

Adopted Levels

Type	Author	History	Citation	Literature Cutoff Date
Full Evaluation	Balraj Singh, M. S. Basunia, Murray Martin et al. ,		NDS 160, 405 (2019)	30-Oct-2019

$Q(\beta^-)=2881$ 12; $S(n)=4368$ 13; $S(p)=5074$ 13; $Q(\alpha)=6874$ 3 [2017Wa10](#)
 $S(2n)=10301$ 12, $S(2p)=12354$ 16 ([2017Wa10](#)).

Additional information 1.

[2019Ba22](#): hyperfine-structure measurements for the 795-nm atomic transitions in ^{218}At at CERN-ISOLDE, using the in-source resonance-ionization laser spectroscopy technique. The ^{218}At source prepared in $\text{U}(p,X), E=1.4$ GeV reaction using UC_x target.

Deduced change in rms charge radius, isotope shift, magnetic moment and quadrupole moment.

No information is available from ^{218}Po β^- decay to ^{218}At .

^{218}At α decay experimental study: [1990Mo08](#).

Theory references: consult NSR database (www.nndc.bnl.gov/nsr/) for 11 primary references for calculations of half-lives of radioactive decays, and one for nuclear structure.

 ^{218}At Levels

E(level)	J^π	$T_{1/2}$	Comments
0	$(3^-, 2^-)$	1.28 s 6	<p>$\% \alpha = 99.95$ 5; $\% \beta^- = 0.05$ 5 Static magnetic dipole moment $\mu = +1.25$ 12(stat) 3(syst) for $J=3$, $+1.195$ 84(stat) 29(syst) for $J=2$ (2019Ba22).</p> <p>Static electric quadrupole moment $Q = +0.55$ 33(stat) 27(syst) for $J=3$, $+0.63$ 33(stat) 32(syst) for $J=2$ (2019Ba22).</p> <p>Change in rms charge radius $\langle r^2 \rangle(^{218}\text{At}, ^{205}\text{At}) = +1.349$ 11(stat) 70(syst) for $J=3$, $+1.369$ 11(stat) 71(syst) for $J=2$ (2019Ba22).</p> <p>$\% \alpha = 99.9$ and $\% \beta^- = 0.1$ were deduced by 1949Wa05 from α intensities of ^{218}At and ^{218}Rn. These results are consistent with non-observation of α decay from ^{218}Rn (β^- daughter of ^{218}At decay) in the study of ^{218}At α decay by 2019Cu02. Theoretical partial $T_{1/2} > 100$ s for ^{218}At β decay and (2019Mo01) gives $\% \beta^- < 1.3$.</p> <p>$T_{1/2}$: from α decay curve. Weighted average of 1.27 s 6 (2019Cu02), 1.5 s 3 (1989Bu09), 1.3 s 1 (1958Wa16, 1949Wa05). Other: ≈ 2 s (1952Hi60).</p> <p><u>Additional information 2.</u></p> <p>J^π: (3^-) proposed by 2019Cu02 from favored α branch to 63-keV level in ^{214}Bi with $J^\pi = (3^-)$ (from 1991Be06), but authors did not rule out (2^-). See also authors' companion paper 2019Ba22, where an expected configuration $= \pi 1h_{9/2} \otimes \nu 2g_{9/2}$ is suggested, with admixture from other configuration(s) from a comparison of measured magnetic dipole moment in 2019Ba22, with that predicted from additivity rule for neighboring odd-A isotopes. From $\Omega(\text{proton}) = 3/2$ and $\Omega(\text{neutron}) = 1/2$ in 2019Mo01, $J = 1, 2$. From systematics, 2017Au03 assigned 1^-.</p>