Adopted Levels

History

Type	Author	Citation	Literature Cutoff Date
Full Evaluation	Jun Chen and Balraj Singh	NDS 190,1 (2023)	20-Jun-2023

Q(β^-)=18200 *syst*; S(n)=3090 *syst*; S(p)=26250 *syst*; Q(α)=−22660 *syst* 2021Wa16

Estimated uncertainties (2021Wa16): 640 for Q(β^-) and S(n), 780 for S(p), and 710 for Q(α).

S(2n)=3670 *580*, Q(β^-n)=16200 *580* (syst,2021Wa16), S(2p)=50070 (theory,2019Mo01). Q(β^-2n)=11900 *510*, Q(β^-3n)=9900 *515*, Q(β^-4n)=4990 *510*, and Q(β^-5n)=1545 *510* deduced by evaluators from relevant mass excesses in 2021Wa16.

First identification of ^{44}Si nuclide by 2007Ta15.

2007Ta15: W(^{48}Ca,Xγ) E=142 MeV/nucleon beam from the National Superconducting Cyclotron Laboratory (NSCL). The fragments were separated with the A1900 fragment separator. Isotopic identification by multiple ΔE signals, magnetic rigidity, total energy and time-of-flight analysis. Detectors: plastic scintillators, parallel-plate avalanche counters (PPACs) and silicon PIN diodes. The ^{9}Be target was also used with ^{48}Ca beam.

A total of three events were assigned to ^{44}Si with natural tungsten target and no events due to ^{44}Si were observed with a ^{9}Be target.

Theoretical structure calculations:

2021Su18: calculated potential energy surface, occupation numbers for ground states in (β,γ) plane, energies, spins, B(E2) and quadrupole moments of low-lying positive-parity levels, proton and neutron single-particle levels as function of β and γ deformation parameters using antisymmetrized molecular dynamics (AMD) with Gogny D1S density functional.

2014Ca21, 2009No01: calculated energy, quadrupole moment, and B(E2) of the first 2^+ states using Large-scale shell-model.

1999La18: calculated binding energy, radius, deformations, neutron shell gap suppression using relativistic Hartree plus Bogoliubov theory.

Other theoretical calculations: 17 references for nuclear structure and one for radioactive decays retrieved from the NSR database (www.nndc.bnl.gov/nsr/) are listed in document records which can be accessed via web-based ENSDF database.

Other theory references: 2021Ku13, 2020Ab12, 2020Th02, 2019Sa58, 2018Yo06, 2015Wu04, 2015Wu07, 2014Eb02, 2014Wa03, 2012Ch48, 2012Ho19,

Additional information 1.

^{44}Si Levels

E(level)	J^π	Comments
0	0^+	%β^-=100; %β^-n=?; %β^-2n=?; %β^-3n=?; %β^-4n=? %β^-5n=? Allowed decay mode is β^- followed by delayed-neutron emission, thus 100% β^- decay mode is assigned by inference. Theoretical $T_{1/2}$=10.6 ms, %β^-n=79, %β^-2n=13, %β^-3n=1, %β^-4n=0 (2019Mo01). Theoretical $T_{1/2}$=12.6 ms, %β^-n=30.1; %β^-2n=9.16, 9.35; %β^-3n=1.53, 1.33; %β^-4n=0.002; %β^-5n=0 (2021Mi17); two values for different fission barriers. Production cross section=7×10^{-10} mb *5* (2007Ta15). $T_{1/2}$: half-life of ^{44}Si has not been measured, but expected to be >360 ns from estimated from time-of-flight of 363 ns, as stated by 2005St29 (Ref. 13 in 2007Ta15) at NSCL facility. Actual half-life is expected to be much longer. From trend of decreasing half-life with increasing neutron number in neutron-rich nuclei, expected half-life is <12 ms from known half-lives of 12.5 ms for ^{42}Si, 20 ms for ^{41}Si, 31 ms for ^{40}Si and 41 ms for ^{39}Si. Other: 4 ms (syst, 2021Ko07).