Adopted Levels, Gammas

History

Type	Author	Citation	Literature Cutoff Date
Full Evaluation	Jun Chen[#] and Balraj Singh	NDS 135, 1 (2016)	31-May-2016

Q(β^-)=15550 *SY*; S(n)=3630 *SY*; S(p)=24620 *SY*; Q(α)=−19940 *SY* 2012Wa38

Estimated uncertainties (syst,2012Wa38): ΔQ(β^-)=550, ΔS(n)=620, ΔS(p)=780, ΔQ(α)=710 (2012Wa38).

S(2n)=5010 *550*, S(2p)=46620 *780*, Q(β^-n)=13470 *510* (syst,2012Wa38).

1990Le03: ^{42}Si identified and produced in ^{64}Ni(^{48}Ca,X) reaction at E=44 MeV/nucleon, followed by a measurement of fragment spectra versus atomic number.

2004Gr20 (also 2004Gr28,2003Gr22): ^{42}Si produced in ^{9}Be(^{48}Ca,X) at E=60 MeV/nucleon, LISE3 spectrometer at GANIL, isotopic identification by energy loss, time-of-flight and magnetic rigidities, double-sided Si strip (DSSD) detectors for residues. Measured (β)(residues) time correlations and half-life using scintillation detectors for β rays. Detailed QRPA calculations. Predictions of Gamow-Teller strengths, Iβ and %β^-n for spherical, prolate (ε=+0.3) and oblate (ε=−0.3) shapes. The measured half-life suggests deformed shape when compared with QRPA calculations.

2006Fr13 (also 2005Fr19), 2006GrZZ: see ^{9}Be(^{44}S,Xγ) data-set.

1999YoZW, from fragmentation of ^{48}Ca beam using ^{9}Be(^{48}Ca,X) and ^{181}Ta(^{48}Ca,X) reactions at 70 MeV/nucleon; measured $T_{1/2}$ and %β^-n; according to the authors, the results are preliminary.

Mass measurement: mass excess=15160 *580* (2007Ju03).

Recent theory papers: 2016Li07, 2011Li47, 2011Ka03, 2010Sm02 and 2010Ga15 (shell-model calculations), 2010Ha33 (quadrupole moment), 2009Co21 (half-life), 2009No01 and 2009Zi01 (B(E2)).

^{42}Si Levels

Cross Reference (XREF) Flags

A ^{9}Be(^{44}S,^{42}Siγ)
B C(^{44}S,^{42}Siγ)

E(level)[†]	J$^\pi$[‡]	$T_{1/2}$	XREF	Comments
0	0$^+$	12.5 ms *35*	AB	%β^-=100; %β^-n=?; %β^-2n=? %β^-n=103 *48* (1999YoZW, preliminary result). Theoretical $T_{1/2}$=43.4 ms, %β^-n=40.4, %β^-2n=4.4 (2003Mo09). Theoretical $T_{1/2}$=29.5 ms, %β^-n=31.5, %β^-2n=11.5 (2016Ma12). $T_{1/2}$: from β(^{42}Si) time correlations followed over 400 ms (2004Gr20). Other: 20 ms *10* (1999YoZW, preliminary result). See also comment for (2$^+$) state.
742 *8*	(2$^+$)		AB	Low energy of 2$^+$ state and comparison of measured half-life with QRPA calculations (2004Gr20) suggest that ^{42}Si is deformed and that there is collapse of N=28 closed shell at Z=14. But the small production cross section of ^{42}Si in both studies (2006Fr13 and 2006GrZZ) suggest closed shell nature of ^{42}Si.
2173 *14*	(4$^+$)		B	
2774? *12*			B	

[†] From a least-square fit to γ energies.
[‡] From systematics of even-even nuclei.

Adopted Levels, Gammas (continued)

$\gamma(^{42}Si)$

E_i(level)	J_i^π	E_γ †	E_f	J_f^π	Comments
742	(2^+)	742 *8*	0	0^+	E_γ: 770 *19* from ^{9}Be(^{44}S,^{42}Siγ).
2173	(4^+)	1431 *11*	742	(2^+)	
2774?		2032‡ *9*	742	(2^+)	E_γ: possible partial feeding of the 2^+ state at 742 keV (2012Ta20).

† From C(^{44}S,^{42}Siγ).
‡ Placement of transition in the level scheme is uncertain.

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Level Scheme