

$^{24}\text{Mg}(^{12}\text{C},\alpha p\gamma)$ **2021Te07**

Type	Author	History	Citation	Literature Cutoff Date
Full Evaluation	Jun Chen and Balraj Singh		NDS 184, 29 (2022)	24-Jun-2022

2021Te07: E(^{12}C)=45 MeV. Measured E_γ , I_γ , $\gamma\gamma$ -coin, (particle) γ -coin $\gamma\gamma(\theta)$ (ADO) using GALILEO array of 25

Compton-suppressed HPGe detectors for γ radiation, EUCLIDES Si-ball for charged particles and Neutron Wall for neutrons at the XTU tandem accelerator facility at Legnaro. Deduced mirror energy differences (MEDs) for ^{31}P and ^{31}S structures. Comparison with shell-model calculations, and with structure of mirror nucleus ^{31}S .

[Additional information 1.](#)

 ^{31}P Levels

E(level) [†]	J π [‡]	E(level) [†]	J π [‡]	E(level) [†]	J π [‡]	E(level) [†]	J π [‡]
0.0 [#]	1/2 ⁺	4431.7 [@] 6	7/2 ⁻	6453.2 [#] 9	11/2 ⁺	7859.2 11	11/2 ⁻
1266.5 [#] 5	3/2 ⁺	4633.8 7	7/2 ⁺	6501.6 [@] 9	9/2 ⁻	8705.8 [@] 8	13/2 ⁻
2233.7 [#] 6	5/2 ⁺	5343.7 [#] 7	9/2 ⁺	6795.9 10	9/2 ⁻	9312.0 [#] 11	13/2 ⁺
3295.3 5	5/2 ⁺	5773.4 12	(7/2 ⁺)	6824.6 [@] 8	11/2 ⁻	10217.8 [@] 10	15/2 ⁻
3415.4 [#] 6	7/2 ⁺	6076.9 10	9/2 ⁺	7440.5 9	11/2 ⁺		

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

[‡] As proposed by **2021Te07** for excited states based on $\gamma\gamma(\theta)$ (ADO) data. Assignments are the same in Adopted Levels, except that some have been given in parentheses where no strong argument is available.

[#] Member of yrast $\pi=+$ sequence.

[@] Member of yrast $\pi=-$ sequence.

 $\gamma(^{31}\text{P})$

$R_{\text{ADO}}=I_\gamma(152^\circ)/I_\gamma(90^\circ)$. Expected $R_{\text{ADO}}\approx 0.64$ for $\Delta J=1$, dipole transitions, and ≈ 1.4 for $\Delta J=2$, quadrupole transitions.

E_γ	I_γ	$E_i(\text{level})$	J π_i	E_f	J π_f	Mult. [†]	Comments
987.0 4		7440.5	11/2 ⁺	6453.2	11/2 ⁺		
1016.5 5		4431.7	7/2 ⁻	3415.4	7/2 ⁺	D	Mult.: $\Delta J=0$ transition. $R_{\text{ADO}}=1.16$ 13.
1061.9 5	8.0 21	3295.3	5/2 ⁺	2233.7	5/2 ⁺	D+Q	$R_{\text{ADO}}=1.21$ 9. Mult.: $\Delta J=0$ transition.
1063.2 6		7859.2	11/2 ⁻	6795.9	9/2 ⁻		
1109.5 5	2.8 6	6453.2	11/2 ⁺	5343.7	9/2 ⁺		
1136.4 5	20.7 26	4431.7	7/2 ⁻	3295.3	5/2 ⁺	D	$R_{\text{ADO}}=0.69$ 2.
1218.2 5	4.3 18	4633.8	7/2 ⁺	3415.4	7/2 ⁺	D+Q	Mult.: $\Delta J=0$ transition. $R_{\text{ADO}}=1.38$ 8.
1266.4 5	100 16	1266.5	3/2 ⁺	0.0	1/2 ⁺	D+Q	$R_{\text{ADO}}=1.0$ 1.
1338.6 6	3.0 7	4633.8	7/2 ⁺	3295.3	5/2 ⁺	D+Q	$R_{\text{ADO}}=0.88$ 16.
1442.7 8		6076.9	9/2 ⁺	4633.8	7/2 ⁺		
1480.5 5	15.6 14	6824.6	11/2 ⁻	5343.7	9/2 ⁺	D	$R_{\text{ADO}}=0.63$ 11.
1511.4 6	0.08 8	10217.8	15/2 ⁻	8705.8	13/2 ⁻		
1870.6 9		9312.0	13/2 ⁺	7440.5	11/2 ⁺		
1880.8 5	11.6 19	8705.8	13/2 ⁻	6824.6	11/2 ⁻		
1927.8 5	32.7 76	5343.7	9/2 ⁺	3415.4	7/2 ⁺	D+Q	E_γ : 1929 in Fig. 3 of 2021Te07 . $R_{\text{ADO}}=0.76$ 2.
2028.9 6	21.4 26	3295.3	5/2 ⁺	1266.5	3/2 ⁺	D+Q	$R_{\text{ADO}}=1.17$ 4.
2069.9 7	6.3 10	6501.6	9/2 ⁻	4431.7	7/2 ⁻	D+Q	$R_{\text{ADO}}=1.62$ 14.

Continued on next page (footnotes at end of table)

$^{24}\text{Mg}(^{12}\text{C},\alpha\text{p}\gamma)$ **2021Te07** (continued) $\gamma(^{31}\text{P})$ (continued)

E_γ	I_γ	$E_i(\text{level})$	J_i^π	E_f	J_f^π	Mult. [†]	Comments
2148.3 8	66.4 84	3415.4	7/2 ⁺	1266.5	3/2 ⁺	Q	$R_{\text{ADO}}=1.26$ 3.
2197.9 9	29.3 45	4431.7	7/2 ⁻	2233.7	5/2 ⁺		
2204.2 9		8705.8	13/2 ⁻	6501.6	9/2 ⁻		
2234.2 7	65.8 68	2233.7	5/2 ⁺	0.0	1/2 ⁺	Q	
2358.0 10		5773.4	(7/2 ⁺)	3415.4	7/2 ⁺		
2363.3 10	5.6 9	6795.9	9/2 ⁻	4431.7	7/2 ⁻		E_γ : 2365 in Fig. 3 of 2021Te07 .
2393.6 7		6824.6	11/2 ⁻	4431.7	7/2 ⁻		
2860.6 12		9312.0	13/2 ⁺	6453.2	11/2 ⁺		
3038.9 19	21.4 62	6453.2	11/2 ⁺	3415.4	7/2 ⁺	Q	$R_{\text{ADO}}=1.44$ 5.
3232 3		9312.0	13/2 ⁺	6076.9	9/2 ⁺		
3293.6 12		3295.3	5/2 ⁺	0.0	1/2 ⁺		E_γ : 3295 in Fig. 3 of 2021Te07 .
3381.6 16	6.4 18	6795.9	9/2 ⁻	3415.4	7/2 ⁺		
3394.8 11	6.4 13	10217.8	15/2 ⁻	6824.6	11/2 ⁻		
3428.2 17	2.9 5	7859.2	11/2 ⁻	4431.7	7/2 ⁻		
3846 4		6076.9	9/2 ⁺	2233.7	5/2 ⁺		
4027 3		7440.5	11/2 ⁺	3415.4	7/2 ⁺		

[†] From $\gamma\gamma(\theta)(\text{ADO})$ data in **2021Te07**. The evaluators assign mult=Q for $\Delta J=2$, quadrupole transitions and D or D+Q for $\Delta J=1$ and in a few cases $\Delta J=0$ transitions, instead of E2, E1 or M1+E2, respectively, as listed in **2021Te07**, since there are no experimental data from this work for magnetic or electric nature.

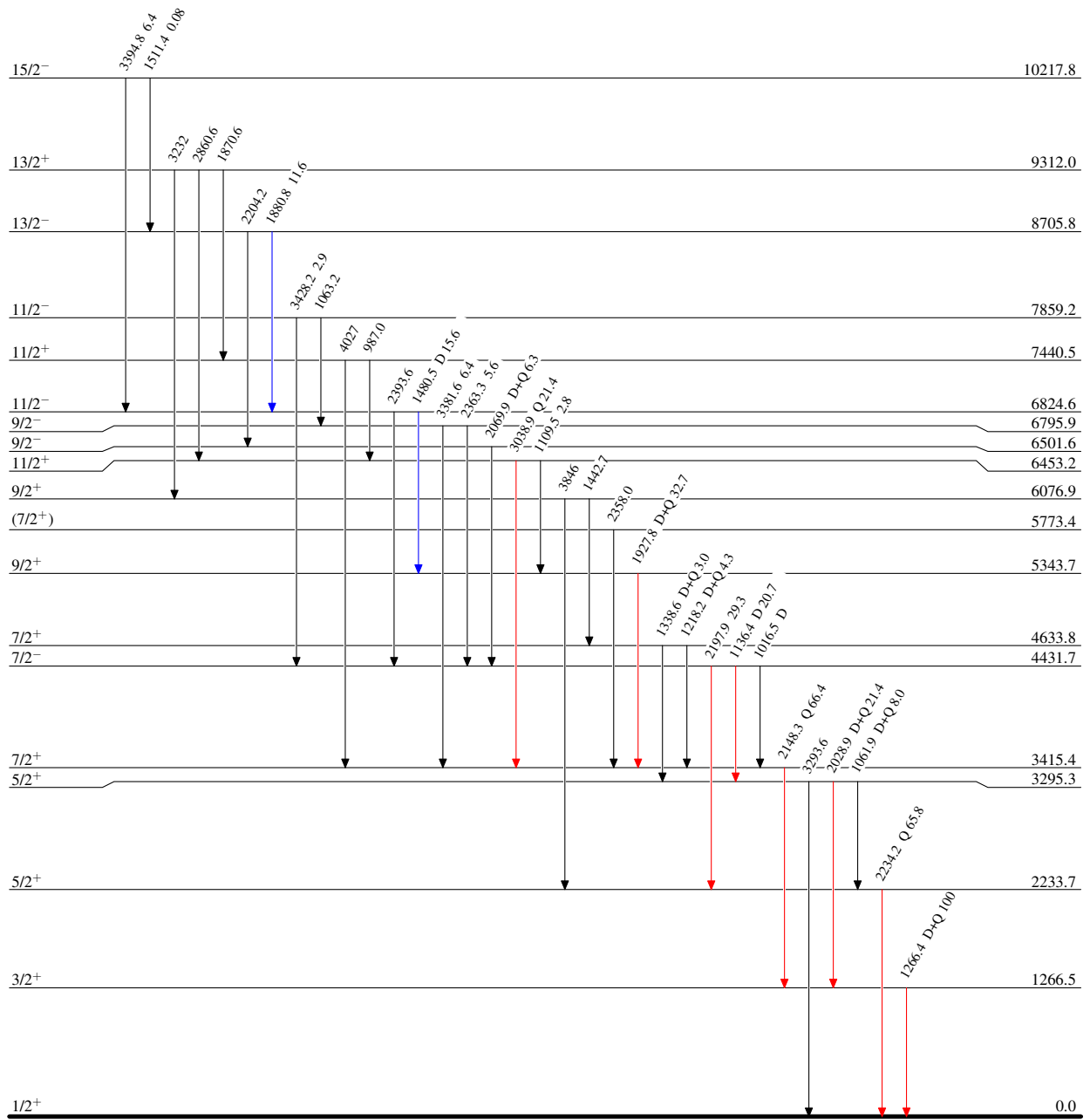
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Level Scheme

Intensities: Relative I_γ

Legend

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

 $^{31}_{15}\text{P}_{16}$