^{40}Ca(^{6}Li,pnγ)   2020Ar16,2011Mi02

History

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

2020Ar16: E=20 MeV ^{6}Li beam was produced from the FN tandem accelerator of the University of Cologne. Target was 0.2 mg/cm^2 enriched ^{40}Ca on 2 mg/cm^2 gold backing, and further covered on each side by a 0.1 mg/cm2 evaporated gold layer to reduce oxidation of the target. γ rays were detected with an array of 12 HPGe detectors. Measured Eγ, Iγ, recoil-distance with a plunger device, Doppler-shift attenuation. Deduced lifetimes by recoil-distance Doppler shift (RDDS) and Doppler-shift attenuation method (DSAM), transition strengths. Comparison with large-scale shell-model calculations using different interactions.

2011Mi02: E=21 MeV ^{6}Li beam was produced from the IFIN-HH tandem accelerator. Target was 0.5 mg/cm^2 ^{40}Ca on a 8 mg/cm^2 Au backing. γ rays were detected with 8 HPGe detectors and 5 LaBr$_3$ detectors. Measured Eγ, Iγ, $\gamma\gamma$-coin, recoil-distance using a plunger device. Deduced levels, lifetime of first 3$^-$ level the recoil distance Doppler-shift (RDDS) method. Complete details of this study are not yet available.

^{44}Ti Levels

E(level)[†]	J$^{\pi}$[†]	T$_{1/2}$[‡]	Comments
0	0$^+$		
1083	2$^+$		
2454	4$^+$	0.423 ps 35	T$_{1/2}$: from measured mean lifetime τ=0.61 ps 7 from DSAM (2020Ar16).
3176	3$^-$	15.6 ps 13	T$_{1/2}$: from measured mean lifetime τ=22.5 ps 18 from RDDS (2020Ar16). Other: 15.1 ps 11 from lifetime=21.8 ps 16 which is read off by the evaluators from the plot of lifetime vs recoil-distance in Fig.2 of 2011Mi02. The authors have drawn lines to indicate the mean, lower and upper lifetime values, but didn't list those values explicitly. The result is preliminary as stated in 2011Mi02.
3646	4$^-$	76.3 ps 56	T$_{1/2}$: from measured mean lifetime τ=110 ps 8 from RDDS (2020Ar16).
4015	6$^+$	0.45 ps 7	T$_{1/2}$: from measured mean lifetime τ=0.65 ps 10 from DSAM (2020Ar16).
4061	5$^-$		
5152	6$^-$		
5671			

[†] As given in 2011Mi02.
[‡] From DSAM or RDDS (2020Ar16).

γ(^{44}Ti)

Transition strengths given under comments are deduced by 2020Ar16 based on their measured lifetimes and known branchings and mixing ratios from the ENSDF database (2011Ch39 update).

E$_\gamma$[†]	E$_i$(level)	J$^{\pi}_i$	E$_f$	J$^{\pi}_f$	Mult.	Comments
415	4061	5$^-$	3646	4$^-$		
470	3646	4$^-$	3176	3$^-$	[M1+E2]	B(E2)↓=0.0290 20; B(M1)↓=0.00026 $+13-7$ (2020Ar16). B(E2) and B(M1) is deduced by 2020Ar16 using δ(E2/M1)=4.2 8 from 1981Di09.
721	3176	3$^-$	2454	4$^+$		
885	4061	5$^-$	3176	3$^-$		
1083	1083	2$^+$	0	0$^+$		
1090	5152	6$^-$	4061	5$^-$		
1371	2454	4$^+$	1083	2$^+$	[E2]	B(E2)↓=0.0276 $+36-28$ (2020Ar16)
1506	5152	6$^-$	3646	4$^-$		
1561	4015	6$^+$	2454	4$^+$	[E2]	B(E2)↓=0.0135 $+25-18$ (2020Ar16)
1606	4061	5$^-$	2454	4$^+$		
1610	5671		4061	5$^-$		

^{40}Ca(^{6}Li,pnγ)   **2020Ar16,2011Mi02 (continued)**

γ(^{44}Ti) (continued)

E_γ[†]	E_i(level)	J^π_i	E_f	J^π_f	Mult.	Comments
2093	3176	3$^-$	1083	2$^+$	[E1]	B(E1)↓=3.0×10^{-8} +3−2 (2020Ar16)
3176	3176	3$^-$	0	0$^+$		2011Mi02 give B(E3)(W.u.)≈=3 from their measured lifetime and the branching 2.0% 3 for 3176γ quoted from 2000UrZX. However, the lifetime=21.8 ps read off from Fig.2 of 2011Mi02 and the same branching give a B(E3)(W.u.)=4.3. It is likely that 2011Mi02 could have used the lifetime value as half-life in calculating their B(E3), since a T$_{1/2}$=21.8 ps would give B(E3)(W.u.)=3.

[†] As given in 2011Mi02.

$^{40}\text{Ca}(^{6}\text{Li,pn}\gamma)$ 2020Ar16,2011Mi02

Level Scheme

$^{44}_{22}\text{Ti}_{22}$