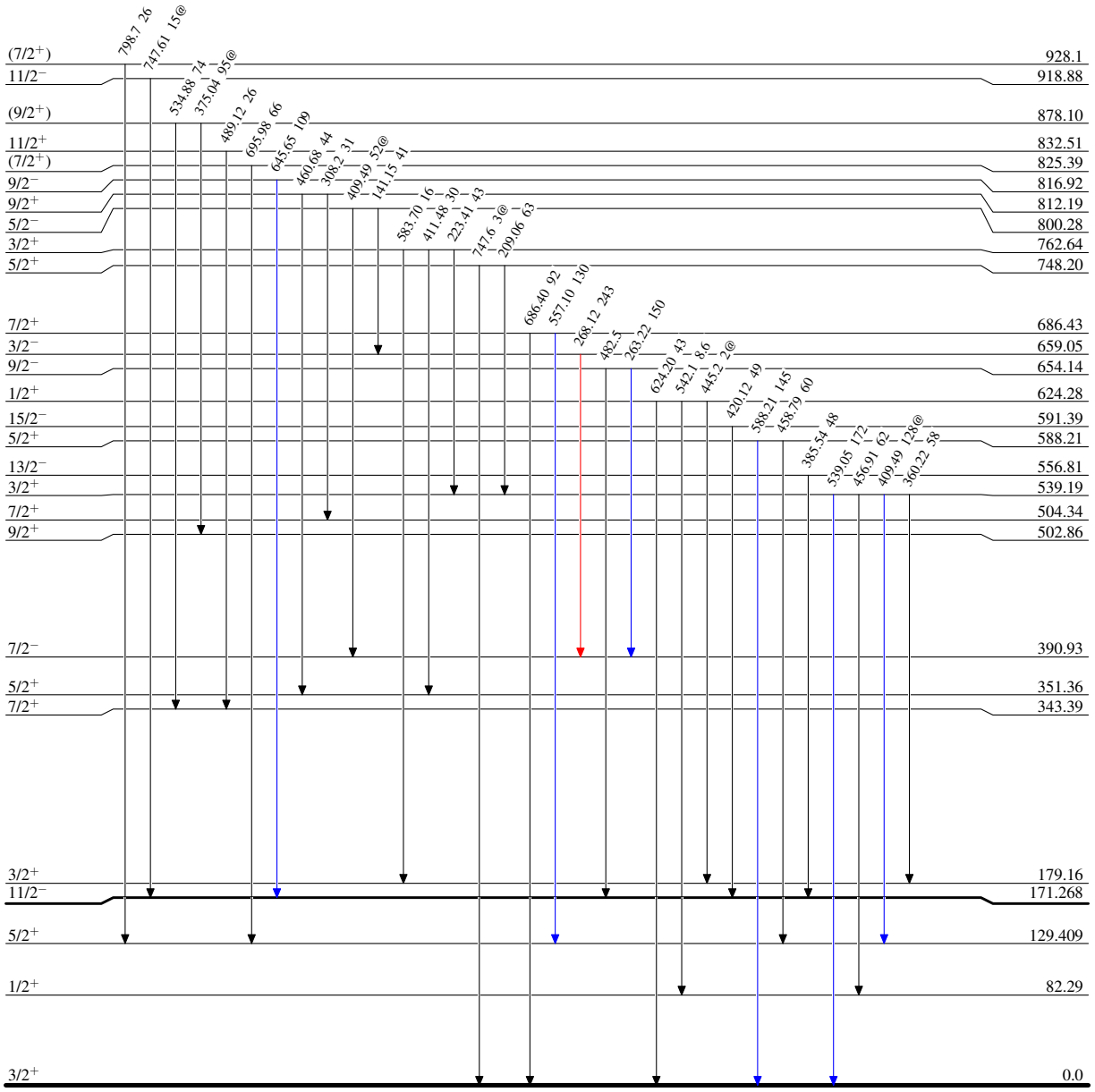
$^{191}_{77}Ir_{114}$

^{191}Ir(n,n′γ) 1987Pr10

Level Scheme (continued)

Intensities: Relative I_γ
@ Multiply placed: intensity suitably divided

Legend
$I_\gamma < 2\% \times I_\gamma^{max}$
$I_\gamma < 10\% \times I_\gamma^{max}$
$I_\gamma > 10\% \times I_\gamma^{max}$



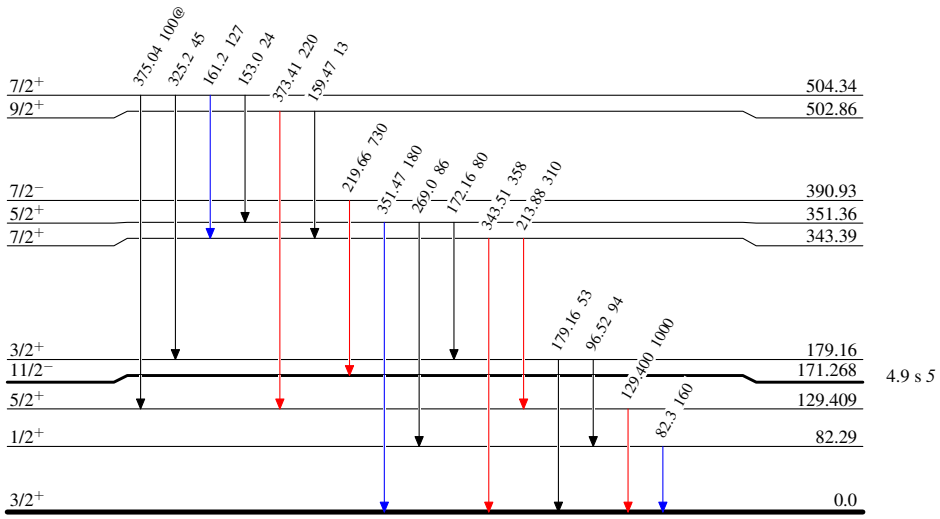
$^{191}_{77}Ir_{114}$

^{191}Ir(n,n′γ) 1987Pr10

Level Scheme (continued)

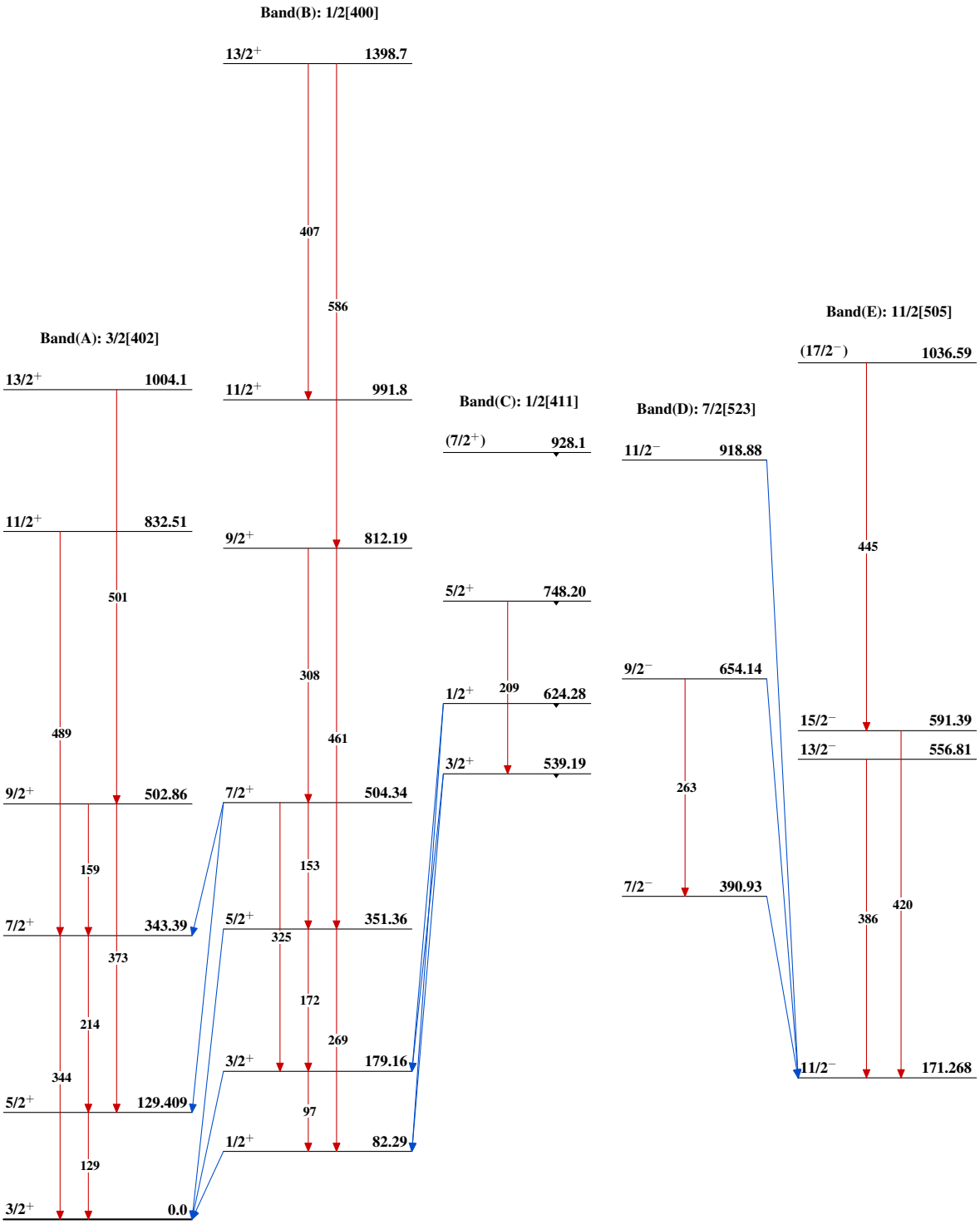
Intensities: Relative I_γ
@ Multiply placed: intensity suitably divided

Legend
$I_\gamma < 2\% \times I_\gamma^{max}$
$I_\gamma < 10\% \times I_\gamma^{max}$
$I_\gamma > 10\% \times I_\gamma^{max}$



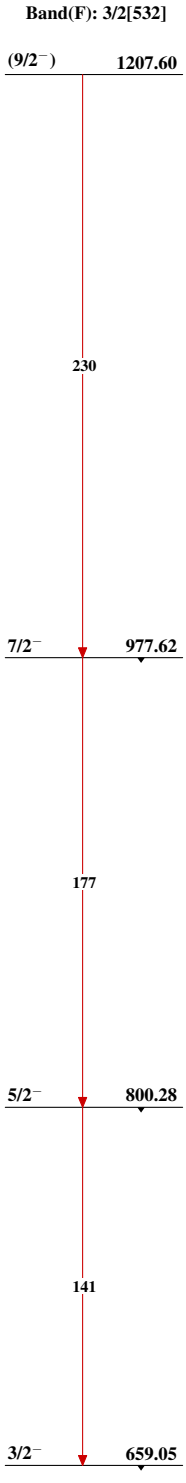
$^{191}_{77}Ir_{114}$

^{191}Ir(n,n′γ) 1987Pr10



$^{191}_{77}Ir_{114}$

^{191}Ir(n,n′γ) 1987Pr10 (continued)



$^{191}_{77}Ir_{114}$