^{1}H(^{56}Ca,npγ)   **2022Ko06**

History

Type	Author	Citation	Literature Cutoff Date
Full Evaluation	Balraj Singh	ENSDF	30-Apr-2022

2022Ko06: excited state in ^{55}Ca reported for the first time using one-nucleon removal reaction. ^{56}Ca beam at 250 MeV/nucleon was produced in ^{9}Be(^{70}Zn,X),E=345 MeV/nucleon at RIBF-RIKEN facility, followed by separation and identification of fragments by TOF-ΔE-Bπ method using BigRIPS spectrometer. Secondary reaction target was thick liquid hydrogen using MINOS system, surrounded by a time-projection chamber (TPC) to measure recoiling protons and protons removed from the projectiles. Reaction products were analyzed using SAMURAI magnetic spectrometer, with event-by-event identification by measuring the trajectory before and after the magnet with two sets of drift chambers, and the kinetic energy and time-of-flight using an array of plastic scintillator detectors. Gamma rays were detected using DALI^2 array of 226 NaI(Tl) detectors. Measured Eγ, Iγ, σ, and level lifetime from peak shape. Deduced level, J^π, spectroscopic factors. Comparison with theoretical calculations using large-scale shell model (LSSM), ab-initio valence-space in-medium similarity renormalization group (VS-IMSRG), and full-space self-consistent Green's function (SCGF NNLO$_{sat}$ and SCGF NN+3N(lnl)).

^{55}Ca Levels

E(level)	$J^{\pi\dagger}$	$T_{1/2}$	Comments
0	$(5/2^-)$		Measured inclusive σ=27.9 mb *23* (2022Ko06).
			Measured exclusive σ=8.3 mb +*67−36* (2022Ko06).
			Spectroscopic factor=2.0 +*16−9* (2022Ko06).
673 *17*	$(1/2^-)$	0.78 ns +*36−23*	Measured exclusive σ=19.6 mb +*67−37* (2022Ko06).
			E(level): from Eγ.
			$T_{1/2}$: mean lifetime τ=1130 ps +*520−330*, estimated from peak-shape analysis in ^{1}H(^{56}Ca,npγ) (2022Ko06).
			Spectroscopic factor=1.31 *42* (2022Ko06).

† from theoretical calculations (2022Ko06) using different models: large-scale shell model (LSSM), ab-initio valence-space in-medium similarity renormalization group (VS-IMSRG), and full-space self-consistent Green's function (SCGF NNLO$_{sat}$ and SCGF NN+3N(lnl)).

γ(^{55}Ca)

E$_\gamma$	E$_i$(level)	J^π_i	E$_f$	J^π_f
673 *17*	673	$(1/2^-)$	0	$(5/2^-)$

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Level Scheme

(1/2⁻) ————————— 673   0.78 ns +36−23

(5/2⁻) ═══════════════ 0

${}^{55}_{20}$Ca$_{35}$