

$^{188}\text{Os}(\alpha,2n\gamma)$  1976Hj01,1974Ya03

Type	Author	History	Citation	Literature Cutoff Date
Full Evaluation	Balraj Singh, <sup>1</sup> and Jun Chen <sup>2</sup>		NDS 169, 1 (2020)	15-Oct-2020

1976Hj01 (also 1975Fu04): E=27 MeV from the Rossendorf cyclotron U-120. Measured  $\gamma$ ,  $\gamma\gamma$ -coin,  $\gamma(t)$ . 1976Hj01 also report data for  $(\alpha,4n\gamma)$ .

1974Ya03, 1974YaZU: E=24 MeV, measured  $\gamma$ ,  $\gamma\gamma$ -coin.

1969Mi03: E=19-31 MeV. Measured  $E\gamma$ ,  $I\gamma$ .

2001Ko41: E=26.8 MeV. Measured g factor of  $10^-$  isomer by  $\gamma(\theta,H)$  method.

 $^{190}\text{Pt}$  Levels

E(level) <sup>†</sup>	$J^\pi$ <sup>@</sup>	$T_{1/2}$	Comments
0.0	0 <sup>+</sup>		
295.71 7	2 <sup>+</sup>		
597.53 9	2 <sup>+</sup>		
736.91 9	4 <sup>+</sup>		
916.43 11	3 <sup>+</sup>		
1127.98 11	4 <sup>+</sup>		
1202.10 <sup>‡</sup> 15	(2 <sup>+</sup> )		
1287.55 12	6 <sup>+</sup>		
1353.11 <sup>#</sup> 13	3 <sup>-</sup>		
1385.80 <sup>‡</sup> 21	(2,3,4)		
1449.65 17	5 <sup>+</sup>		
1464.35 11	5 <sup>-</sup>		
1600.5 <sup>‡</sup> 3	(1 <sup>+</sup> ,2 <sup>+</sup> )		
1624.61 <sup>‡</sup> 20			
1627.86 <sup>‡</sup> 17			
1630.94 11	7 <sup>-</sup>	<1 ns	$T_{1/2}$ : from $\gamma(t)$ (1976Hj01), $E\gamma$ not stated in 1976Hj01, probably 167 $\gamma$ .
1732.46 <sup>#</sup> 20	(6 <sup>+</sup> )		
1833.67 14	(6 <sup>-</sup> )		
1915.06 17	8 <sup>+</sup>		
2043.66 <sup>#</sup> 19			
2078.12 19	8 <sup>-</sup>		
2222.43 16	9 <sup>-</sup>		
2297.3 <sup>#</sup> 3	10 <sup>-</sup>	48 ns 5	g=0.009 8 (2001Ko41) $T_{1/2}$ : from 219.2 $\gamma(t)$ (1976Hj01). g: from $\gamma(\theta,H)$ of 219 $\gamma$ , 447 $\gamma$ and 591 $\gamma$ . Configuration= $\nu 9/2[505]\nu 11/2[615]$ (2001Ko41) from consistency measured and calculated g factor.
2534.94 <sup>#</sup> 25	10 <sup>+</sup>		
2570.5 <sup>#</sup> 4	11 <sup>-</sup>		
2602.61 21	10 <sup>+</sup>		
2701.7 <sup>#</sup> 4	10 <sup>+</sup>		
2726.1 <sup>#</sup> 3	12 <sup>+</sup>	<1 ns	$T_{1/2}$ : from 191 $\gamma(t)$ (1976Hj01).
2760.7 <sup>#</sup> 4	11 <sup>-</sup>		
2819.7 <sup>#</sup> 4	(11 <sup>+</sup> )		
3068.5 <sup>#</sup> 5	14 <sup>+</sup>		

<sup>†</sup> From least-squares fit to  $E\gamma$  values. Uncertain placements were included in the fitting procedure.

<sup>‡</sup> Level proposed by 1974Ya03 only.

<sup>#</sup> Level proposed by 1976Hj01 only.

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<sup>188</sup>Os( $\alpha, 2n\gamma$ ) **1976Hj01, 1974Ya03 (continued)**

<sup>190</sup>Pt Levels (continued)

@ As proposed in 1976Hj01 and 1974Ya03 based on deexcitation pattern and band associations. See the Adopted Levels for detailed arguments.

						$\gamma(^{190}\text{Pt})$		
$E_\gamma$ †	$I_\gamma$ ‡	$E_i(\text{level})$	$J_i^\pi$	$E_f$	$J_f^\pi$	Comments		
(75.0)		2297.3	10 <sup>-</sup>	2222.43	9 <sup>-</sup>			
123.2# 3	0.08 3	2726.1	12 <sup>+</sup>	2602.61	10 <sup>+</sup>			
166.59 1	16.3 8	1630.94	7 <sup>-</sup>	1464.35	5 <sup>-</sup>	E $\gamma$ =166.6 1 (1976Hj01). E $\gamma$ =166.58 15, I $\gamma$ =9.0 16 (1974Ya03).		
176.8# 3	0.5 2	1464.35	5 <sup>-</sup>	1287.55	6 <sup>+</sup>			
191.4# 3	1.4 3	2726.1	12 <sup>+</sup>	2534.94	10 <sup>+</sup>			
217.1# 3	0.34 11	2819.7	(11 <sup>+</sup> )	2602.61	10 <sup>+</sup>			
219.2 2	2.4 2	2297.3	10 <sup>-</sup>	2078.12	8 <sup>-</sup>	E $\gamma$ =219.1 2 (1976Hj01). E $\gamma$ =219.3 3, I $\gamma$ =1.4 2 (1974Ya03).		
<sup>x</sup> 223.1@ 5	0.8@ 3							
271.5@a 2	0.8@ 4	1624.61		1353.11	3 <sup>-</sup>			
273.2# 3	1.4 5	2570.5	11 <sup>-</sup>	2297.3	10 <sup>-</sup>			
274.73@ 14	0.8@ 4	1627.86		1353.11	3 <sup>-</sup>			
295.70 7	100	295.71	2 <sup>+</sup>	0.0	0 <sup>+</sup>	E $\gamma$ =295.7 1 (1976Hj01). E $\gamma$ =295.70 7, I $\gamma$ =100 (1974Ya03). E $\gamma$ =301.8 1 (1976Hj01). E $\gamma$ =301.80 8, I $\gamma$ =20.8 20 (1974Ya03). E $\gamma$ =318.9 2 (1976Hj01). E $\gamma$ =318.81 15, I $\gamma$ =9.5 15 (1974Ya03).		
301.80 8	14.8 7	597.53	2 <sup>+</sup>	295.71	2 <sup>+</sup>			
318.84 15	6.5 7	916.43	3 <sup>+</sup>	597.53	2 <sup>+</sup>			
321.76@a 18	4.0@ 9	1449.65	5 <sup>+</sup>	1127.98	4 <sup>+</sup>	I $\gamma$ (322 $\gamma$ )/I $\gamma$ (533 $\gamma$ )=0.9 is high by a factor of 4 than in (p,2n $\gamma$ ). E $\gamma$ =336.4 2 (1976Hj01). E $\gamma$ =336.31 8, I $\gamma$ =4.2 5 (1974Ya03).		
336.32 8	4.2 4	1464.35	5 <sup>-</sup>	1127.98	4 <sup>+</sup>			
342.4# 3	0.9 3	3068.5	14 <sup>+</sup>	2726.1	12 <sup>+</sup>			
343.36 8	10.5 5	1630.94	7 <sup>-</sup>	1287.55	6 <sup>+</sup>	E $\gamma$ =343.4 1 (1976Hj01). E $\gamma$ =343.34 8, I $\gamma$ =6.2 6 (1974Ya03).		
<sup>x</sup> 355.7@ 2	0.9@ 2							
369.32 8	3.8 4	1833.67	(6) <sup>-</sup>	1464.35	5 <sup>-</sup>	E $\gamma$ =369.3 2 (1976Hj01). E $\gamma$ =369.32 8, I $\gamma$ =3.5 3 (1974Ya03).		
380.0@a 2	1.4@ 2	2602.61	10 <sup>+</sup>	2222.43	9 <sup>-</sup>			
390.99 9	2.0 2	1127.98	4 <sup>+</sup>	736.91	4 <sup>+</sup>	E $\gamma$ =390.9 2 (1976Hj01). E $\gamma$ =391.01 9, I $\gamma$ =3.1 4 (1974Ya03).		
<sup>x</sup> 402.86@ 7	0.8@ 3							
412.72 15	2.4 2	2043.66		1630.94	7 <sup>-</sup>	E $\gamma$ =412.7 2 (1976Hj01). E $\gamma$ =412.73 15, I $\gamma$ =2.2 2 (1974Ya03). E $\gamma$ =422.6 3 (1976Hj01). E $\gamma$ =422.3 4, I $\gamma$ =2.1 3 (1974Ya03). Placement from 1974Ya03. Unplaced in 1976Hj01.		
422.5 <sup>a</sup> 3	1.0 3	1624.61		1202.10	(2 <sup>+</sup> )			
<sup>x</sup> 436.2@ 5	1.5@ 5							
441.19 7	65 3	736.91	4 <sup>+</sup>	295.71	2 <sup>+</sup>	E $\gamma$ =441.2 1 (1976Hj01). E $\gamma$ =441.18 7, I $\gamma$ =59.7 30 (1974Ya03). E $\gamma$ =447.3 2 (1976Hj01). E $\gamma$ =447.12 15, I $\gamma$ =4.5 7 (1974Ya03).		
447.18 15	9.6 10	2078.12	8 <sup>-</sup>	1630.94	7 <sup>-</sup>			
<sup>x</sup> 449.9@ 5	1.4@ 5							
<sup>x</sup> 460.1 3	1.3 4					Uncertain $\gamma$ ray. Other: E $\gamma$ =460.2 4, I $\gamma$ =0.9 3 (1974Ya03).		
469.0@ 7	2.3@ 6	1385.80?	(2,3,4)	916.43	3 <sup>+</sup>			
530.6 2	7.7 8	1127.98	4 <sup>+</sup>	597.53	2 <sup>+</sup>	E $\gamma$ =530.6 2, I $\gamma$ =8.0 8 (1974Ya03).		

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$^{188}\text{Os}(\alpha, 2n\gamma)$  **1976Hj01, 1974Ya03 (continued)** $\gamma(^{190}\text{Pt})$  (continued)

$E_\gamma^\dagger$	$I_\gamma^\ddagger$	$E_i(\text{level})$	$J_i^\pi$	$E_f$	$J_f^\pi$	Comments
533.1 2	4.0 4	1449.65	5 <sup>+</sup>	916.43	3 <sup>+</sup>	$E_\gamma=533.1$ 2 (1976Hj01). $E_\gamma=533.0$ 3, $I_\gamma=4.5$ 6 (1974Ya03).
538.3 <sup>#</sup> 3	1.3 4	2760.7	11 <sup>-</sup>	2222.43	9 <sup>-</sup>	$E_\gamma=550.6$ 1 (1976Hj01). $E_\gamma=550.66$ 9, $I_\gamma=18.7$ 12 (1974Ya03).
550.63 9	25.4 13	1287.55	6 <sup>+</sup>	736.91	4 <sup>+</sup>	
591.41 13	9.1 9	2222.43	9 <sup>-</sup>	1630.94	7 <sup>-</sup>	$E_\gamma=591.4$ 2 (1976Hj01). $E_\gamma=591.42$ 13, $I_\gamma=5.6$ 5 (1974Ya03).
597.6 2	5.4 5	597.53	2 <sup>+</sup>	0.0	0 <sup>+</sup>	$E_\gamma=597.62$ 15, $I_\gamma=8.1$ 14 (1974Ya03).
<sup>x</sup> 600.5 <sup>@</sup> 7	2.8 <sup>@</sup> 12					
604.48 <sup>&amp;</sup> 17	2.6 <sup>&amp;</sup> 3	1202.10	(2 <sup>+</sup> )	597.53	2 <sup>+</sup>	$E_\gamma=604.5$ 2 (1976Hj01). Placement from 1974Ya03. 1976Hj01 placed it deexciting 1733 level. $E_\gamma=604.46$ 17, $I_\gamma=1.8$ 5 (1974Ya03).
604.48 <sup>&amp;</sup> 17	2.6 <sup>&amp;</sup> 3	1732.46	(6 <sup>+</sup> )	1127.98	4 <sup>+</sup>	$E_\gamma=616.4$ 3 (1976Hj01). $E_\gamma=616.1$ 2, $I_\gamma=1.5$ 4 (1974Ya03).
616.2 2	$\approx 1.4$	1353.11	3 <sup>-</sup>	736.91	4 <sup>+</sup>	
620.0 <sup>#</sup> 2	3.0 3	2534.94	10 <sup>+</sup>	1915.06	8 <sup>+</sup>	$E_\gamma=620.7$ 2 (1976Hj01). $E_\gamma=620.72$ 12, $I_\gamma=6.0$ 6 (1974Ya03).
620.71 12	3.4 3	916.43	3 <sup>+</sup>	295.71	2 <sup>+</sup>	
627.60 14	10.6 5	1915.06	8 <sup>+</sup>	1287.55	6 <sup>+</sup>	$E_\gamma=627.6$ 1 (1976Hj01). $E_\gamma=627.59$ 14, $I_\gamma=4.1$ 4 (1974Ya03).
687.7 3	2.5 8	2602.61	10 <sup>+</sup>	1915.06	8 <sup>+</sup>	$E_\gamma=687.8$ 3 (1976Hj01). $E_\gamma=687.5$ 3, $I_\gamma=1.0$ 3 (1974Ya03).
711.5 <sup>@</sup> 3	1.4 <sup>@</sup> 5	1627.86		916.43	3 <sup>+</sup>	$E_\gamma=727.5$ 1 (1976Hj01). $E_\gamma=727.51$ 9, $I_\gamma=24.3$ 17 (1974Ya03).
727.51 9	20.6 10	1464.35	5 <sup>-</sup>	736.91	4 <sup>+</sup>	
786.6 <sup>#</sup> 3	3.3 11	2701.7	10 <sup>+</sup>	1915.06	8 <sup>+</sup>	$I_\gamma: I_\gamma(788\gamma)/I_\gamma(469\gamma)=0.83$ (1974Ya03) is high as compared to 0.48 in (p,2n $\gamma$ ). $I_\gamma: \text{from } I_\gamma(832\gamma)/I_\gamma(531\gamma)=0.075$ (1974Ya03).
788.3 <sup>@</sup> 2	1.9 <sup>@</sup> 4	1385.80?	(2,3,4)	597.53	2 <sup>+</sup>	
832.4 <sup>@</sup> 3	0.6 <sup>@</sup> 3	1127.98	4 <sup>+</sup>	295.71	2 <sup>+</sup>	$E_\gamma=1057.4$ 2 (1976Hj01). $E_\gamma=1057.38$ 15, $I_\gamma=3.8$ 4 (1974Ya03).
906.5 <sup>@</sup> 2	1.2 <sup>@</sup> 3	1202.10	(2 <sup>+</sup> )	295.71	2 <sup>+</sup>	
1057.38 15	3.1 3	1353.11	3 <sup>-</sup>	295.71	2 <sup>+</sup>	
1304.8 <sup>@a</sup> 3	0.9 <sup>@</sup> 4	1600.5?	(1 <sup>+</sup> ,2 <sup>+</sup> )	295.71	2 <sup>+</sup>	

<sup>†</sup> Weighted average of values from 1976Hj01 and 1974Ya03.

<sup>‡</sup> From 1976Hj01, unless otherwise stated. Corresponding values from 1974Ya03 are given under comments. Values from both the studies were considered in deducing relative branching ratios in the Adopted Gammas.

<sup>#</sup>  $\gamma$  reported by 1976Hj01 only.

<sup>@</sup>  $\gamma$  reported by 1974Ya03 only. Intensity is at  $E_\alpha=24$  MeV.

<sup>&</sup> Multiply placed with undivided intensity.

<sup>a</sup> Placement of transition in the level scheme is uncertain.

<sup>x</sup>  $\gamma$  ray not placed in level scheme.

$^{188}\text{Os}(\alpha,2n\gamma)$  1976Hj01,1974Ya03

Level Scheme

Intensities: Relative  $I_\gamma$   
& Multiply placed: undivided intensity given

Legend

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

