

$^2\text{H}(^{78}\text{Zn,p}),(^{78}\text{Zn,p}\gamma)$ **2015Or01**

Type	Author	History Citation	Literature Cutoff Date
Full Evaluation	Balraj Singh	NDS 135, 193 (2016)	31-May-2016

2015Or01: $E(^{78}\text{Zn})=2.83$ MeV/nucleon beam was produced in $\text{U}(p,F)$ at $E(p)=1$ GeV from the CERN PS Booster, target= UC_x . ^{78}Zn atoms were laser ionized using the RILIS set up at CERN. Secondary target was $105 \mu\text{g}/\text{cm}^2$ thick deuterated polyethylene (DPE). Protons were detected using T-REX array of Si telescopes and γ rays were detected using eight triple-cluster HPGe detectors of Miniball array. Measured $E(p)$, $E\gamma$, $I\gamma$, $\gamma\gamma$ -coin, $p\gamma$ -coin, $p(\theta)$, $p\gamma(\theta)$. DWBA analysis. Deduced levels, J, π , isomer.

 ^{79}Zn Levels

E(level)	J^π [‡]	L	S	Comments
0	$9/2^+$			
983 3	$5/2^+$	2	0.38 5	J^π : $L(d,p)=2$ from angular distribution of 983γ -gated proton spectrum; also $L(d,p)=0+2$ (41% $3 L=0$ and 51% $4 L=2$ component) for 850-1550-keV region proton spectrum and comparison with DWBA calculations; also shell-model predictions; γ to $9/2^+$ rules out $3/2^+$.
110×10^1 15	$(1/2^+)$	(0)	0.41 10	E(level): from proton spectrum, expected to be an isomer from systematics; half-life and decay modes are not known. J^π : $L(d,p)=0+2$ for 850-1550 keV region proton spectrum and comparison with DWBA calculations.
1336 [†] 1	$(1/2^+, 3/2^+)$			E(level): 1.34 MeV 15 from proton spectrum. J^π : prompt 236γ to $(1/2^+)$ is M1 or E1; feeding from higher states favors positive parity.
1424 4	$(3/2^+, 5/2^+)$	(2)	0.05 2	J^π : $L(d,p)=2$ from angular distribution of 441γ -gated proton spectrum; also $L(d,p)=0+2$ for 850-1550 keV region proton spectrum and comparison with DWBA calculations.
2312? 4				E(level): 2.35 MeV 15 from 888γ -ray gated proton spectrum.
2521 [†] 3				E(level): 2.65 MeV 15 from 236γ -ray gated proton spectrum.
3195 [†] 4				E(level): 3.20 MeV 15 from 1859γ -ray gated proton spectrum.
3198? 6				E(level): 3.30 MeV 15 from 1774γ -ray gated proton spectrum.
3304? 5				E(level): 3.45 MeV 15 from 2321γ -ray gated proton spectrum.

[†] Uncertainty is relative with respect to the uncertainty in $E\gamma$ from this level, assuming fixed energy of 1100 keV for the $(1/2^+)$ isomer. Absolute uncertainty is 150 keV.

[‡] As proposed by **2015Or01** based on γ -gated proton angular distributions, DWBA analysis.

 $\gamma(^{79}\text{Zn})$

E_γ	$E_i(\text{level})$	J_i^π	E_f	J_f^π	Mult.	Comments
236 [†] 1	1336	$(1/2^+, 3/2^+)$	110×10^1	$(1/2^+)$	(D)	Mult.: prompt γ ray is likely to be M1 or E1.
441 [†] 1	1424	$(3/2^+, 5/2^+)$	983	$5/2^+$		
888 [‡] 3	2312?		1424	$(3/2^+, 5/2^+)$		
983 [†] 3	983	$5/2^+$	0	$9/2^+$		
1185 3	2521		1336	$(1/2^+, 3/2^+)$		
1774 [‡] 4	3198?		1424	$(3/2^+, 5/2^+)$		
1859 4	3195		1336	$(1/2^+, 3/2^+)$		
2321 [‡] 4	3304?		983	$5/2^+$		

[†] Prominent γ rays in the gamma-ray spectra, 983γ being the most intense.

[‡] Placement of transition in the level scheme is uncertain.

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Level Scheme

Legend

- γ Decay (Uncertain)
- Coincidence

