^{9}Be(^{70}Ni,^{69}Niγ) 2016Re20

Type	Author	History Citation	Literature Cutoff Date
Full Evaluation	C. D. Nesaraja	NDS 207,1 (2026)	1-Apr-2023

No significant changes from XUNDL compiled dataset by J. Chen (NSCL, MSU), December 1, 2016.

2016Re20 (also includes 2018ReZY): E=74 MeV/nucleon (mid-target) ^{70}Ni secondary beam was produced by fragmentation of a 140 MeV/nucleon ^{82}Se primary beam from the Coupled Cyclotron Facility (CCF) at NSCL, on a 423 mg/cm^2 ^{9}Be production target. Fragments were selected and purified with the A1900 separator and impinged on a 281 mg/cm^2 ^{9}Be reaction target. Reaction residues were detected and identified on an event-by-event basis using the time-of-flight and energy-loss information with the beamline timing detectors and the S800 spectrograph focal-plane detector system. Prompt γ rays were detected with the Gamma-Ray Energy Tracking In-beam Nuclear Array (GRETINA) surrounding the reaction target; delayed γ rays were detected with a CsI(Na) detector array at the S800 focal plane. Measured Eγ, Iγ, $\gamma\gamma$-coin. Deduced levels, J, π, knock-out cross sections. Comparisons with shell-model calculations. σ=168 mb *13* (2018ReZY).

^{69}Ni Levels

E(level)[†]	J$^\pi$[#]	T$_{1/2}$[‡]	σ(mb)[&]	Comments
0	9/2$^+$	11.4 s *3*	≤88[a]	
321 *2*	1/2$^-$	3.5 s *4*	≤88[a]	E(level): From 1998Gr14. Additional information 1.
915.0 *9*	5/2$^-$	120 ps *34*	26 *3*	
1450.0?[@] *20*	(1/2$^-$,3/2$^-$)		8 *1*	
1517.0 *12*	5/2$^-$		6 *1*	
1640?[@] *5*	(1/2$^-$,3/2$^-$)		4 *1*	
1866?[@] *4*	(1/2$^-$,3/2$^-$)		2 *1*	
2143.0?[@] *20*	(3/2$^-$)		16 *2*	
2170?[@] *4*			2.8 *6*	
2701	17/2$^-$	0.439 μs *3*		E(level): From 1998Gr14. Additional information 2.
3080.0?[@] *20*				
3544.0?[@] *10*				

[†] From least-squares fit to Eγ data by the evaluator.
[‡] From Adopted Levels.
[#] As given in 2016Re20. Values in parentheses are tentative assignments made by 2016Re20 based on comparisons with shell-model calculations.
[@] Levels based on author's tentative placement of transitions feeding the 1/2$^-$ isomer and comparison to shell-model calculations.
[&] The measured inclusive knock-out cross section=168 mb *13*.
[a] For g.s.+321 levels.

γ(^{69}Ni)

E$_\gamma$[†]	I$_\gamma$	E$_i$(level)	J$_i^\pi$	E$_f$	J$_f^\pi$
[x]219 *1*	6.1 *11*				
304 *1*	10.8 *22*	2170?		1866?	(1/2$^-$,3/2$^-$)
379 *2*	3.3 *13*	3080.0?		2701	17/2$^-$
594 *1*	100 *5*	915.0	5/2$^-$	321	1/2$^-$
602[‡]	7.5[‡] *26*	1517.0	5/2$^-$	915.0	5/2$^-$
843[#]		3544.0?		2701	17/2$^-$
1129 *2*	32.4 *21*	1450.0?	(1/2$^-$,3/2$^-$)	321	1/2$^-$
1196 *2*	15.3[‡] *29*	1517.0	5/2$^-$	321	1/2$^-$

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^{9}Be(^{70}Ni,^{69}Niγ) 2016Re20 (continued)

γ(^{69}Ni) (continued)

E_γ [†]	I_γ	E_i(level)	J_i^π	E_f	J_f^π
1319 *5*	10.3 *26*	1640?	(1/2$^-$,3/2$^-$)	321	1/2$^-$
[x]1345 *2*	16.0 *27*				
1545 *4*	17.7 *26*	1866?	(1/2$^-$,3/2$^-$)	321	1/2$^-$
[x]1582 *3*	18.8 *28*				
[x]1642 *3*	8.3 *10*				
1822 *2*	61.9 *23*	2143.0?	(3/2$^-$)	321	1/2$^-$

[†] From 2016Re20.
[‡] The 602γ was not resolved from the 594γ in 2016Re20. Intensities are deduced by the authors based on the branching ratios of the 1517 level taken from 2015Li33.
[#] Placement of transition in the level scheme is uncertain.
[x] γ ray not placed in level scheme.

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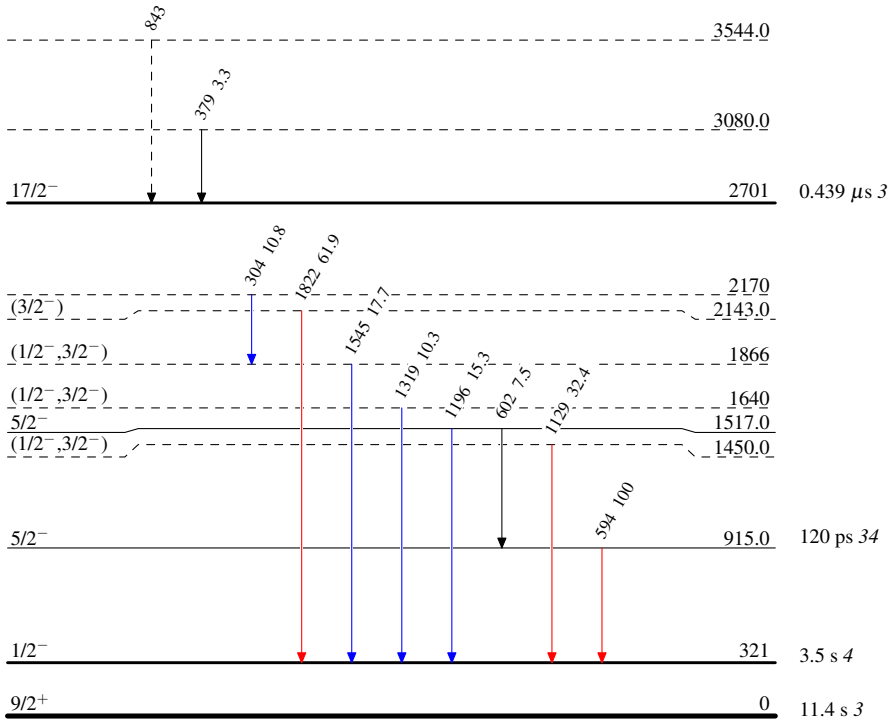
Level Scheme

Intensities: Relative I_γ

Legend

- $I_\gamma < 2\% \times I_\gamma^{max}$
- $I_\gamma < 10\% \times I_\gamma^{max}$
- $I_\gamma > 10\% \times I_\gamma^{max}$
- γ Decay (Uncertain)



$^{69}_{28}Ni_{41}$