

Adopted Levels

Type	Author	Citation	Literature Cutoff Date
Full Evaluation	J. Kelley, T. Truong, C. G. Sheu	ENSDF	17-July-2016

S(n)=2.323×10⁴ 8; S(p)=-1.51×10³ 7; Q(α)=-9.92×10³ 8 [2012Wa38](#)

Highlighted theoretical analyses:

2011Fo02: Reanalyzed data on ¹⁵C levels populated in ¹³C(t,p)¹⁵C and interpreted results to revise predictions on ¹⁵F levels.

2010Mu03: Parameters of the lowest J^π=1/2⁺ and 5/2⁺ states were analyzed via the S-matrix pole method.

2015Gr04: Analysis, which focused on ¹⁶Ne, found the ¹⁵F ground state should lie near E_{res}(p+¹⁴O)=1.39 to 1.42 MeV.

2006Ca08, 2015Fr04: Analyzed the ¹⁴C+n system and then used multichannel algebraic scattering theory to predict resonances in the mirror ¹⁵F nucleus. See also [2007Ca31](#).

2005Ba73: A microscopic cluster model was developed that was tuned to the ¹⁴C+n system and used to predict the ¹⁴O+p scattering reaction and ¹⁵F resonances. Results are compared and found in agreement with an R-matrix analysis of experimental observations.

2005Fo10: The lowest T=3/2 and J^π=1/2⁺ and 5/2⁺ states of the A=15 quartet are analyzed in a (0+2)ħω shell model.

2006Fo16: The definition of resonance energy is explored by considering three different parameters that may define the position:

“(a) the energy at which the appropriate cross section peaks, (b) the energy at which the nuclear phase shift has the value δ=π/2, and (c) the energy at which the magnitude of the internal wave function or the derivative of the phase shift dδ/dE is a maximum.” Then, discussion on various A=15 and 16 states and analysis of the IMME mass relation are used to constrain predicted values for poorly known ¹⁵O, ¹⁵F and ¹⁶F states.

General theoretical analyses:

Other theoretical analyses relevant to ¹⁵F include general calculations on mass and structure properties in

([1978Gu10,1993Po11,2008Qi04,2013Ci04](#)). More detailed analyses considering pairs of mirror nuclides, Coulomb shifts,

Thomas-Ehrman shifts and other detailed relationships are found in ([1988Co15,1995Fo18,1997Gr18,1999Og11,1999Ts06,2013Fo22](#)).

Other experimental results:

¹⁵F is not strongly populated in ¹²C(³He,π⁻) reactions at E(³He)=283 MeV ([1986Mi25](#)) or 235 MeV ([1984Bi08](#)).

¹⁵F Levels

Cross Reference (XREF) Flags

A	¹ H(¹⁴ O,P):NSCL	E	⁹ Be(¹⁶ Ne, ¹⁵ F)
B	¹ H(¹⁴ O,P):Texas	F	¹⁶ O(¹⁴ N, ¹⁵ C)
C	¹ H(¹⁴ O,P):LBNL	G	²⁰ Ne(³ He, ⁸ Li):NSCL
D	¹ H(¹⁴ O,P):GANIL	H	²⁰ Ne(³ He, ⁸ Li):LBNL

E(level)	J ^π	T _{1/2}	E(p+ ¹⁴ O) _{cm} (keV)	XREF	Comments
0	1/2 ⁺	660 keV 20	1.28×10 ³ 4	ABCDEFGH	%p=100 E(level): The value E _{res} =1.28 MeV 4 is adopted; excited state energies are calculated using this value. The weighted average of all reported resonance energy values is 1.28 MeV 2 (external uncertainty); this value compares with the Rajeval technique value (1.29 MeV 3) and the Method of Best Representation (see 2014Bi13) value (1.37 MeV 13). A critical scrutiny of some of the data may suggest exclusion of some results, such as those from (1978Be26,1978Ke06,2008Mu13), but these have little impact on the values deduced using the weighted average or Rajeval techniques. T _{1/2} : The values Γ>900 keV (1978Be26) and Γ≈1200 keV (2003Pe23) are not considered, and a 20% uncertainty is assigned to Γ≈700 keV from 2004Go15 . This yields the weighted average Γ=660 keV 20.

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Adopted Levels (continued) ^{15}F Levels (continued)

<u>E(level)</u>	<u>J^π</u>	<u>T_{1/2}</u>	<u>E(p+¹⁴O)_{cm} (keV)</u>	<u>XREF</u>	<u>Comments</u>
1.52×10 ³ 5	5/2 ⁺	300 keV 13	2798 24	ABCDEFGH	%p=100 E(level): The value E _{res} =2798 keV 24 is deduced using the Method of Best Representation; this value is accepted. This compares with the weighted average of all values, E _{res} =2785 keV 10, and the value deduced using the Rajeval technique, 2797 keV 11. An analysis was carried out in 2016De15 that recommended 2794 keV 16.
3.48×10 ³ 4	1/2 ⁻	36 keV 15	4757 12	DEF	T _{1/2} : from the weighted average of all values. %p=100
5.1×10 ³ 2	(3/2 ⁻ ,5/2 ⁻)	0.2 MeV 2	6.4×10 ³ 2	EF	E(level),T _{1/2} : from 2016De15 . %p=100
6.5×10 ³ 2	(3/2 ⁺ ,5/2 ⁺)	0.4 MeV 4	7.8×10 ³ 2	E	Γ _p =0.2 MeV 2 (2009Mu09,2010Mu12) E(level),T _{1/2} : from (2009Mu09,2010Mu12). J ^π : 3/2 ⁻ favored from arguments based on the mirror ¹⁵ C nucleus. %p=100
					Γ _p =0.4 MeV 4 (2009Mu09,2010Mu12) E(level),T _{1/2} : from (2009Mu09,2010Mu12).