

<sup>158</sup>Gd(p,t) 1974Gu08,1982Ri08

Type	Author	History Citation	Literature Cutoff Date
Full Evaluation	C. W. Reich	NDS 113, 2537 (2012)	1-Mar-2012

**Additional information 1.**

Data are primarily from 1974Gu08 and 1982Ri08. Others: 1971F109, 1971IsZP, 1971Su01, 1972E107, 1973F104, and 1973TaZH.

Experimental methods:

**1974Gu08:** <sup>158</sup>Gd(p,t): E(p)=18.0, 20.5, and 27.6 MeV. Metallic target, enriched, ≈100 μg/cm<sup>2</sup> thick. <sup>3</sup>H measured using an Enge split-pole spectrograph. FWHM≈18 keV. 38 <sup>156</sup>Gd levels excited. <sup>3</sup>H(θ) measured at E(p)=27.6 MeV between 5° and 50°. L values shown on graphs.

**1982Ri08:** <sup>158</sup>Gd(p,t): E(p)=40 MeV. Enriched (95.4%) metallic target. tritons detected in a magnetic spectrograph having FWHM≈20 keV. measured <sup>3</sup>H(θ) from 6° to 51° in 3° steps. Deduced L values shown on graphs.

**1973F104:** <sup>158</sup>Gd(p,t): E(p)=18 MeV. Enriched (>95%) oxide target evaporated onto C backing. <sup>3</sup>H detected in a magnetic spectrograph. <sup>3</sup>H(θ) measured from 5.0° to 70.0° in 5.0° steps. Report 13 excited states and differential cross sections. Reported E(level) and J<sup>π</sup> values are from other references.

Other relevant experiments: 1971F109; 1971IsZP; 1971Su01; 1972E107; 1973TaZH. For a brief description of the experimental details, see the ENSDF file.

<sup>156</sup>Gd Levels

E(level) <sup>†</sup>	J <sup>π</sup> <sup>‡</sup>	L <sup>#</sup>	S@&	Comments
0 <sup>g</sup>	0 <sup>+</sup>	0	624	
89 <sup>g</sup>	2 <sup>+</sup>	2 <sup>c</sup>	295 <sup>f</sup>	
286 <sup>g</sup>	4 <sup>+</sup>	4 <sup>cd</sup>	14	
583 <sup>g</sup>	6 <sup>+</sup>	6 <sup>c</sup>	4	
1049 <sup>h</sup>	0 <sup>+</sup>	0	64	
1130 <sup>h</sup>	2 <sup>+</sup>	2	30 <sup>f</sup>	
1155 <sup>i</sup>	2 <sup>+</sup>	2	65 <sup>f</sup>	
1172 <sup>j</sup>	0 <sup>+</sup>	0 <sup>d</sup>	12 <sup>f</sup>	
1251			≤2	J <sup>π</sup> : Level may be associated with either the 1248, 3 <sup>+</sup> , or the 1258, 2 <sup>+</sup> , levels, or with both.
1277 <sup>k</sup>	3 <sup>-</sup>		3	
1300 <sup>h</sup>	4 <sup>+</sup>	4	≤1	
1355 <sup>abi</sup>	4 <sup>+</sup>	4	≤2	
1408 <sup>ak</sup>	5 <sup>-</sup>		3	
1459 <sup>j</sup>	4 <sup>+</sup>			
1505 <sup>b</sup>	4 <sup>+</sup>	4		
1715 <sup>l</sup>	0 <sup>+</sup>	0	12 3	E(level),L: In 1973F104 a level is reported at 1740 keV with J <sup>π</sup> =(0 <sup>+</sup> ). The evaluator assumes that this is the same level. S: From 1973F104. Value at 30°.
1772 <sup>l</sup>	2 <sup>+</sup>	2		
1829	2 <sup>+</sup>	2,3 <sup>e</sup>		
1853				J <sup>π</sup> : May be associated with levels having J <sup>π</sup> =0 <sup>+</sup> and/or 3 <sup>-</sup> .
1893 <sup>l</sup>	4 <sup>+</sup>			
1915	2 <sup>+</sup>	2,3		
1989	0 <sup>+</sup>	0 <sup>e</sup>		
2022	3 <sup>-</sup>	0+2		
2048	2 <sup>+</sup>	4		L: From 1982Ri08 for level at 2041 keV; 1974Gu08 report 2,3 for level at 2048.
2175	2 <sup>+</sup>	2		
2192		2,3 <sup>e</sup>		
2218	2 <sup>+</sup>	2,3 <sup>e</sup>		
2255	4 <sup>+</sup>			
2305				J <sup>π</sup> : May be associated with levels having J <sup>π</sup> =2 <sup>+</sup> and/or 4 <sup>+</sup> .

Continued on next page (footnotes at end of table)

$^{158}\text{Gd}(p,t)$  [1974Gu08](#),[1982Ri08](#) (continued) $^{156}\text{Gd}$  Levels (continued)

E(level) <sup>†</sup>	J <sup>π</sup> <sup>‡</sup>	L#	Comments
2323	2 <sup>+</sup>		
2382	2 <sup>+</sup>		L: <a href="#">1982Ri08</a> report L=4+6 for level at 2373 keV.
2436	(2 <sup>+</sup> )		
2484 <sup>b</sup>	6 <sup>+</sup>	6	
2497	(1 <sup>-</sup> )		
2521	(4 <sup>+</sup> ,5 <sup>-</sup> )	4+6	
2596			
2615	1 <sup>+</sup> ,2 <sup>+</sup>		
2649	1 <sup>+</sup> ,2 <sup>+</sup>		
3025			
3055			
3068			
3138			

<sup>†</sup> From [1974Gu08](#) unless otherwise noted.

<sup>‡</sup> From adopted values. In associating the (p,t) levels with the Adopted Levels for the purpose of assigning J<sup>π</sup> values, where there is ambiguity in which adopted level corresponds to a given (p,t) level, the evaluator has been guided by the observation that “natural-parity” states are preferentially excited in this reaction. Where an association cannot reasonably be made, no value is listed.

# From <sup>3</sup>H angular distributions. Listed values are from [1982Ri08](#) unless noted otherwise. Conflicting assignments are noted.

Others: [1971Su01](#), [1973F104](#), and [1974Gu08](#).

@ Label=dσ/dΩ(μb/sr).

& From [1973F104](#). Values at or near the peak angle (5° for 2<sup>+</sup> transitions and 30° for all others). Relative uncertainties are ≈7% for transitions >10 μb/sr and 25% for weak transitions. ([1973F104](#)).

<sup>a</sup> From [1973F104](#).

<sup>b</sup> From [1982Ri08](#).

<sup>c</sup> From [1971Su01](#).

<sup>d</sup> From [1973F104](#).

<sup>e</sup> From [1974Gu08](#).

<sup>f</sup> Extrapolated value.

<sup>g</sup> Band(A): K<sup>π</sup>=0<sup>+</sup> g.s. band.

<sup>h</sup> Band(B): First excited K<sup>π</sup>=0<sup>+</sup> band.

<sup>i</sup> Band(C): K<sup>π</sup>=2<sup>+</sup> γ-vibrational band.

<sup>j</sup> Band(D): K<sup>π</sup>=0<sup>+</sup> band.

<sup>k</sup> Band(E): K<sup>π</sup>=1<sup>-</sup> octupole-vibrational band.

<sup>l</sup> Band(F): K<sup>π</sup>=0<sup>+</sup> band.

