^{30}Ar p decay:(2$^+$) state 2015Mu13

History

Type	Author	Citation	Literature Cutoff Date
Full Evaluation	Balraj Singh	ENSDF	31-Jan-2016

Parent: ^{30}Ar: E=0.7×10^3; J^π=(2$^+$); $T_{1/2}$=?; Q(p)=0.4×10^3; %p decay=100.0

^{30}Ar-$T_{1/2}$: Expected to be very short as for the ^{30}Ar g.s. which is <10 ps.

^{30}Ar-Q(p): Estimated by compiler from level-scheme shown in Fig. 5 of 2015Mu13 (S(p)(^{30}Ar g.s.)=1.8 MeV − 2.25 MeV=0.4 MeV). Other: S(p)=−430 *640* from systematic trend (2012Wa38).

^{30}Ar-%p decay: %p=100 assumed for the decay of excited (2$^+$) state of ^{30}Ar.

2015Mu13: identification of ^{29}Cl nuclide through the investigation of ^{30}Ar decay by in-flight decay spectroscopy of particle spectra and analysis of reaction kinematics. ^{30}Ar produced in one-neutron knockout from ^{31}Ar. The secondary ^{31}Ar beam at 620 MeV/nucleon was produced in ^{9}Be(^{36}Ar,X),E=885 MeV/nucleon primary fragmentation reaction at SIS-GSI accelerator facility. ^{31}Ar ions separated by using the fragment separator FRS. Secondary ^{9}Be target was 4.8 g/cm^2 thick. The ^{30}Ar ions were produced in one-neutron knockout reaction. Measured positions and angular correlations of ^{30}Ar in-flight decay products such as coincident two protons (emitted by the decay of ^{30}Ar) and heavy-ion recoil such as ^{28}S (2p-decay daughter of ^{30}Ar).

Observed peaks "D to H" in range of 3.5 to 15 MeV in the ^{28}S+p+p spectrum of Fig. 2c, and peaks #3, #4 and #5 in the range of 2.5-5 MeV in the ^{28}S+p spectrum of Fig. 3 in 2015Mu13 correspond to higher excitations in ^{30}Ar and ^{29}Cl, which the authors relegate to forthcoming publications.

^{29}Cl Levels

E(level)	J^π[†]	Comments
0	(1/2$^+$)	%p≈100 Decays to ground state of ^{28}S. E(level): the ground state is deduced at E(p)=1.8 MeV *1* from analysis of peak #1 in Figure 3 of 2015Mu13, implying S(p)(^{29}Cl)=−1.8 MeV *1* i.e. ground state is unbound towards 1p emission. Note that in 2012Wa38, S(p)=−2410 *430* from systematics.
0.5×10^3	(3/2$^+$)	%p≈100 Decays to ground state and first 2$^+$ state of ^{28}S. E(level): the excited state is deduced from the analysis of peak #1 with E(p)=1.8 MeV and peak #2 with E(p)=2.3 MeV in Figure 3 of 2015Mu13. This energy difference is similar to energy difference calculated by applying a Thomas-Ehrman shift to energy levels in isobaric mirror nuclide, ^{29}Mg.

[†] From analogy with mirror nuclide ^{29}Mg, where the 3/2$^+$ ground state and the first excited state, presumably 1/2$^+$, are separated by only 55 keV (see ^{29}Mg Adopted Levels) (2015Mu13).