C(^{44}S,^{40}Si$\alpha\gamma$) 2012Ta20

Type	Author	History Citation	Literature Cutoff Date
Full Evaluation	Jun Chen	NDS 140, 1 (2017)	30-Sep-2015

2012Ta20: E=385 MeV/nucleon ^{48}Ca primary beam with an average intensity of 70 pnA was produced at the RIBF facility at RIKEN and incident on a 15-mm-thick rotating beryllium target. A secondary ^{44}S beam was analyzed by the BigRIPS fragment separator and accelerated to E=210 MeV/nucleon with an intensity of 4×10^4 pps. The secondary target was a 2.54 g/cm^2 carbon foil. Reaction products were analyzed by the ZeroDegree spectrometer and identified using the energy loss (ionization chamber), magnetic rigidity and time-of-flight (plastic scintillators); γ rays were detected by the DALI2 array of 186 NaI(Tl) detectors surrounding the reaction target (20% efficiency, FWHM=10% at Eγ=1 MeV). Measured Eγ, Iγ, particle-γ-coin. Deduced levels, J^π, rapid deformation development of Si isotopes. Comparison with shell-model calculations.

^{40}Si Levels

E(level)[†]	J^π[‡]	Comments
0	0^+	
985 *11*	2^+	
1614? *14*	$(0^+,2^+,4^+)$[#]	
2524? *19*	(4^+)[#]	E(level): this level is tentatively assigned by authors based on $\gamma\gamma$-coin as the first 4^+ state predicted by shell-model calculations. Resulting energy ratio between the first 4^+ and 2^+ states is $R_{4/2}$=2.56 *5*. Another possible candidate for the first 4^+ state is 1614 keV from the 629γ -> 985γ cascade (2012Ta20).

† From Eγ data.

‡ Predicted by shell-model calculations.

From shell-model calculations 2012Ta20 suggest that the 2524 level is the first 4^+ state and that the 1624 level has J^π=0 or 2^+. They do not rule out the possibility that the 1624 level is the 4^+ state; however, they argue that the systematics of E(4^+)/E(2^+) ratio of neighbouring nuclei favors the first alternative.

γ(^{40}Si)

Eγ	E$_i$(level)	J_i^π	E$_f$	J_f^π
629 *8*	1614?	$(0^+,2^+,4^+)$	985	2^+
985 *11*	985	2^+	0	0^+
1539 *16*	2524?	(4^+)	985	2^+

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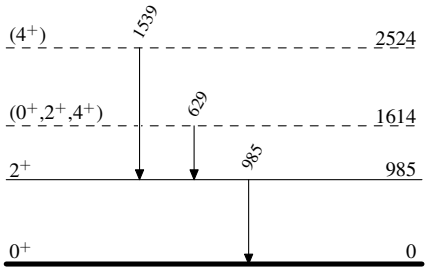
Level Scheme



$^{40}_{14}Si_{26}$