

$^{166}\text{Er}(\text{n},\gamma),(\text{n},\text{n})$:resonances **2018MuZZ**

Type	Author	History	Citation	Literature Cutoff Date
Full Evaluation	Balraj Singh and Jun Chen		NDS 191,1 (2023)	22-Aug-2023

2018MuZZ: evaluation of neutron resonances and their parameters.

1963Vi01, **1963Vi02**, **1967Mu17**, **1968Ka17**, **1972Li08**, **1972Li09**, **1972Ra26**: measurements of neutron resonances and associated parameters.

2021Li61: measured resonance parameters and cross sections for three neutron resonances at 15.55 eV, 73.79 eV and 81.73 eV using natural Er target and four C_6D_6 liquid scintillators for γ radiation at the China spallation neutron source (CSNS) facility.

All data here are from **2018MuZZ**.

 ^{167}Er Levels

Values of $g\Gamma_n^0$ are also listed in **2018MuZZ** for almost all the resonances, while $g\Gamma_n^1$ are listed for only six resonances.

E(level) [‡]	J ^π	$g\Gamma_n$ (eV) [†]	L	Comments
S(n)-0.0449?	1/2 ⁺		0	E(level): fictitious level. $\Gamma_\gamma=(0.0824 \text{ eV } 64)$.
S(n)+0.01556 4	1/2 ⁺	$2.20 \times 10^{-3} \text{ eV } 15$	0	$\Gamma_\gamma=0.094 \text{ eV } 6$. Other: $\Gamma_\gamma=88.61 \text{ meV}$, $\Gamma_n=1.93 \text{ meV}$ (2021Li61) for 15.55-eV resonance.
S(n)+0.07379 7	1/2 ⁺	0.065 eV 4	0	$\Gamma_\gamma=0.081 \text{ eV } 8$. Other: $\Gamma_\gamma=111.32 \text{ meV}$, $\Gamma_n=24.96 \text{ meV}$ (2021Li61) for 73.79-eV resonance.
S(n)+0.08174 8	1/2 ⁺	$9.5 \times 10^{-3} \text{ eV } 5$	0	$\Gamma_\gamma=0.082 \text{ eV } 9$. Other: $\Gamma_\gamma=128.27 \text{ meV}$, $\Gamma_n=6.14 \text{ meV}$ (2021Li61) for 81.73-eV resonance.
S(n)+0.11063 8	(1/2 ⁻ , 3/2 ⁻)	$6.3 \times 10^{-5} \text{ eV } 35$	(1)	$\Gamma_\gamma=0.089 \text{ eV } 9$.
S(n)+0.15415 21	1/2 ⁺	$7.0 \times 10^{-3} \text{ eV } 3$	0	$\Gamma_\gamma=0.089 \text{ eV } 12$.
S(n)+0.17098 24	1/2 ⁺	0.445 eV 30	0	$\Gamma_\gamma=0.110 \text{ eV } 30$.
S(n)+0.24359 21	1/2 ⁺	0.025 eV 2	0	$\Gamma_\gamma=0.100 \text{ eV } 20$.
S(n)+0.30115 29	1/2 ⁺	0.195 eV 12	0	$\Gamma_\gamma=0.093 \text{ eV } 11$.
S(n)+0.31597 30	1/2 ⁺	0.320 eV 20	0	$\Gamma_\gamma=0.110 \text{ eV } 25$.
S(n)+0.35223 36	1/2 ⁺	0.084 eV 7	0	$\Gamma_\gamma=0.090 \text{ eV } 15$.
S(n)+0.38846 42	1/2 ⁺	0.185 eV 15	0	
S(n)+0.45788 19	1/2 ⁺	$1.5 \times 10^{-3} \text{ eV } 10$	0	
S(n)+0.50904 32	1/2 ⁺	0.053 eV 5	0	
S(n)+0.53532 34	1/2 ⁺	0.054 eV 5	0	$\Gamma_\gamma=0.096 \text{ eV } 20$.
S(n)+0.59484 40	1/2 ⁺	0.720 eV 70	0	
S(n)+0.6011 10	1/2 ⁺	$4.2 \times 10^{-3} \text{ eV } 25$	0	
S(n)+0.64217 50	1/2 ⁺	0.044 eV 6	0	
S(n)+0.7083 13	1/2 ⁺	$2.8 \times 10^{-3} \text{ eV } 12$	0	
S(n)+0.74732 60	1/2 ⁺	0.085 eV 10	0	
S(n)+0.77284 60	1/2 ⁺	0.039 eV 6	0	
S(n)+0.79446 60	1/2 ⁺	0.115 eV 12	0	
S(n)+0.84895 30	1/2 ⁺	0.960 eV 70	0	
S(n)+0.87307 90	1/2 ⁺	$6.6 \times 10^{-3} \text{ eV } 22$	0	
S(n)+0.90502 40	1/2 ⁺	0.500 eV 50	0	
S(n)+0.9239 10	(1/2 ⁻ , 3/2 ⁻)	$2.4 \times 10^{-3} \text{ eV } 12$	(1)	
S(n)+0.9739 11	(1/2 ⁻ , 3/2 ⁻)	$2.6 \times 10^{-3} \text{ eV } 13$	(1)	
S(n)+1.0251 5	1/2 ⁺	0.250 eV 26	0	
S(n)+1.0369 12	1/2 ⁺	$8.1 \times 10^{-3} \text{ eV } 30$	0	
S(n)+1.0568 5	1/2 ⁺	0.156 eV 16	0	
S(n)+1.1372 5	1/2 ⁺	0.081 eV 10	0	
S(n)+1.1710 5	1/2 ⁺	0.305 eV 25	0	
S(n)+1.1837 5	1/2 ⁺	0.550 eV 50	0	
S(n)+1.2595 6	1/2 ⁺	0.174 eV 16	0	

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$^{166}\text{Er}(n,\gamma), (n,n)$:resonances **2018MuZZ** (continued) ^{167}Er Levels (continued)

E(level) [‡]	J ^π	gΓ _n (eV) [†]	L	E(level) [‡]	J ^π	gΓ _n (eV) [†]	L
S(n)+1.3250 17	(1/2 ⁺)	4.7×10 ⁻³ eV 31	(0)	S(n)+3.3787 13	1/2 ⁺	0.88 eV 12	0
S(n)+1.3397 6	1/2 ⁺	0.066 eV 8	0	S(n)+3.4154 13	1/2 ⁺	0.602 eV 70	0
S(n)+1.3673 7	1/2 ⁺	0.990 eV 70	0	S(n)+3.4686 14	1/2 ⁺	0.034 eV 25	0
S(n)+1.4313 19	1/2 ⁺	0.008 eV 5	0	S(n)+3.5194 14	1/2 ⁺	1.00 eV 14	0
S(n)+1.4686 8	1/2 ⁺	0.091 eV 11	0	S(n)+3.5410 15	1/2 ⁺	0.74 eV 11	0
S(n)+1.5023 8	1/2 ⁺	0.640 eV 50	0	S(n)+3.6009 15	1/2 ⁺	0.260 eV 50	0
S(n)+1.5456 21	(1/2 ⁻ , 3/2 ⁻)	0.003 eV 2	(1)	S(n)+3.6159 15	1/2 ⁺	0.220 eV 50	0
S(n)+1.5562 9	1/2 ⁺	0.290 eV 28	0	S(n)+3.6306 15	1/2 ⁺	0.120 eV 30	0
S(n)+1.6181 23	(1/2 ⁺)	6.7×10 ⁻³ eV 36	(0)	S(n)+3.6638 15	1/2 ⁺	0.025 eV 25	0
S(n)+1.6405 9	1/2 ⁺	0.140 eV 20	0	S(n)+3.7550 16	1/2 ⁺	0.80 eV 10	0
S(n)+1.6789 24	(1/2 ⁻ , 3/2 ⁻)	0.004 eV 3	(1)	S(n)+3.7907 16	1/2 ⁺	0.120 eV 30	0
S(n)+1.7578 5	1/2 ⁺	0.197 eV 21	0	S(n)+3.8415 16	1/2 ⁺	0.81 eV 20	0
S(n)+1.7857 6	1/2 ⁺	0.360 eV 45	0	S(n)+3.8513 16	1/2 ⁺	1.40 eV 22	0
S(n)+1.8096 6	1/2 ⁺	0.160 eV 25	0	S(n)+3.8950 16	1/2 ⁺	0.380 eV 69	0
S(n)+1.8319 6	1/2 ⁺	0.103 eV 15	0	S(n)+3.9193 17	1/2 ⁺	0.031 eV 31	0
S(n)+1.8464 6	1/2 ⁺	0.625 eV 70	0	S(n)+3.9821 17	1/2 ⁺	0.73 eV 10	0
S(n)+1.9065 29	1/2 ⁺	0.010 eV 7	0	S(n)+4.0159 17	1/2 ⁺	0.054 eV 30	0
S(n)+1.9402 6	1/2 ⁺	0.165 eV 20	0	S(n)+4.0474 18	1/2 ⁺	0.052 eV 30	0
S(n)+1.9877 6	1/2 ⁺	0.054 eV 8	0	S(n)+4.1109 18	1/2 ⁺	0.096 eV 40	0
S(n)+2.0275 7	1/2 ⁺	0.033 eV 7	0	S(n)+4.1527 18	1/2 ⁺	0.430 eV 70	0
S(n)+2.0690 33	(1/2 ⁺)	0.008 eV 5	(0)	S(n)+4.1693 19	1/2 ⁺	0.480 eV 70	0
S(n)+2.1216 7	1/2 ⁺	0.456 eV 70	0	S(n)+4.2338 19	1/2 ⁺	0.280 eV 50	0
S(n)+2.1289 7	1/2 ⁺	0.74 eV 10	0	S(n)+4.3061 19	1/2 ⁺	0.490 eV 70	0
S(n)+2.1745 7	1/2 ⁺	0.220 eV 25	0	S(n)+4.349 2	1/2 ⁺	0.490 eV 70	0
S(n)+2.1975 7	1/2 ⁺	0.225 eV 35	0	S(n)+4.4225 20	1/2 ⁺	0.230 eV 80	0
S(n)+2.2454 7	1/2 ⁺	0.385 eV 45	0	S(n)+4.4887 21	1/2 ⁺	0.067 eV 34	0
S(n)+2.2695 7	1/2 ⁺	0.340 eV 35	0	S(n)+4.6169 21	1/2 ⁺	0.095 eV 60	0
S(n)+2.3645 8	1/2 ⁺	0.056 eV 10	0	S(n)+4.6526 22	1/2 ⁺	0.440 eV 70	0
S(n)+2.4014 8	1/2 ⁺	0.750 eV 90	0	S(n)+4.6886 22	1/2 ⁺	0.103 eV 48	0
S(n)+2.4632 9	1/2 ⁺	0.089 eV 14	0	S(n)+4.7597 22	1/2 ⁺	0.066 eV 35	0
S(n)+2.4762 9	1/2 ⁺	0.690 eV 80	0	S(n)+4.8579 22	1/2 ⁺	0.360 eV 84	0
S(n)+2.5140 9	1/2 ⁺	0.365 eV 50	0	S(n)+4.9022 24	1/2 ⁺	1.50 eV 30	0
S(n)+2.5485 45	(1/2 ⁺)	0.012 eV 8	(0)	S(n)+4.9364 24	1/2 ⁺	1.30 eV 20	0
S(n)+2.5690 9	1/2 ⁺	0.99 eV 11	0	S(n)+4.9854 24	1/2 ⁺	1.50 eV 24	0
S(n)+2.5949 9	1/2 ⁺	0.074 eV 15	0	S(n)+5.0364 25	1/2 ⁺	0.200 eV 70	0
S(n)+2.6564 9	1/2 ⁺	1.20 eV 10	0	S(n)+5.1408 25	1/2 ⁺	0.370 eV 80	0
S(n)+2.6696 49	(1/2 ⁻ , 3/2 ⁻)	0.005 eV 4	(1)	S(n)+5.3144 26	1/2 ⁺	0.092 eV 15	0
S(n)+2.736 1	1/2 ⁺	0.910 eV 90	0	S(n)+5.4166 27	1/2 ⁺	0.065 eV 12	0
S(n)+2.7855 10	1/2 ⁺	0.87 eV 10	0	S(n)+5.4495 27	1/2 ⁺	0.110 eV 60	0
S(n)+2.8082 11	1/2 ⁺	0.042 eV 11	0	S(n)+5.5613 28	1/2 ⁺	0.510 eV 80	0
S(n)+2.8296 11	1/2 ⁺	1.60 eV 27	0	S(n)+5.6099 29	1/2 ⁺	0.400 eV 70	0
S(n)+2.8502 11	1/2 ⁺	0.030 eV 12	0	S(n)+5.7296 30	1/2 ⁺	1.29 eV 20	0
S(n)+2.8901 11	1/2 ⁺	0.540 eV 65	0	S(n)+5.7804 30	1/2 ⁺	0.160 eV 70	0
S(n)+2.9318 11	1/2 ⁺	0.260 eV 40	0	S(n)+5.800 3	1/2 ⁺	1.50 eV 26	0
S(n)+2.9503 11	1/2 ⁺	0.036 eV 18	0	S(n)+5.8457 31	1/2 ⁺	2.20 eV 40	0
S(n)+2.9845 11	1/2 ⁺	0.170 eV 27	0	S(n)+5.9448 32	1/2 ⁺	0.43 eV 11	0
S(n)+3.0227 12	1/2 ⁺	0.024 eV 24	0	S(n)+6.0224 32	1/2 ⁺	0.48 eV 14	0
S(n)+3.0409 12	1/2 ⁺	0.061 eV 39	0	S(n)+6.1114 33	1/2 ⁺	1.10 eV 18	0
S(n)+3.0685 12	1/2 ⁺	0.026 eV 26	0	S(n)+6.2748 33	1/2 ⁺	0.62 eV 12	0
S(n)+3.1273 12	1/2 ⁺	0.030 eV 20	0	S(n)+6.3038 34	1/2 ⁺	0.64 eV 12	0
S(n)+3.1470 12	1/2 ⁺	0.185 eV 30	0	S(n)+6.3485 35	1/2 ⁺	0.67 eV 12	0
S(n)+3.2149 12	1/2 ⁺	0.440 eV 50	0	S(n)+6.4289 35	1/2 ⁺	0.73 eV 13	0
S(n)+3.2807 13	1/2 ⁺	0.370 eV 46	0	S(n)+6.4750 36	1/2 ⁺	0.470 eV 70	0
S(n)+3.3408 13	1/2 ⁺	0.400 eV 64	0	S(n)+6.5433 36	1/2 ⁺	2.40 eV 60	0
S(n)+3.3514 13	1/2 ⁺	0.610 eV 90	0	S(n)+6.5560 36	1/2 ⁺	2.00 eV 50	0

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$^{166}\text{Er}(\text{n},\gamma),(\text{n},\text{n}):$ resonances **2018MuZZ** (continued) ^{167}Er Levels (continued)

E(level) [‡]	J ^π	$g\Gamma_n$ (eV) [†]	L	E(level) [‡]	J ^π	$g\Gamma_n$ (eV) [†]	L
S(n)+6.6017 37	1/2 ⁺	0.38 eV 18	0	S(n)+7.9693 49	1/2 ⁺	1.20 eV 28	0
S(n)+6.7019 38	1/2 ⁺	0.75 eV 20	0	S(n)+8.0133 49	1/2 ⁺	1.40 eV 32	0
S(n)+6.7705 38	1/2 ⁺	0.91 eV 18	0	S(n)+8.1324 50	1/2 ⁺	2.70 eV 50	0
S(n)+6.8707 39	1/2 ⁺	0.18 eV 18	0	S(n)+8.2851 52	1/2 ⁺	1.50 eV 30	0
S(n)+7.0172 40	1/2 ⁺	0.60 eV 17	0	S(n)+8.3998 53	1/2 ⁺	1.90 eV 35	0
S(n)+7.0576 41	1/2 ⁺	0.150 eV 60	0	S(n)+8.4581 53	1/2 ⁺	4.30 eV 70	0
S(n)+7.1935 42	1/2 ⁺	0.170 eV 70	0	S(n)+8.6807 55	1/2 ⁺	3.00 eV 60	0
S(n)+7.2228 42	1/2 ⁺	0.62 eV 15	0	S(n)+8.8350 57	1/2 ⁺	5.70 eV 80	0
S(n)+7.2735 43	1/2 ⁺	0.320 eV 94	0	S(n)+9.0167 59	1/2 ⁺	0.39 eV 20	0
S(n)+7.3548 43	1/2 ⁺	1.50 eV 30	0	S(n)+9.0756 59	1/2 ⁺	1.50 eV 40	0
S(n)+7.3851 44	1/2 ⁺	1.80 eV 34	0	S(n)+9.1951 61	1/2 ⁺	2.50 eV 50	0
S(n)+7.4772 44	1/2 ⁺	0.92 eV 16	0	S(n)+9.2748 62	1/2 ⁺	0.42 eV 18	0
S(n)+7.5936 45	1/2 ⁺	1.60 eV 26	0	S(n)+9.3734 62	1/2 ⁺	0.78 eV 30	0
S(n)+7.6368 46	1/2 ⁺	0.40 eV 14	0	S(n)+9.4296 62	1/2 ⁺	1.70 eV 35	0
S(n)+7.7058 46	1/2 ⁺	0.80 eV 26	0	S(n)+9.4862 62	1/2 ⁺	2.10 eV 50	0
S(n)+7.8299 47	1/2 ⁺	0.41 eV 17	0				

[†] g =statistical weight factor $(2J+1)/[(2s+1)(2I+1)]$, where $s=1/2$ for neutrons, J is the spin of the resonance state, and I is spin of the target. For $^{166}\text{Er}(\text{n},\text{X})$, $g=(2J+1)/2$, which is simply 1 for $J=1/2$, and 2 for $J=3/2$.

[‡] $S(\text{n})(^{167}\text{Er})+E(\text{n})$, where $S(\text{n})=6436.43$ 18 is from [2021Wa16](#), and $E(\text{n})$ in lab system from [2018MuZZ](#).