^{188}Os(n,γ):resonances 2010Fu04

History

Type	Author	Citation	Literature Cutoff Date
Full Evaluation	T. D. Johnson, Balraj Singh	NDS 142, 1 (2017)	15-Apr-2017

See also companion papers: 2010Mo15, 2010Mo16 and 2010Co02.

Neutrons from 1 eV to 1 MeV produced in bombardment of 20 GeV/c protons on a massive Pb target. Measured neutron spectra by time-of-flight method. Resonance parameters extracted using SAMMY code for a full R-matrix fit of the capture yields. Average resonance parameters were derived by a statistical analysis to provide a comprehensive experimental basis for modeling stellar neutron capture rates of these isotopes in terms of the Hauser-Feshback statistical model. Discussed consequences for s-process component of the ^{187}Os abundance and evaluation of time duration of galactic nucleosynthesis via Re/Os cosmochronometer. Experiment conducted at n_TOF facility at CERN.

See also 2006MuZX evaluation of neutron resonances.

Values with no uncertainty listed in the data field or comments were kept fixed during the fitting procedures.

^{189}Os Levels

E(level)[†]	J^π[‡]	L	$g\Gamma_\gamma\Gamma_n/\Gamma$ (meV)[#]	Comments
S(n)+0.03868	1/2$^+$	0	22.1	
S(n)+0.07874	1/2$^+$	0	32.5 *4*	E(n)=0.078739 *2*. Γ_γ=35.6 meV *5*, gΓ_n=377.9 meV.
S(n)+0.15007	1/2$^+$	0	30.3 *3*	E(n)=0.150066 *3*. Γ_γ=37.4 meV *2*, gΓ_n=159.8 meV *10*.
S(n)+0.19192	1/2$^+$	0	27.7 *3*	E(n)=0.191922 *3*. Γ_γ=36.1 meV 3, gΓ_n=120.0 meV 10.
S(n)+0.25421	1/2$^+$	0	31.1 *4*	E(n)=0.254208 *3*.
S(n)+0.28244	1/2$^+$	0	9.95 *12*	E(n)=0.282441 *3*. Γ_γ=52.0 meV, gΓ_n=12.3 meV *1*.
S(n)+0.31723	1/2$^+$	0	54.3 *4*	Γ_γ=57.5 meV *5*, gΓ_n=960.8 meV.
S(n)+0.38837 *2*	1/2$^+$	0	41.5 *5*	Γ_γ=43.8 meV *5*, gΓ_n=812.2 meV.
S(n)+0.47892 *2*	1/2$^+$	0	40.0 *5*	Γ_γ=43.5 meV *5*, gΓ_n=490.1 meV.
S(n)+0.52877	1/2$^+$	0	37.7 *8*	E(n)=0.528774 *5*.
S(n)+0.53697 *1*	1/2$^+$	0	36.8 *8*	
S(n)+0.62055 *1*	1/2$^+$	0	40.6 *9*	
S(n)+0.64955 *1*	1/2$^+$	0	37.1 *12*	
S(n)+0.70599 *1*	1/2$^+$	0	38.0 *13*	
S(n)+0.74570 *2*	1/2$^+$	0	42.1 *6*	Γ_γ=48.6 meV *7*, gΓ_n=313 meV.
S(n)+0.78151 *5*	1/2$^+$	0	42.9 *9*	Γ_γ=44.6 meV *10*, gΓ_n=1.125 eV.
S(n)+0.81995 *1*	1/2$^+$	0	28.7 *15*	
S(n)+0.84441 *6*	1/2$^+$	0	43.5 *9*	Γ_γ=44.6 meV *10*, gΓ_n=1.880 eV.
S(n)+0.86311 *1*	1/2$^+$	0	39.5 *8*	Γ_γ=44.0 meV *8*, gΓ_n=380 meV.
S(n)+0.90027 *2*	1/2$^+$	0	2.8 *5*	Γ_γ=52.0 meV, gΓ_n=2.9 meV *5*.
S(n)+0.98003 *1*	1/2$^+$	0	34.9 *7*	Γ_γ=46.5 meV *9*, gΓ_n=140.0 meV.
S(n)+1.00152	1/2$^+$	0	22.9	E(n)=1.001523 *3*. Γ_γ=52.0 meV, gΓ_n=41.0 meV.
S(n)+1.04215 *2*	1/2$^+$	0	44.0 *7*	Γ_γ=48.0 meV *7*, gΓ_n=529 meV.
S(n)+1.07976 *1*	1/2$^+$	0	14.5 *4*	Γ_γ=52.0 meV, gΓ_n=20.2 meV *5*.
S(n)+1.10778 *4*	1/2$^+$	0	49.9 *8*	Γ_γ=51.9 meV *8*, gΓ_n=1.280 eV.
S(n)+1.18274 *1*	1/2$^+$	0	23.5	Γ_γ=52.0 meV, gΓ_n=43.0 meV.
S(n)+1.21667 *1*	1/2$^+$	0	47.5 *30*	
S(n)+1.29322 *2*	1/2$^+$	0	32.4	Γ_γ=52.0 meV, gΓ_n=86.0 meV.
S(n)+1.31653 *3*	1/2$^+$	0	49.3 *9*	Γ_γ=52.1 meV *10*, gΓ_n=936 meV.
S(n)+1.34789 *2*	1/2$^+$	0	41.0 *14*	Γ_γ=54.1 meV *18*, gΓ_n=170.0 meV.
S(n)+1.41327 *5*	1/2$^+$	0	57.0 *11*	Γ_γ=59.5 meV *12*, gΓ_n=1.330 eV.
S(n)+1.48560 *2*	1/2$^+$	0	38 *6*	
S(n)+1.52035 *2*	1/2$^+$	0	34.5 *10*	Γ_γ=48.1 meV *13*, gΓ_n=122.0 meV.
S(n)+1.54493	1/2$^+$	0	26.0	E(n)=1.544931 *4*.

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^{188}Os(n,γ):resonances 2010Fu04 (continued)

^{189}Os Levels (continued)

E(level)†	J$^\pi$‡	L	g$\Gamma_\gamma\Gamma_n/\Gamma$ (meV)#	Comments
				Γ_γ=52.0 meV, gΓ_n=52.0 meV.
S(n)+1.59814 *7*	1/2$^+$	0	49.9 *11*	Γ_γ=51.4 meV *11*, gΓ_n=1.730 eV.
S(n)+1.62526 *1*	1/2$^+$	0	2.9 *6*	Γ_γ=52.0 meV, gΓ_n=3.1 meV *6*.
S(n)+1.67373 *4*	1/2$^+$	0	44.1 *9*	Γ_γ=47.1 meV *10*, gΓ_n=678.1 meV.
S(n)+1.71994 *2*	1/2$^+$	0	36.7 *10*	Γ_γ=54.3 meV *14*, gΓ_n=113.0 meV.
S(n)+1.76443 *1*	1/2$^+$	0	4.6 *9*	Γ_γ=52.0 meV, gΓ_n=5.0 meV *10*.
S(n)+1.77950 *3*	1/2$^+$	0	28.49	Γ_γ=52.0 meV, gΓ_n=63.0 meV.
S(n)+1.80343 *2*	1/2$^+$	0	44.9 *11*	Γ_γ=57.8 meV *14*, gΓ_n=202.0 meV.
S(n)+1.87687 *6*	1/2$^+$	0	43.3 *11*	Γ_γ=45.2 meV *11*, gΓ_n=1.020 meV.
S(n)+1.90575	1/2$^+$	0	23.2	E(n)=1.905748 *3*. Γ_γ=52.0 meV, gΓ_n=42.0 meV.
S(n)+1.96762 *1*	1/2$^+$	0	35.6	Γ_γ=52.0 meV, gΓ_n=113.0 meV.
S(n)+1.97165 *3*	1/2$^+$	0	41.0 *11*	Γ_γ=47.3 meV *13*, gΓ_n=303.9 meV.
S(n)+2.01789 *3*	1/2$^+$	0	32.2 *24*	
S(n)+2.04907 *9*	1/2$^+$	0	5.3 *4*	Γ_γ=52.0 meV, gΓ_n=5.9 meV *4*.
S(n)+2.09224 *3*	1/2$^+$	0	44.0 *12*	Γ_γ=55.0 meV *15*, gΓ_n=219.0 meV.
S(n)+2.13805 *3*	1/2$^+$	0	47.6 *14*	Γ_γ=56.3 meV *16*, gΓ_n=306.0 meV.
S(n)+2.17942 *2*	1/2$^+$	0	15 *3*	Γ_γ=52.0 meV, gΓ_n=21 meV *4*.
S(n)+2.19159 *5*	1/2$^+$	0	44.2 *15*	Γ_γ=50.6 meV *17*, gΓ_n=351.1 meV.
S(n)+2.25779 *1*	1/2$^+$	0	4.6 *9*	Γ_γ=52.0 meV, gΓ_n=5.0 meV *10*.
S(n)+2.27438 *5*	1/2$^+$	0	44.1 *12*	Γ_γ=48.0 meV *13*, gΓ_n=540.9 meV.
S(n)+2.29898 *8*	1/2$^+$	0	48.3 *14*	Γ_γ=50.1 meV *15*, gΓ_n=1.360 eV.
S(n)+2.38682 *1*	1/2$^+$	0	33 *6*	Γ_γ=52.0 meV, gΓ_n=93 meV *17*.
S(n)+2.41206 *7*	1/2$^+$	0	44.4 *14*	Γ_γ=47.1 meV *15*, gΓ_n=762 meV.
S(n)+2.43833 *4*	1/2$^+$	0	42.9 *14*	Γ_γ=52.6 meV *17*, gΓ_n=233 meV.
S(n)+2.50093 *7*	1/2$^+$	0	42.6 *13*	Γ_γ=45.3 meV *14*, gΓ_n=715 meV.
S(n)+2.50478 *3*	1/2$^+$	0	2.7 *5*	Γ_γ=52.0 meV, gΓ_n=2.8 meV *6*.
S(n)+2.54505 *1*	1/2$^+$	0	26 *5*	Γ_γ=52.0 meV, gΓ_n=53 meV *10*.
S(n)+2.57083 *2*	1/2$^+$	0	39.8 *13*	Γ_γ=46.8 meV *16*, gΓ_n=267.0 meV.
S(n)+2.61322 *15*	1/2$^+$	0	5.1 *6*	Γ_γ=52.0 meV, gΓ_n=5.7 meV *6*.
S(n)+2.61976 *1*	1/2$^+$	0	3.7 *7*	Γ_γ=52.0 meV, gΓ_n=4.0 meV *8*.
S(n)+2.62682 *4*	1/2$^+$	0	45.5 *18*	Γ_γ=55.5 meV *22*, gΓ_n=253.0 meV.
S(n)+2.72912 *12*	1/2$^+$	0	8.1 *6*	Γ_γ=52.0 meV, gΓ_n=9.6 meV *7*.
S(n)+2.76844 *1*	1/2$^+$	0	19 *4*	Γ_γ=52.0 meV, gΓ_n=30 meV *6*.
S(n)+2.79950 *11*	1/2$^+$	0	9.52 *7*	Γ_γ=52.0 meV, gΓ_n=11.6 meV *8*.
S(n)+2.81579 *6*	1/2$^+$	0	41	
S(n)+2.86400 *6*	1/2$^+$	0	36 *4*	
S(n)+2.92414 *2*	1/2$^+$	0	8.4 *17*	Γ_γ=52.0 meV, gΓ_n=10 meV *2*.
S(n)+2.96798 *8*	1/2$^+$	0	4.7 *9*	Γ_γ=52.0 meV, gΓ_n=5.2 meV *10*.
S(n)+2.97572 *13*	1/2$^+$	0	46.0 *18*	Γ_γ=47.3 meV *19*, gΓ_n=1.670 eV.
S(n)+2.98842 *6*	1/2$^+$	0	39 *5*	
S(n)+3.03660 *7*	1/2$^+$	0	53.2 *17*	Γ_γ=58.4 meV *18*, gΓ_n=600 meV.
S(n)+3.05603 *8*	1/2$^+$	0	57.7 *19*	Γ_γ=62.7 meV *20*, gΓ_n=730 meV.
S(n)+3.11330 *8*	1/2$^+$	0	48.3 *17*	Γ_γ=54.8 meV *20*, gΓ_n=403 meV.
S(n)+3.12895 *8*	1/2$^+$	0	45.6 *18*	Γ_γ=58.3 meV *22*, gΓ_n=210 meV.
S(n)+3.18954 *12*	1/2$^+$	0	55.0 *24*	Γ_γ=55.7 meV *24*, gΓ_n=4.390 eV.
S(n)+3.20881 *8*	1/2$^+$	0	49.6 *19*	Γ_γ=55.9 meV *22*, gΓ_n=437 meV.
S(n)+3.26943 *9*	1/2$^+$	0	25.2 *22*	
S(n)+3.28427 *7*	1/2$^+$	0	46.1 *16*	Γ_γ=51.4 meV *18*, gΓ_n=448 meV.
S(n)+3.35503 *6*	1/2$^+$	0	48.6 *19*	Γ_γ=61.1 meV *24*, gΓ_n=237 meV.
S(n)+3.41795 *8*	1/2$^+$	0	49.1 *19*	Γ_γ=56.9 meV *21*, gΓ_n=360 meV.
S(n)+3.43886 *8*	1/2$^+$	0	45.5 *17*	Γ_γ=49.8 meV *19*, gΓ_n=528 meV.
S(n)+3.48612 *8*	1/2$^+$	0	27.8 *23*	
S(n)+3.51756 *1*	1/2$^+$	0	6.2 *12*	Γ_γ=52.0 meV, gΓ_n=7.0 meV *14*.
S(n)+3.60022 *10*	1/2$^+$	0	55.5 *21*	Γ_γ=59.7 meV *22*, gΓ_n=786 meV.
S(n)+3.63202 *1*	1/2$^+$	0	8.4 *17*	Γ_γ=52.0 meV, gΓ_n=10 meV *2*.

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^{188}Os(n,γ):resonances 2010Fu04 (continued)

^{189}Os Levels (continued)

E(level)†	J^{π}‡	L	$g\Gamma_{\gamma}\Gamma_n/\Gamma$ (meV)#	Comments
S(n)+3.66031 *1*	1/2+	0	11.7 *23*	Γ_{γ}=52.0 meV, $g\Gamma_n$=15 meV *3*.
S(n)+3.66831 *2*	1/2+	0	15 *3*	Γ_{γ}=52.0 meV, $g\Gamma_n$=20 meV *4*.
S(n)+3.69502 *20*	1/2+	0	43.8 *24*	Γ_{γ}=44.9 meV *24*, $g\Gamma_n$=1.790 eV.
S(n)+3.7064 *5*	1/2+	0	35 *3*	Γ_{γ}=35.2 meV *3*, $g\Gamma_n$=4.590 eV.
S(n)+3.71978 *11*	1/2+	0	52.0 *23*	Γ_{γ}=55.9 meV *25*, $g\Gamma_n$=763 meV.
S(n)+3.73294 *2*	1/2+	0	7.9 *15*	Γ_{γ}=52.0 meV, $g\Gamma_n$=9.3 meV *18*.
S(n)+3.77265 *13*	1/2+	0	22.9 *22*	
S(n)+3.88398 *10*	1/2+	0	57.1 *22*	Γ_{γ}=62.1 meV *24*, $g\Gamma_n$=703 meV.
S(n)+3.92904 *1*	1/2+	0	15 *3*	Γ_{γ}=52.0 meV, $g\Gamma_n$=20 meV *4*.
S(n)+3.93148 *1*	1/2+	0	33.2	Γ_{γ}=52.0 meV, $g\Gamma_n$=92.0 meV.
S(n)+3.94753 *10*	1/2+	0	39.6 *22*	Γ_{γ}=56 meV *3*, $g\Gamma_n$=134.0 meV.
S(n)+3.96666 *10*	1/2+	0	38.5 *24*	Γ_{γ}=59 meV *4*, $g\Gamma_n$=111.0 meV.
S(n)+3.98207 *3*	1/2+	0	15 *3*	Γ_{γ}=52.0 meV, $g\Gamma_n$=20 meV *4*.
S(n)+3.98738 *12*	1/2+	0	35.2	Γ_{γ}=52.0 meV, $g\Gamma_n$=109.0 meV.
S(n)+4.10633 *12*	1/2+	0	41 *7*	Γ_{γ}=52.0 meV, $g\Gamma_n$=196 meV *35*.
S(n)+4.13473 *1*	1/2+	0	34 *6*	
S(n)+4.21540 *10*	1/2+	0	49.6 *25*	Γ_{γ}=65 meV *3*, $g\Gamma_n$=208 meV.
S(n)+4.23628 *17*	1/2+	0	53.8 *24*	Γ_{γ}=55.9 meV *24*, $g\Gamma_n$=1.451 eV.
S(n)+4.26821 *19*	1/2+	0	45.4 *23*	Γ_{γ}=46.7 meV *24*, $g\Gamma_n$=1.600 eV.
S(n)+4.31322 *12*	1/2+	0	34 *4*	
S(n)+4.34127 *14*	1/2+	0	24.4 *23*	
S(n)+4.43427 *6*	1/2+	0	48 *8*	Γ_{γ}=58 meV *10*, $g\Gamma_n$=263.0 meV.
S(n)+4.45093 *16*	1/2+	0	53.7 *25*	Γ_{γ}=56 meV *3*, $g\Gamma_n$=1.310 eV.
S(n)+4.48301 *16*	1/2+	0	28.9	Γ_{γ}=52.0 meV, $g\Gamma_n$=65.0 meV.
S(n)+4.57992 *12*	1/2+	0	41 *9*	Γ_{γ}=61 meV *6*, $g\Gamma_n$=130 meV *23*.
S(n)+4.60379 *6*	1/2+	0	25 *5*	
S(n)+4.62801 *2*	1/2+	0	8.4 *17*	Γ_{γ}=52.0 meV, $g\Gamma_n$=10 meV *2*.
S(n)+4.64147 *25*	1/2+	0	49 *3*	Γ_{γ}=51 meV *3*, $g\Gamma_n$=2.150 eV.
S(n)+4.72268 *15*	1/2+	0	40.4 *24*	Γ_{γ}=51 meV *3*, $g\Gamma_n$=198 meV.
S(n)+4.74696 *14*	1/2+	0	46 *3*	Γ_{γ}=56 meV *3*, $g\Gamma_n$=242 meV.
S(n)+4.81755 *11*	1/2+	0	41 *6*	Γ_{γ}=54 meV *8*, $g\Gamma_n$=160 meV.
S(n)+4.85249 *20*	1/2+	0	43 *3*	Γ_{γ}=50 meV *3*, $g\Gamma_n$=300 meV.
S(n)+4.88195 *20*	1/2+	0	48 *3*	Γ_{γ}=50 meV *3*, $g\Gamma_n$=950 meV.
S(n)+4.89385 *15*	1/2+	0	47 *3*	Γ_{γ}=57 meV *4*, $g\Gamma_n$=269 meV.
S(n)+4.93339 *16*	1/2+	0	32 *6*	
S(n)+4.95980 *8*	1/2+	0	38 *6*	Γ_{γ}=48 meV *8*, $g\Gamma_n$=194 meV.
S(n)+4.98975 *8*	1/2+	0	37 *6*	
S(n)+5.05483 *17*	1/2+	0	44 *8*	
S(n)+5.09482 *4*	1/2+	0	11.8 *23*	
S(n)+5.10232 *7*	1/2+	0	48 *7*	
S(n)+5.16311 *17*	1/2+	0	50.3	
S(n)+5.20425 *3*	1/2+	0	23 *5*	
S(n)+5.21134 *2*	1/2+	0	29 *6*	
S(n)+5.24654 *20*	1/2+	0	41 *7*	
S(n)+5.27356 *3*	1/2+	0	37 *7*	
S(n)+5.33724 *2*	1/2+	0	13 *3*	
S(n)+5.35027 *2*	1/2+	0	41 *8*	
S(n)+5.38397 *1*	1/2+	0	25 *5*	
S(n)+5.40193 *18*	1/2+	0	46 *9*	
S(n)+5.43743 *19*	1/2+	0	47 *9*	
S(n)+5.45592 *19*	1/2+	0	38 *6*	
S(n)+5.52535 *25*	1/2+	0	48 *9*	
S(n)+5.5626 *3*	1/2+	0	50 *7*	
S(n)+5.61352 *3*	1/2+	0	38 *7*	
S(n)+5.63456 *1*	1/2+	0	26 *5*	
S(n)+5.66613 *19*	1/2+	0	42 *7*	

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^{188}Os(n,γ):resonances 2010Fu04 (continued)

^{189}Os Levels (continued)

E(level)†	Jπ‡	L	$g\Gamma_\gamma\Gamma_n/\Gamma$ (meV)#
S(n)+5.73431 *23*	1/2+	0	48 *7*
S(n)+5.78524 *2*	1/2+	0	45 *8*
S(n)+5.82958 *25*	1/2+	0	47 *9*
S(n)+5.89021 *23*	1/2+	0	42 *8*
S(n)+5.9077 *3*	1/2+	0	50.3
S(n)+5.9711 *3*	1/2+	0	47 *9*
S(n)+5.9961 *3*	1/2+	0	47 *9*
S(n)+6.04467 *11*	1/2+	0	42 *8*
S(n)+6.10495 *4*	1/2+	0	34 *7*
S(n)+6.13069 *1*	1/2+	0	14 *3*
S(n)+6.1837 *3*	1/2+	0	46 *9*
S(n)+6.2010 *4*	1/2+	0	51 *8*
S(n)+6.2503 *3*	1/2+	0	48 *9*
S(n)+6.28738 *25*	1/2+	0	25 *4*
S(n)+6.3351 *4*	1/2+	0	47 *8*
S(n)+6.37645 *24*	1/2+	0	42 *7*
S(n)+6.42643 *22*	1/2+	0	47 *9*
S(n)+6.45835 *4*	1/2+	0	32 *6*
S(n)+6.48552 *25*	1/2+	0	43 *8*
S(n)+6.5319 *5*	1/2+	0	46 *9*
S(n)+6.5367 *3*	1/2+	0	37 *7*
S(n)+6.5529 *4*	1/2+	0	11.6 *20*
S(n)+6.60559 *10*	1/2+	0	39 *7*
S(n)+6.64015 *1*	1/2+	0	38 *7*
S(n)+6.68960 *12*	1/2+	0	34 *7*
S(n)+6.7110 *3*	1/2+	0	47 *9*
S(n)+6.77633 *2*	1/2+	0	39 *8*
S(n)+6.8152 *3*	1/2+	0	44 *8*
S(n)+6.89958 *4*	1/2+	0	45 *9*
S(n)+6.94311 *2*	1/2+	0	43 *8*
S(n)+6.9591 *3*	1/2+	0	43 *8*
S(n)+6.99397 *1*	1/2+	0	21 *4*
S(n)+7.0218 *3*	1/2+	0	46 *9*
S(n)+7.06764 *1*	1/2+	0	35 *7*
S(n)+7.12346 *5*	1/2+	0	45 *9*
S(n)+7.16165 *1*	1/2+	0	30 *6*
S(n)+7.19370 *3*	1/2+	0	43 *8*
S(n)+7.2333 *3*	1/2+	0	43. *8*
S(n)+7.2603 *3*	1/2+	0	47 *9*
S(n)+7.2795 *3*	1/2+	0	45 *8*
S(n)+7.3257 *3*	1/2+	0	45 *9*
S(n)+7.37249 *5*	1/2+	0	33 *7*
S(n)+7.38421 *2*	1/2+	0	43 *8*
S(n)+7.4432 *4*	1/2+	0	42 *8*
S(n)+7.47532 *3*	1/2+	0	42 *8*
S(n)+7.50136 *8*	1/2+	0	35 *7*
S(n)+7.54629 *1*	1/2+	0	30 *6*
S(n)+7.58596 *2*	1/2+	0	39 *8*
S(n)+7.6412 *4*	1/2+	0	42 *7*
S(n)+7.70073 *3*	1/2+	0	30 *6*
S(n)+7.7335 *4*	1/2+	0	42 *8*
S(n)+7.77948 *3*	1/2+	0	41 *8*
S(n)+7.8773 *5*	1/2+	0	38 *7*
S(n)+7.89127 *1*	1/2+	0	28 *6*
S(n)+7.9603 *4*	1/2+	0	35 *5*

† S(n)(^{189}Os)+E(n)(c.m.), where S(n)=5920.8 *4* (2017Wa10) E(n)=neutron resonance energy. E(n)(lab) values are shown in the comments. Recoil correction is 0.20 eV to 42 eV over the range of 38 eV to 8.0 keV.

‡ All spins are defined as s-wave, target spin=0.

\# g=statistical weight factor=(2J+1)/[(2s+1)(2I+1)], where J=spin of the compound state, I=spin of the target g.s., which is 0 for ^{188}Os, s=spin of the incident neutron=1/2.