

$^{52}\text{Cr}(^{16}\text{O},\alpha p\gamma)$ **2000Mu20**

Type	Author	History Citation	Literature Cutoff Date
Full Evaluation	Jun Chen	NDS 196,17 (2024)	30-Sep-2023

2000Mu20: E=65 MeV ^{16}O beam was produced from the 15 UD Pelletron facility at the Nuclear Science Centre, New Delhi.

Target was 1 mg/cm² natural chromium on a 7.2 mg/cm² Au backing. γ rays were detected with an array of 12 HPGe detectors with BGO Compton suppressors and charged particles were detected with a 4π charged particle detector array consisted of fourteen phoswich ΔE -E detectors. Measured E_γ , I_γ , $\gamma\gamma$ -coin, $\gamma\gamma(\text{DCO})$. Deduced levels, J, π . Comparisons with shell-model calculations.

 ^{63}Cu Levels

E(level) [†]	J π [‡]	E(level) [†]	J π [‡]	E(level) [†]	J π [‡]	E(level) [†]	J π [‡]
0.0	3/2 ⁻	2092.03 8	7/2 ⁻	3295.00 9	(11/2 ⁺)	5007.11 16	(19/2 ⁺)
962.01 6	5/2 ⁻	2208.02 8	9/2 ⁻	3461.09 11	11/2 ⁺	5318.12 16	
1327.01 7	7/2 ⁻	2505.04 7	9/2 ⁺	4129.10 13	13/2 ⁺	5768.13 16	
1410.02 8	5/2 ⁻	2618.03 10		4155.12 11	13/2 ⁺	6283.14 14	19/2 ⁽⁺⁾
1861.03 7	7/2 ⁻	2677.01 10		4497.11 13	17/2 ⁺	7073.15 17	23/2 ⁽⁺⁾
1952.03 9		2911.04 12		4576.12 14			

[†] From a least-squares fit to γ -ray energies.

[‡] From **2000Mu20**, based on measured $\gamma\gamma(\text{DCO})$ and γ decay patterns. For yrast state, ascending spin is assumed as excitation energy increases.

 $\gamma(^{63}\text{Cu})$

Expected DCO ratios are ≈ 1.0 for stretched quadrupole transition and ≈ 0.6 for stretched dipole when gating on a pure quadrupole transition (**2000Mu20**). But the authors do not report multipolarities.

E_γ #	I_γ #	$E_i(\text{level})$	J_i^π	E_f	J_f^π	Mult. @	Comments
297.0 1	3	2505.04	9/2 ⁺	2208.02	9/2 ⁻		
342.0 1	45	4497.11	17/2 ⁺	4155.12	13/2 ⁺	Q	DCO=1.02.
365.0 1	18	1327.01	7/2 ⁻	962.01	5/2 ⁻	D	DCO=0.73.
368.0 1	4	4497.11	17/2 ⁺	4129.10	13/2 ⁺		
406.0 1	4	2911.04		2505.04	9/2 ⁺		
413.0 1	28	2505.04	9/2 ⁺	2092.03	7/2 ⁻	D	DCO=0.61.
421.0 1	10	4576.12		4155.12	13/2 ⁺		
448.0 1	4	1410.02	5/2 ⁻	962.01	5/2 ⁻		
468.0 [‡] 1	3	2677.01		2208.02	9/2 ⁻		E_γ : very poor fit and omitted in the fitting; level-energy difference=468.99.
510.0 1	20	5007.11	(19/2 ⁺)	4497.11	17/2 ⁺	D	DCO=0.49.
526.0 1	7	2618.03		2092.03	7/2 ⁻		
553.0 1	2	2505.04	9/2 ⁺	1952.03			
618.0 1	5	3295.00	(11/2 ⁺)	2677.01			
644.0 1	36	2505.04	9/2 ⁺	1861.03	7/2 ⁻	D	DCO=0.47.
668.0 1	12	4129.10	13/2 ⁺	3461.09	11/2 ⁺	D	DCO=0.74.
694.0 1	14	4155.12	13/2 ⁺	3461.09	11/2 ⁺	D	DCO=0.43.
765.0 1	3	2092.03	7/2 ⁻	1327.01	7/2 ⁻		
790.0 1	8	3295.00	(11/2 ⁺)	2505.04	9/2 ⁺		
790.0 1	13	7073.15	23/2 ⁽⁺⁾	6283.14	19/2 ⁽⁺⁾	Q	DCO=1.15.
821.0 1	2	5318.12		4497.11	17/2 ⁺		
861.0 [†] 1	6	4155.12	13/2 ⁺	3295.00	(11/2 ⁺)	D	E_γ : uncertainty multiplied by a factor of 3 in the fitting;

Continued on next page (footnotes at end of table)

$^{52}\text{Cr}(^{16}\text{O},\alpha\text{p}\gamma)$ **2000Mu20** (continued) $\gamma(^{63}\text{Cu})$ (continued)

E_γ [#]	I_γ [#]	$E_i(\text{level})$	J_i^π	E_f	J_f^π	Mult. [@]	Comments
							level-energy difference=860.12. DCO=0.41.
881.0 <i>I</i>	3	2208.02	9/2 ⁻	1327.01	7/2 ⁻		
899.0 <i>I</i>	8	1861.03	7/2 ⁻	962.01	5/2 ⁻	D	DCO=0.51.
956.0 <i>I</i>	21	3461.09	11/2 ⁺	2505.04	9/2 ⁺	D	DCO=0.55.
962.0 <i>I</i>	100	962.01	5/2 ⁻	0.0	3/2 ⁻	D	DCO=0.55.
990.0 <i>I</i>	8	1952.03		962.01	5/2 ⁻		
1087.0 <i>I</i>	2	3295.00	(11/2 ⁺)	2208.02	9/2 ⁻		
1130.0 <i>I</i>	37	2092.03	7/2 ⁻	962.01	5/2 ⁻	D	DCO=0.63.
1179.0 [‡] <i>I</i>	33	2505.04	9/2 ⁺	1327.01	7/2 ⁻	D	E_γ : very poor fit and omitted in the fitting; level-energy difference=1178.02. DCO=0.67. DCO=0.98.
1246.0 <i>I</i>	10	2208.02	9/2 ⁻	962.01	5/2 ⁻	Q	
1271.0 <i>I</i>	8	5768.13		4497.11	17/2 ⁺		
1291.0 <i>I</i>	8	2618.03		1327.01	7/2 ⁻		
1327.0 <i>I</i>	38	1327.01	7/2 ⁻	0.0	3/2 ⁻	Q	DCO=1.10.
1350.0 <i>I</i>	8	2677.01		1327.01	7/2 ⁻		
1410.0 <i>I</i>	10	1410.02	5/2 ⁻	0.0	3/2 ⁻	D	DCO=0.62.
1543.0 <i>I</i>	4	2505.04	9/2 ⁺	962.01	5/2 ⁻		
1650.0 <i>I</i>	45	4155.12	13/2 ⁺	2505.04	9/2 ⁺	Q	DCO=1.13.
1707.0 <i>I</i>	3	6283.14	19/2 ⁽⁺⁾	4576.12			
1786.0 <i>I</i>	24	6283.14	19/2 ⁽⁺⁾	4497.11	17/2 ⁺	D	DCO=0.62.
1861.0 <i>I</i>	18	1861.03	7/2 ⁻	0.0	3/2 ⁻	Q	DCO=0.94.

[†] Poor fit; uncertainty multiplied by a factor in the fitting.

[‡] Very poor fit and omitted in the fitting.

[#] From **2000Mu20**.

[@] Deduced by the evaluator based on DCO ratios reported in **2000Mu20** and authors' statement on expected DCO ratios for stretched dipole and quadrupole.

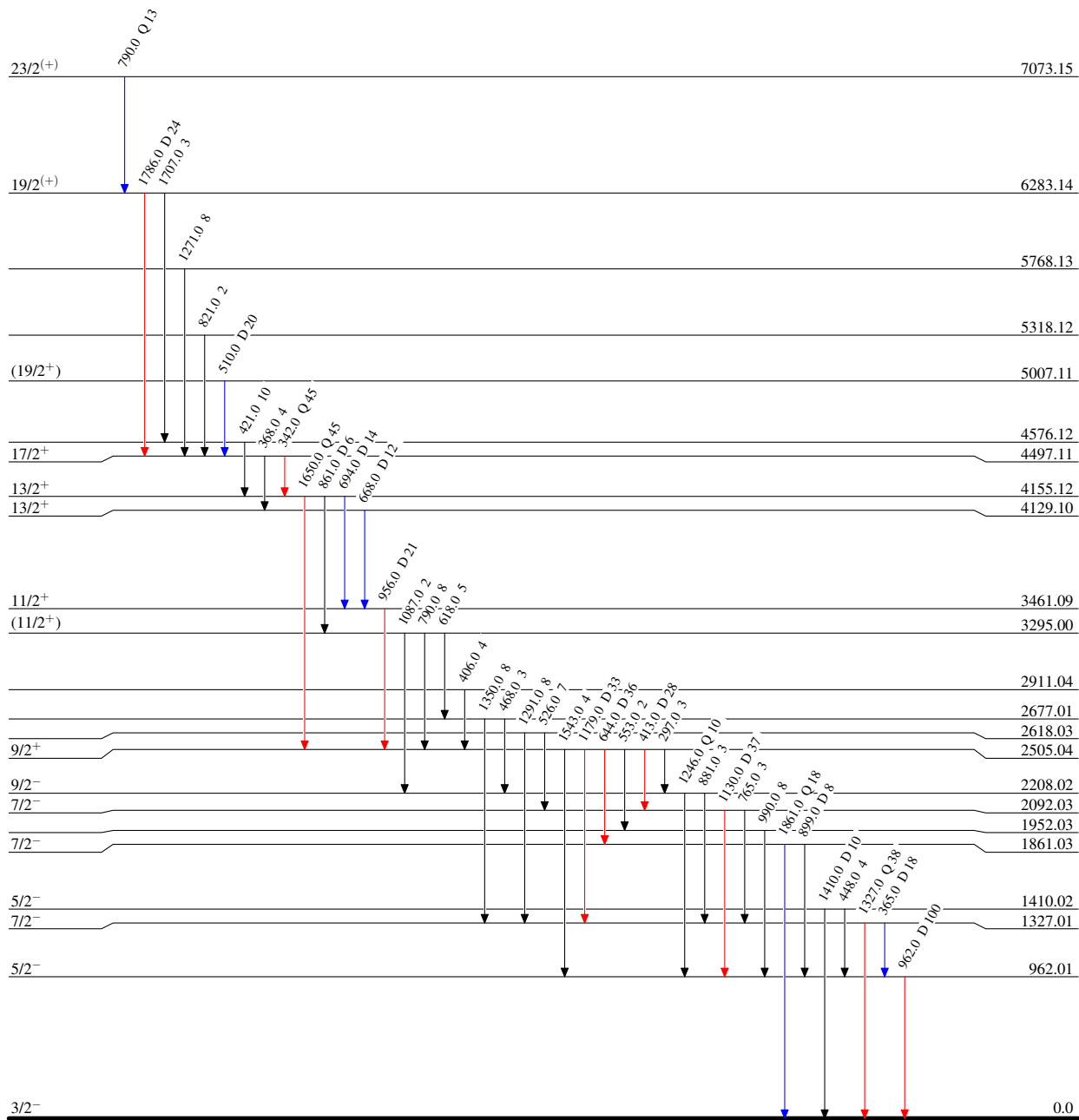
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Level Scheme

Intensities: Relative I_γ

Legend

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

 $^{63}_{29}\text{Cu}_{34}$