

inelastic scattering [1968Ve01,1964Ke08](#)

Type	Author	History Citation	Literature Cutoff Date
Full Evaluation	N. Nica	NDS 200,2 (2025)	22-Aug-2022

Additional information 1.

Several levels listed here are not included in the Adopted Levels. Some are not confirmed in the most recent (n,n'γ) study, where they should have been seen if their J^π values were ≤5.

The studies that provide level-structure information are: for (p,p'), [1961Co27](#), [1964Ke08](#) and [1990Fr07](#); and, for (d,d'): [1965Ze01](#), [1966EI07](#) and [1968Ve01](#), with E(p) or E(d)=12 MeV.

A large number of other studies of inelastic scattering have been made for a variety of purposes. These include moments:

[1982An10](#), [1982Cl03](#), [1983Ro11](#), [1986Ic02](#), and [1989Gu09](#); nuclear shapes: [1970Ap03](#), [1972Yu03](#), [1973SaXO](#), [1977Mc02](#), [1980DeYV](#), [1987Ic04](#), [1989Gu09](#), and [1989Ob02](#); angular distribution of outgoing particle: [1966Ze03](#), [1967Ha05](#), [1968He24](#), [1970Br19](#), [1970Fu05](#), [1972Wo03](#), [1975Ea03](#), [1975La18](#), [1977Ea01](#), [1979Ki14](#), [1979Pa08](#), [1980Ba30](#), [1987Ic01](#), [1989Gu09](#), and [1989Ob02](#); spin contribution to excitation of collective 1⁺ level: [1985Dj02](#) and [1990Fr07](#); and others: [1967Ku14](#), [1967St09](#), [1971FuZV](#), [1971Kr10](#), [1972Ku15](#), [1975Ea01](#), [1980La18](#), [1981Am03](#), [1981An04](#), [1981Ra10](#), [1983Ha16](#), [1983Oh02](#), and [1983Pa08](#).

Experimental methods:

[1961Co27](#): (p,p') with E(p)=11 MeV. Report 2 excited states.

[1964Ke08](#): (p,p') on enriched (99.07%) target with E(p)=12 MeV. p' measured in magnetic spectrometer at five angles. Report 22 levels.

[1965Ze01](#): (d,d') on enriched (99%) target with E(d)=12 MeV. d' measured with Si(Au) detector telescope, and magnetic spectrometer. Confirms J^π of several states.

[1966EI07](#): (d,d') on enriched target with E(d)=12 MeV. d' measured in magnetic spectrometer. Report relative population of ground-state band members.

[1968Ve01](#): (d,d') on enriched (>96%) target with E(d)=12.1 MeV. d' measured in magnetic spectrograph at four angles.

FMHM=15-20 and 7-10 keV. J^π from ratios of cross sections at 90° and 125°. Report 21 levels. See also Coulomb excitation data set.

[1990Fr07](#): (p,p') to look for 1⁺ strength.

¹⁵⁴Sm Levels

E(level) [†]	J ^{π‡}	Comments
0	0 ⁺	
82 2	2 ⁺	
267 2	4 ⁺	
543 2	6 ⁺	
921 2	1 ⁻	
1011 3	3 ⁻	
1096 3	0 ⁺	
1104 [#] 10		
1120 [#] 10		
1178 3	5 ⁻	
1178 3	2 ⁺	
1209 [#] 10		
1295 [#] 10		
1344 [#] 10		
1365 [#] 10		
1372 [#] 3	(4 ⁺)	E(level): Proposed as a member (head?) of a band by 1992Mo20 in Coul. ex., but this level is not confirmed by 2006De19 (n,n'γ).
1438 3	2 ⁺	
1475 5	(1 ⁻)	
1522 [#] 10		
1547 [#] 10		

Continued on next page (footnotes at end of table)

inelastic scattering 1968Ve01,1964Ke08 (continued) ^{154}Sm Levels (continued)

<u>E(level)[†]</u>	<u>J^π[‡]</u>	<u>Comments</u>
1582 4	3 ⁻	
1667 4	4 ⁺	
1706 10		
1775 4		
1812 4	4 ⁺ ,3 ⁻	J^π : From 1968Ve01. From the Adopted Values, $J^\pi=2^+,3$.
1978 4		
2012 4		
2062 4		
2130 4		
2275 4		
2288 4		
3190 [@]	1 ⁺	B(M1) \uparrow =2.5 2 B(M1) \uparrow : From 1990Fr07 with E(p)=200 MeV.

[†] From 1968Ve01 and 1964Ke08, unless otherwise noted. The values of 1968Ve01 are systematically lower, but they are within the quoted uncertainties.

[‡] Based on angular distribution of scattered particles (1968Ve01); authors deduce L values, but quote results as J^π values. These are the same as the adopted J^π values, unless noted otherwise.

Level not included in the Adopted Levels data set. See the general comment above.

@ From 1990Fr07.