^{28}Si(^{36}Ar,2pnγ) 2009An01

History

Type	Author	Citation	Literature Cutoff Date
Full Evaluation	Kazimierz Zuber, Balraj Singh	NDS 125, 1 (2015)	25-Jan-2015

2009An01: E=142, 148 MeV beam provided by ATLAS-ANL facility. Measured Eγ, Iγ, $\gamma\gamma$, (particle)γ coin, angular distributions using GAMMASPHERE array of Ge detectors. The charged particles were detected using Microball array and ΔE-E telescopes. Comparisons with cranked Nilsson-Strutinsky calculations. See also 2006An31 from the same group using ^{40}Ca(^{24}Mg,2pnγ) reaction. See also dataset for this reaction.

1999Yu10: E=143 MeV; also ^{40}Ca(^{29}Si,2$\alpha\gamma$) E=130 MeV. Measured Eγ, Iγ, $\gamma\gamma$, particle-γ coin, $\gamma\gamma(\theta)$(DCO) using GAMMASPHERE array of 82 and 100 Compton-suppressed Ge detectors and 95-element CsI Microball. Deduced SD-1 band and interconnecting transitions of 5172 and 5278 keV to normal band. Interband transition of 5278 keV is confirmed in 2009An01.

Level scheme below 8500-keV level shown in figure 1 of 2009An01 is taken from their previous work reported in 2006An31, which used ^{40}Ca(^{24}Mg,2pnγ) reaction.

^{61}Zn Levels

Nomenclature for configuration assignments is [p_1p_2,n_1n_2], where p_1 and n_1 denote number of proton or neutron holes in the orbitals of high-j $1f_{7/2}$ shell; p_2 and n_2 denote the number of (proton or neutron) particles in the high-j $1g_{9/2}$ shell, relative to the closed ^{56}Ni core. Active orbitals for protons and neutrons are: $1f_{7/2}$, $1g_{9/2}$, $1f_{5/2}$, $2p_{3/2}$ and $2p_{1/2}$; the number of particles in the last three orbitals are denoted as p_3 or n_3.

E(level)†	Jπ‡	E(level)†	Jπ‡	E(level)†	Jπ‡	E(level)†	Jπ‡
0.0[e]	3/2−	6211.2 *11*		12665[&] *3*	31/2−	15738[a] *4*	(37/2−)
88.77[f] *9*	1/2−	7283.2[j] *10*	21/2−	12725.2 *24*	33/2(−)	16098[q] *4*	(35/2−)
123.94[d] *9*	5/2−	7295.7[h] *11*	23/2+	12760 *5*	(31/2−)	16229[n] *5*	(39/2−)
419.42[g] *10*	3/2−	7485.8 *16*	25/2+	12801[l] *3*	29/2+	16279[l] *4*	37/2+
755.68[f] *15*	5/2−	7628.0[k] *10*	23/2−	12864[@] *4*	(31/2−)	16438[&] *4*	39/2−
997.07[e] *16*	7/2−	8334.9[b] *12*	21/2−	13209 *4*	33/2	17118[p] *5*	(37/2−)
1265.4[d] *6*	9/2−	8495.6 *13*	25/2+	13263[m] *5*	(33/2−)	17125[@] *5*	(39/2−)
1403.0[g] *3*	7/2−	8774.8[c] *12*	23/2−	13319.0[c] *15*	35/2−	17309[m] *5*	(41/2−)
2002.8[f] *6*	9/2−	8878.7[j] *13*	25/2−	13663[o] *6*	(33/2−)	17454[o] *6*	(41/2−)
2269.0[e] *6*	11/2−	9036.0? *22*		13881[#] *4*	(33/2+)	17609[#] *5*	(41/2+)
2398.5[i] *6*	9/2+	9160.1[k] *13*	27/2−	13885[a] *4*	(33/2−)	17986[a] *5*	(41/2−)
2698.9[g] *6*	11/2−	9302.8[b] *12*	25/2−	14060 *6*	(35/2−)	18195[q] *5*	(39/2−)
2798.0[d] *7*	13/2−	9366.9 *12*	25/2−	14071 *5*	35/2−	18362[l] *5*	41/2+
3243.8[h] *9*	11/2+	9950.5[c] *12*	27/2−	14113 *5*	33/2	18470[n] *6*	(43/2−)
3335.2[i] *7*	13/2+	10057.1[j] *13*	29/2−	14143[n] *6*	(35/2−)	19149[&] *5*	43/2−
3460.9[f] *9*	13/2−	10154.2[k] *13*	31/2−	14299.1[b] *17*	37/2−	19269[p] *5*	(41/2−)
3494.4 *12*		10664.3[b] *13*	29/2−	14325[&] *3*	35/2−	19652[o] *6*	(45/2−)
3843.1[e] *9*	15/2−	10870 *6*	(25/2+)	14430[l] *4*	33/2+	19689[m] *6*	(45/2−)
4263.2[h] *8*	15/2+	11183 *5*	27/2+	14432 *7*	31/2−	19772[@] *6*	(43/2−)
4308.1 *12*	13/2	11260? *5*	25/2+	14448 *5*	35/2−	20059[#] *6*	(45/2+)
4414.2[i] *9*	17/2+	11367[l] *3*	25/2+	14768 *6*		20530[q] *5*	(43/2−)
4643.7[d] *9*	17/2−	11505.1[c] *13*	31/2−	14816[@] *4*	(35/2−)	20641[a] *6*	(45/2−)
4914.0 *12*		11527?[m] *5*	(29/2−)	15019 *6*	33/2−	20673[l] *5*	45/2+
5194.5[f] *10*	17/2−	11770 *5*	(29/2+)	15205[m] *5*	(37/2−)	20998[n] *6*	(47/2−)
5253.7 *9*		12041[o] *6*	(29/2−)	15223[p] *4*	(33/2−)	21744[p] *6*	(45/2−)
5467.2 *13*		12231 *4*	29/2+	15261.0[c] *25*	39/2−	22238[o] *7*	(49/2−)
5542.4[e] *9*	19/2−	12336[a] *4*	(29/2−)	15292 *6*		22396[m] *7*	(49/2−)
5551.8[h] *9*	19/2+	12468.7[b] *14*	33/2−	15474[o] *5*	(37/2−)	22584[&] *6*	(47/2−)
6089.8[i] *13*	21/2+	12536[#] *4*	(29/2+)	15564[#] *5*	(37/2+)	22900[@] *7*	(47/2−)

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^{28}Si(^{36}Ar,2pnγ) 2009An01 (continued)

^{61}Zn Levels (continued)

E(level)†	Jπ‡	E(level)†	Jπ‡	E(level)†	Jπ‡
22964[#] 7	(49/2+)	23900[a] 6	(49/2−)	26041[l] 7	53/2+
23180[q] 6	(47/2−)	24604[p] 7	(49/2−)	26220[q] 7	(51/2−)
23221[l] 6	49/2+	25280?[o] 8	(53/2−)	26695[#] 8	(53/2+)
23855[n] 7	(51/2−)	25449?[m] 8	(53/2−)	27084?[n] 8	(55/2−)
				29170[l] 7	57/2+

† From least-squares fit to Eγ data.
‡ As proposed in 2009An01 and 2006An31 based on γγ(θ) data for selected transitions and band associations. See also Adopted Levels for recommended values.
[#] Band(A): Band based on (29/2+). Configuration=[22,01].
[@] Band(B): Band based on (31/2−), 12864. Configuration=[21,11] or [11,11]. Population intensity=1%.
[&] Band(C): Band based on 31/2−, 12665. Configuration=[21,01] or [11,11].
[a] Band(D): Band based on (29/2−). Configuration=[11,12].
[b] Band(E): Band based on 21/2−,α=+1/2. Configuration=[11,01].
[c] Band(e): Band based on 23/2−,α=−1/2. Configuration=[11,01].
[d] Band(F): Band based on 3/2−,α=+1/2. Configuration=[00,00].
[e] Band(f): Band based on 3/2−,α=−1/2. Configuration=[00,00].
[f] Band(G): Band based on 1/2−,α=+1/2.
[g] Band(g): Band based on 1/2−,α=−1/2.
[h] Band(H): Band based on 11/2+. Configuration=[01,00].
[i] Band(I): Band based on 9/2+. Configuration=[00,01].
[j] Band(J): Band based on 21/2−,α=+1/2. Configuration=[01,01].
[k] Band(j): Band based on 23/2−,α=−1/2. Configuration=[01,01].
[l] Band(K): SD-1 band,α=+1/2. Configuration=[22,23]. Population intensity=5%.
[m] Band(L): SD-2 band,α=+1/2. Configuration=[22,22]. Population intensity=2%.
[n] Band(l): SD-3 band,α=−1/2. Configuration=[22,22] or [22,12]. Population intensity=2%.
[o] Band(M): SD-4 band,α=+1/2. Configuration=[22,22] or [22,12]. Population intensity=2%.
[p] Band(N): SD-5 band,α=+1/2. Configuration=[11,23]. Population intensity=0.7%.
[q] Band(n): SD-6 band,α=−1/2. Configuration=[11,23]. Population intensity=0.7%.

γ(^{61}Zn)

Additional information 1.
R(30°−83°) is angular asymmetry ratio: expected ratio is ≈1.6-1.7 for ΔJ=2, quadrupole and ≈0.7-0.8 for ΔJ=1, dipole transition.

Eγ†	Iγ	Ei(level)	Jiπ	Ef	Jfπ	Mult.‡	Comments
88.9 *1*		88.77	1/2−	0.0	3/2−		
123.9 *1*	100	123.94	5/2−	0.0	3/2−		
241.4 *1*		997.07	7/2−	755.68	5/2−		
295.5 *1*		419.42	3/2−	123.94	5/2−		
331.3 *2*		419.42	3/2−	88.77	1/2−		Eγ: level-energy difference=330.6.
338		755.68	5/2−	419.42	3/2−		Eγ: from figure 1 of 2009An01.
344.8 *2*		7628.0	23/2−	7283.2	21/2−		
419.1 *2*		419.42	3/2−	0.0	3/2−		
439.9 *4*	3.0 *5*	8774.8	23/2−	8334.9	21/2−	D+Q	R(30°−83°)=0.98 *11*.
528.0 *6*	2.9 *4*	9302.8	25/2−	8774.8	23/2−		

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^{28}Si(^{36}Ar,2pnγ) 2009An01 (continued)

$\gamma(^{61}Zn)$ (continued)

E_γ[†]	I_γ	E_i(level)	J_i^π	E_f	J_f^π	Mult.[‡]	Comments
529.4 *3*		2798.0	$13/2^-$	2269.0	$11/2^-$		
578.2 *3*		997.07	$7/2^-$	419.42	$3/2^-$		
583.3 *6*	7.8 *6*	9950.5	$27/2^-$	9366.9	$25/2^-$	D+Q	R(30°−83°)=1.00 *10*.
592.0 *4*	1.9 *3*	9366.9	$25/2^-$	8774.8	$23/2^-$		
631.7 *3*		755.68	$5/2^-$	123.94	$5/2^-$		
647.1 *3*		1403.0	$7/2^-$	755.68	$5/2^-$		
647.6 *5*	6.3 *7*	9950.5	$27/2^-$	9302.8	$25/2^-$	D+Q	R(30°−83°)=0.93 *11*.
666.6 *3*		755.68	$5/2^-$	88.77	$1/2^-$		
696.2 *3*		2698.9	$11/2^-$	2002.8	$9/2^-$		
713.6 *5*	11 *1*	10664.3	$29/2^-$	9950.5	$27/2^-$	D+Q	R(30°−83°)=0.99 *9*.
737.6 *4*		2002.8	$9/2^-$	1265.4	$9/2^-$		
755 *1*	0.9 *3*	16229	$(39/2^-)$	15474	$(37/2^-)$		
755.7 *4*		755.68	$5/2^-$	0.0	$3/2^-$		
839.2 *4*		5253.7		4414.2	$17/2^+$		
840.7 *6*	6.6 *5*	11505.1	$31/2^-$	10664.3	$29/2^-$	D+Q	R(30°−83°)=0.95 *8*, for doublet structure.
850 *1*	2.6 *5*	13319.0	$35/2^-$	12468.7	$33/2^-$	D+Q	R(30°−83°)=0.95 *8*, for doublet structure.
868 *1*	0.8 *2*	8495.6	$25/2^+$	7628.0	$23/2^-$		
872.7 *4*		997.07	$7/2^-$	123.94	$5/2^-$		
875 *1*	1.0 *4*	16098	$(35/2^-)$	15223	$(33/2^-)$		
897		10057.1	$29/2^-$	9160.1	$27/2^-$		E_γ: from figure 1 of 2009An01.
898.9 *4*		5542.4	$19/2^-$	4643.7	$17/2^-$		
908.3 *5*		5551.8	$19/2^+$	4643.7	$17/2^-$		
936.7 *5*		3335.2	$13/2^+$	2398.5	$9/2^+$		
963.6 *6*	5.5 *4*	12468.7	$33/2^-$	11505.1	$31/2^-$		
968 *1*	1.0 *2*	9302.8	$25/2^-$	8334.9	$21/2^-$		
980 *1*	2.0 *5*	14299.1	$37/2^-$	13319.0	$35/2^-$		
984.3 *5*		1403.0	$7/2^-$	419.42	$3/2^-$		
990.9 *5*		5253.7		4263.2	$15/2^+$		
994.1 *5*		10154.2	$31/2^-$	9160.1	$27/2^-$		E_γ: from 2006An31.
996.7 *5*		997.07	$7/2^-$	0.0	$3/2^-$		
997.0[#] *5*		2398.5	$9/2^+$	1403.0	$7/2^-$		
1005 *1*		2269.0	$11/2^-$	1265.4	$9/2^-$		
1006 *1*		2002.8	$9/2^-$	997.07	$7/2^-$		
1019 *1*		4263.2	$15/2^+$	3243.8	$11/2^+$		
1020[#] *1*	1.0 *5*	17118	$(37/2^-)$	16098	$(35/2^-)$		
1024 *1*	1.2 *2*	16229	$(39/2^-)$	15205	$(37/2^-)$		
1039 *1*	1.8 *4*	8334.9	$21/2^-$	7295.7	$23/2^+$		
1046 *1*		3843.1	$15/2^-$	2798.0	$13/2^-$		
1066 *1*		3335.2	$13/2^+$	2269.0	$11/2^-$		
1079 *1*		4414.2	$17/2^+$	3335.2	$13/2^+$		
1080[#] *1*	0.7 *5*	17309	$(41/2^-)$	16229	$(39/2^-)$		
1141 *1*		1265.4	$9/2^-$	123.94	$5/2^-$		
1175.9 *4*	7.9 *8*	9950.5	$27/2^-$	8774.8	$23/2^-$	Q	R(30°−83°)=1.60 *20*.
1178		10057.1	$29/2^-$	8878.7	$25/2^-$		E_γ: from figure 1 of 2009An01.
1198 *2*	1.5 *4*	8495.6	$25/2^+$	7295.7	$23/2^+$		
1246 *1*		2002.8	$9/2^-$	755.68	$5/2^-$		
1273 *1*		2269.0	$11/2^-$	997.07	$7/2^-$		
1278 *1*		1403.0	$7/2^-$	123.94	$5/2^-$		
1289 *1*		5551.8	$19/2^+$	4263.2	$15/2^+$		
1345 *1*	1.2 *4*	13881	$(33/2^+)$	12536	$(29/2^+)$	Q	R(30°−83°)=1.41 *25*.
1362 *1*	3.8 *6*	10664.3	$29/2^-$	9302.8	$25/2^-$		
1396 *1*		7485.8	$25/2^+$	6089.8	$21/2^+$		
1403 *1*		1403.0	$7/2^-$	0.0	$3/2^-$		
1403 *1*		2398.5	$9/2^+$	997.07	$7/2^-$		
1408 *2*	0.6 *3*	9036.0?		7628.0	$23/2^-$		

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^{28}Si(^{36}Ar,2pnγ) 2009An01 (continued)

$\gamma(^{61}Zn)$ (continued)

E_γ[†]	I_γ	E_i(level)	J_i^π	E_f	J_f^π	Mult.[‡]	Comments
1433 *1*		2698.9	$11/2^-$	1265.4	$9/2^-$		
1434 *1*	1.7 *5*	12801	$29/2^+$	11367	$25/2^+$	Q	R(30°−83°)=1.45 *18*.
1446 *2*	1.4 *5*	11505.1	$31/2^-$	10057.1	$29/2^-$		
1458 *1*		3460.9	$13/2^-$	2002.8	$9/2^-$		
1466 *1*		4263.2	$15/2^+$	2798.0	$13/2^-$		
1531 *1*		2798.0	$13/2^-$	1265.4	$9/2^-$		
1532 *1*		9160.1	$27/2^-$	7628.0	$23/2^-$		E_γ: from 2006An31.
1538 *1*		7628.0	$23/2^-$	6089.8	$21/2^+$		
1542[#] *2*	0.5 *3*	12801	$29/2^+$	11260?	$25/2^+$	(Q)	R(30°−83°)=1.44 *16*, for doublet structure.
1549 *2*	6.0 *6*	13885	$(33/2^-)$	12336	$(29/2^-)$	Q	R(30°−83°)=1.41 *12*.
1555 *1*	7.2 *8*	11505.1	$31/2^-$	9950.5	$27/2^-$	Q	R(30°−83°)=1.41 *12*.
1572 *1*		3843.1	$15/2^-$	2269.0	$11/2^-$		E_γ: level-energy difference=1574.
1595 *1*		8878.7	$25/2^-$	7283.2	$21/2^-$		E_γ: from 2006An31.
1622 *2*	3.1 *5*	13663	$(33/2^-)$	12041	$(29/2^-)$		
1624 *1*		5467.2		3843.1	$15/2^-$		
1629 *2*	4.7 *8*	14430	$33/2^+$	12801	$29/2^+$	Q	R(30°−83°)=1.35 *11*.
1660 *2*	1.9 *5*	14325	$35/2^-$	12665	$31/2^-$		
1675 *3*		6089.8	$21/2^+$	4414.2	$17/2^+$		
1675 *4*		9160.1	$27/2^-$	7485.8	$25/2^+$		E_γ: from 2006An31.
1676 *2*	2.8 *7*	9302.8	$25/2^-$	7628.0	$23/2^-$	D+Q	R(30°−83°)=1.07 *10*.
1683 *2*	4.0 *5*	15564	$(37/2^+)$	13881	$(33/2^+)$	Q	R(30°−83°)=1.29 *10*.
1698 *1*		5542.4	$19/2^-$	3843.1	$15/2^-$		
1702[#] *2*	0.5 *3*	14430	$33/2^+$	12725.2	$33/2^{(-)}$		
1733 *1*		5194.5	$17/2^-$	3460.9	$13/2^-$		
1733 *1*		7283.2	$21/2^-$	5551.8	$19/2^+$		
1736[#] *2*		13263	$(33/2^-)$	11527?	$(29/2^-)$		
1743 *1*		7295.7	$23/2^+$	5551.8	$19/2^+$		
1799 *1*		6211.2		4414.2	$17/2^+$		
1805 *2*	4.8 *5*	12468.7	$33/2^-$	10664.3	$29/2^-$	Q	R(30°−83°)=1.37 *14*.
1811 *2*	3.2 *5*	15474	$(37/2^-)$	13663	$(33/2^-)$		
1814 *2*	4.6 *6*	13319.0	$35/2^-$	11505.1	$31/2^-$	Q	R(30°−83°)=1.42 *10*.
1831 *2*	3.8 *5*	14299.1	$37/2^-$	12468.7	$33/2^-$	Q	R(30°−83°)=1.30 *17*.
1847 *1*		4643.7	$17/2^-$	2798.0	$13/2^-$		
1849 *2*	5.5 *5*	16279	$37/2^+$	14430	$33/2^+$	Q	R(30°−83°)=1.68 *13*.
1853 *2*	6.5 *7*	15738	$(37/2^-)$	13885	$(33/2^-)$	Q	R(30°−83°)=1.30 *12*.
1895 *2*	2.0 *4*	17118	$(37/2^-)$	15223	$(33/2^-)$		
1942 *2*	3.0 *6*	15205	$(37/2^-)$	13263	$(33/2^-)$	Q	R(30°−83°)=1.30 *21*.
1942 *2*	2.4 *6*	15261.0	$39/2^-$	13319.0	$35/2^-$		
1946 *1*		6211.2		4263.2	$15/2^+$		
1952 *2*	0.8 *3*	14816	$(35/2^-)$	12864	$(31/2^-)$		
1978 *1*		3243.8	$11/2^+$	1265.4	$9/2^-$		
1980 *2*	2.9 *4*	17454	$(41/2^-)$	15474	$(37/2^-)$	Q	R(30°−83°)=1.35 *25*.
2006 *2*	3.4 *6*	9302.8	$25/2^-$	7295.7	$23/2^+$	D	R(30°−83°)=0.94 *11*.
2039 *1*		4308.1	13/2	2269.0	$11/2^-$		
2045 *2*	4.3 *5*	17609	$(41/2^+)$	15564	$(37/2^+)$	Q	R(30°−83°)=1.75 *15*.
2071 *2*	1.7 *6*	9366.9	$25/2^-$	7295.7	$23/2^+$	D	R(30°−83°)=1.18 *20*.
2083 *2*	5.3 *5*	18362	$41/2^+$	16279	$37/2^+$	Q	R(30°−83°)=1.76 *14*.
2086 *2*	1.8 *3*	16229	$(39/2^-)$	14143	$(35/2^-)$	(Q)	R(30°−83°)=1.3 *4*.
2088 *1*		7283.2	$21/2^-$	5194.5	$17/2^-$		
2097 *2*	3.0 *7*	18195	$(39/2^-)$	16098	$(35/2^-)$	Q	R(30°−83°)=1.7 *3*.
2104 *2*	5.1 *6*	17309	$(41/2^-)$	15205	$(37/2^-)$	Q	R(30°−83°)=1.28 *16*.
2113 *2*	2.5 *5*	16438	$39/2^-$	14325	$35/2^-$	Q	R(30°−83°)=1.9 *3*.
2116 *1*		4914.0		2798.0	$13/2^-$		
2151 *2*	2.5 *5*	19269	$(41/2^-)$	17118	$(37/2^-)$		
2169 *3*	0.8 *2*	16229	$(39/2^-)$	14060	$(35/2^-)$	(Q)	R(30°−83°)=1.2 *4*.

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^{28}Si(^{36}Ar,2pnγ) 2009An01 (continued)

$\gamma(^{61}Zn)$ (continued)

E_γ[†]	I_γ	E_i(level)	J_i^π	E_f	J_f^π	Mult.[‡]	Comments
2195 *1*		3460.9	13/2$^-$	1265.4	9/2$^-$		
2198 *2*	2.4 *4*	19652	(45/2$^-$)	17454	(41/2$^-$)	Q	R(30°−83°)=1.36 *23*.
2199 *2*	0.4 *2*	14430	33/2$^+$	12231	29/2$^+$		
2229 *1*		3494.4		1265.4	9/2$^-$		
2241 *2*	3.8 *7*	18470	(43/2$^-$)	16229	(39/2$^-$)		
2246[#] *2*	0.8 *4*	8334.9	21/2$^-$	6089.8	21/2$^+$		
2248 *2*	6.4 *8*	17986	(41/2$^-$)	15738	(37/2$^-$)	Q	R(30°−83°)=1.52 *17*.
2273 *1*		2398.5	9/2$^+$	123.94	5/2$^-$		
2309 *3*	1.2 *2*	17125	(39/2$^-$)	14816	(35/2$^-$)		
2311 *2*	4.3 *5*	20673	45/2$^+$	18362	41/2$^+$	Q	R(30°−83°)=1.56 *13*.
2335 *2*	2.0 *4*	20530	(43/2$^-$)	18195	(39/2$^-$)	Q	R(30°−83°)=1.8 *3*.
2380 *2*	3.7 *4*	19689	(45/2$^-$)	17309	(41/2$^-$)		
2450 *3*	3.8 *4*	20059	(45/2$^+$)	17609	(41/2$^+$)	Q	R(30°−83°)=1.21 *12*.
2475 *3*	1.8 *4*	21744	(45/2$^-$)	19269	(41/2$^-$)		
2528 *3*	2.9 *4*	20998	(47/2$^-$)	18470	(43/2$^-$)		
2548 *3*	3.8 *4*	23221	49/2$^+$	20673	45/2$^+$	Q	R(30°−83°)=1.24 *11*.
2571 *2*	3.3 *4*	12725.2	33/2$^{(-)}$	10154.2	31/2$^-$	D+Q	R(30°−83°)=0.59 *8*.
2586 *3*	1.0 *3*	22238	(49/2$^-$)	19652	(45/2$^-$)		
2639 *1*		7283.2	21/2$^-$	4643.7	17/2$^-$		
2647 *3*	0.8 *2*	19772	(43/2$^-$)	17125	(39/2$^-$)		
2649 *3*	1.5 *5*	23180	(47/2$^-$)	20530	(43/2$^-$)	Q	R(30°−83°)=1.5 *3*.
2655 *3*	3.9 *5*	20641	(45/2$^-$)	17986	(41/2$^-$)	Q	R(30°−83°)=1.48 *16*.
2707 *3*	2.1 *4*	22396	(49/2$^-$)	19689	(45/2$^-$)		
2711 *3*	1.4 *3*	19149	43/2$^-$	16438	39/2$^-$	Q	R(30°−83°)=1.8 *4*.
2785 *2*	0.6 *3*	8334.9	21/2$^-$	5551.8	19/2$^+$		
2820 *3*	1.7 *3*	26041	53/2$^+$	23221	49/2$^+$	Q	R(30°−83°)=1.50 *19*.
2857 *3*	1.1 *4*	23855	(51/2$^-$)	20998	(47/2$^-$)		
2859 *3*	0.5 *2*	24604	(49/2$^-$)	21744	(45/2$^-$)		
2905 *3*	3.0 *4*	22964	(49/2$^+$)	20059	(45/2$^+$)	Q	R(30°−83°)=1.37 *17*.
3040 *3*	0.7 *2*	26220	(51/2$^-$)	23180	(47/2$^-$)	Q	R(30°−83°)=1.6 *7*.
3041[#] *4*	0.3 *1*	25280?	(53/2$^-$)	22238	(49/2$^-$)		
3052[#] *4*	0.6 *3*	25449?	(53/2$^-$)	22396	(49/2$^-$)		
3055 *3*	1.5 *4*	13209	33/2	10154.2	31/2$^-$	D	R(30°−83°)=0.68 *15*. Mult.: ΔJ=1 transition.
3109[#] *4*	0.6 *3*	13263	(33/2$^-$)	10154.2	31/2$^-$	(D)	R(30°−83°)=1.0 *5*.
3128 *4*	0.5 *1*	22900	(47/2$^-$)	19772	(43/2$^-$)		
3129 *3*	0.4 *2*	29170	57/2$^+$	26041	53/2$^+$	Q	R(30°−83°)=1.4 *4*.
3142 *3*	0.8 *3*	8334.9	21/2$^-$	5194.5	17/2$^-$		
3165 *3*	1.1 *3*	13319.0	35/2$^-$	10154.2	31/2$^-$		
3228[#] *4*	0.3 *1*	27084?	(55/2$^-$)	23855	(51/2$^-$)		
3258 *3*	1.5 *5*	23900	(49/2$^-$)	20641	(45/2$^-$)	Q	R(30°−83°)=1.5 *4*.
3435 *3*	0.5 *2*	22584	(47/2$^-$)	19149	43/2$^-$		
3500 *4*	0.7 *2*	12536	(29/2$^+$)	9036.0?			
3505 *3*	2.2 *3*	12665	31/2$^-$	9160.1	27/2$^-$	Q	R(30°−83°)=1.6 *3*, for doublet structure.
3600 *4*	0.8 *3*	12760	(31/2$^-$)	9160.1	27/2$^-$	Q	R(30°−83°)=2.1 *7*.
3691 *3*	2.1 *5*	8334.9	21/2$^-$	4643.7	17/2$^-$	Q	R(30°−83°)=1.3 *4*.
3697 *4*	1.2 *3*	11183	27/2$^+$	7485.8	25/2$^+$	D+Q	R(30°−83°)=0.99 *15*.
3704[#] *4*	0.1 *1*	12864	(31/2$^-$)	9160.1	27/2$^-$		
3731 *3*	1.1 *3*	13885	(33/2$^-$)	10154.2	31/2$^-$	D+Q	R(30°−83°)=1.32 *19*.
3731 *4*	0.6 *2*	26695	(53/2$^+$)	22964	(49/2$^+$)		
3917 *4*	2.3 *4*	14071	35/2$^-$	10154.2	31/2$^-$	Q	R(30°−83°)=1.46 *18*.
3959 *4*	0.6 *3*	14113	33/2	10154.2	31/2$^-$	D	R(30°−83°)=0.9 *3*. Mult.: ΔJ=1 transition.
4170 *4*	1.2 *3*	14325	35/2$^-$	10154.2	31/2$^-$	Q	R(30°−83°)=1.42 *22*.

Continued on next page (footnotes at end of table)

^{28}Si(^{36}Ar,2pnγ) 2009An01 (continued)

$\gamma(^{61}Zn)$ (continued)

E_γ[†]	I_γ	E_i(level)	J_i^π	E_f	J_f^π	Mult.[‡]	Comments
4284 *4*	0.8 *2*	11770	(29/2$^+$)	7485.8	25/2$^+$	Q	R(30°−83°)=1.3 *3*.
4294 *4*	0.8 *3*	14448	35/2$^-$	10154.2	31/2$^-$	Q	R(30°−83°)=1.56 *23*.
4305 *5*	0.9 *2*	12801	29/2$^+$	8495.6	25/2$^+$	Q	R(30°−83°)=1.4 *3*.
4559[#] *5*	0.4 *2*	15223	(33/2$^-$)	10664.3	29/2$^-$		
4593 *5*	0.7 *3*	16098	(35/2$^-$)	11505.1	31/2$^-$		
4614 *5*	0.7 *2*	14768		10154.2	31/2$^-$		
4662 *5*	0.8 *3*	14816	(35/2$^-$)	10154.2	31/2$^-$		
4745 *5*	0.9 *3*	12231	29/2$^+$	7485.8	25/2$^+$		
4780 *5*	1.1 *3*	10870	(25/2$^+$)	6089.8	21/2$^+$	Q	R(30°−83°)=2.0 *6*.
4865 *5*	0.7 *3*	15019	33/2$^-$	10154.2	31/2$^-$	D+Q	R(30°−83°)=0.9 *3*.
5050 *5*	0.5 *2*	12536	(29/2$^+$)	7485.8	25/2$^+$	Q	R(30°−83°)=1.5 *4*.
5138 *5*	0.6 *2*	15292		10154.2	31/2$^-$		
5170[#] *4*	0.7 *2*	11260?	25/2$^+$	6089.8	21/2$^+$		
5272 *6*	0.3 *2*	14432	31/2$^-$	9160.1	27/2$^-$	Q	R(30°−83°)=1.4 *3* for doublet structure.
5278 *5*	1.2 *3*	11367	25/2$^+$	6089.8	21/2$^+$	Q	R(30°−83°)=1.32 *23*, for doublet structure.
5314 *5*	0.4 *2*	12801	29/2$^+$	7485.8	25/2$^+$	Q	R(30°−83°)=1.32 *23*.

[†] From 2006An31 for transitions from levels up to 8500 keV, all others are from 2009An01.

[‡] From $\gamma\gamma(\theta)$ data. The ΔJ=2, quadrupole transitions, multipolarity is most likely E2, and for interband transitions, ΔJ=1,0, D+Q is most likely M1+E2.

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

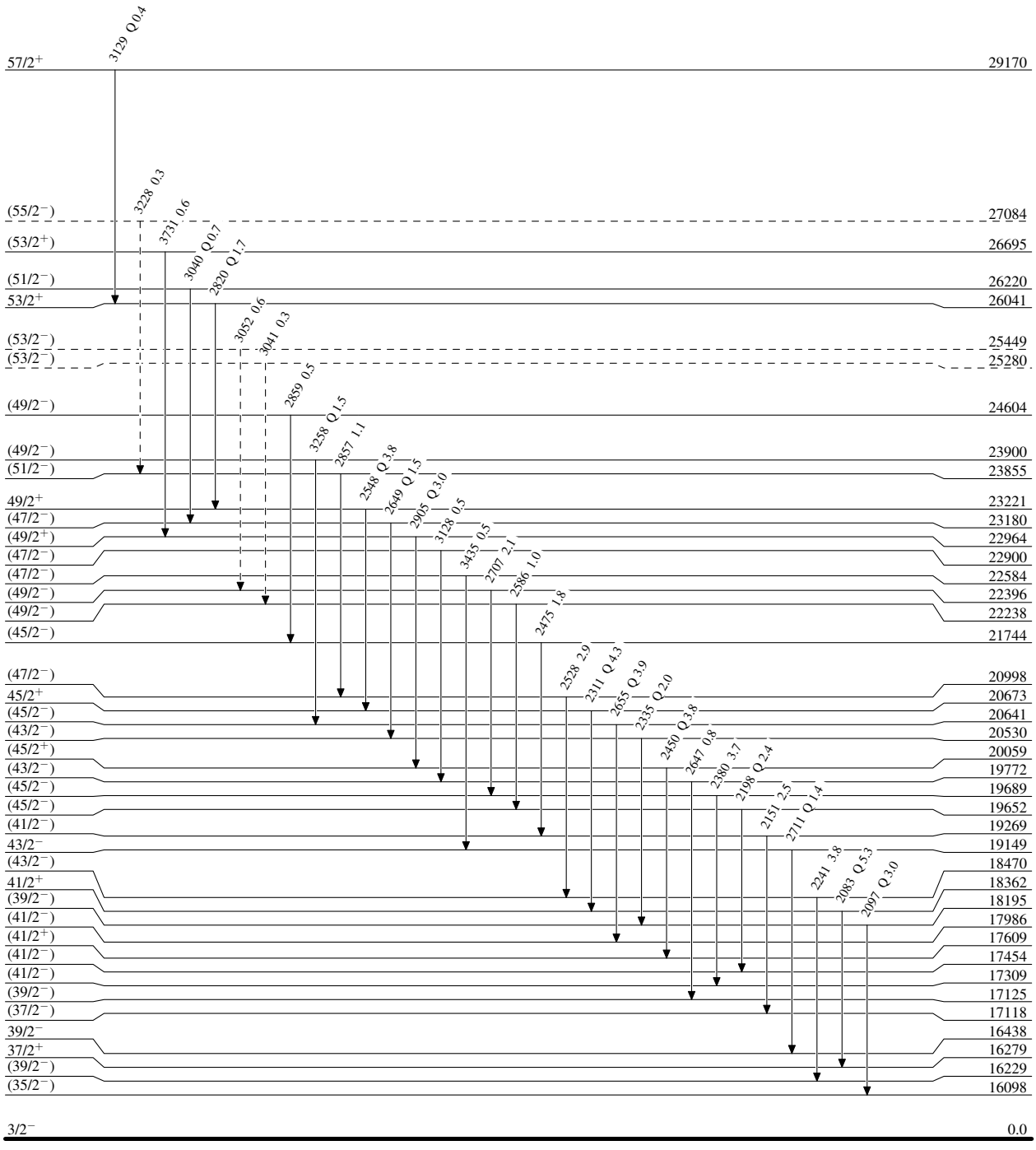
^{28}Si(^{36}Ar,2pnγ) 2009An01

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)



$^{61}_{30}Zn_{31}$

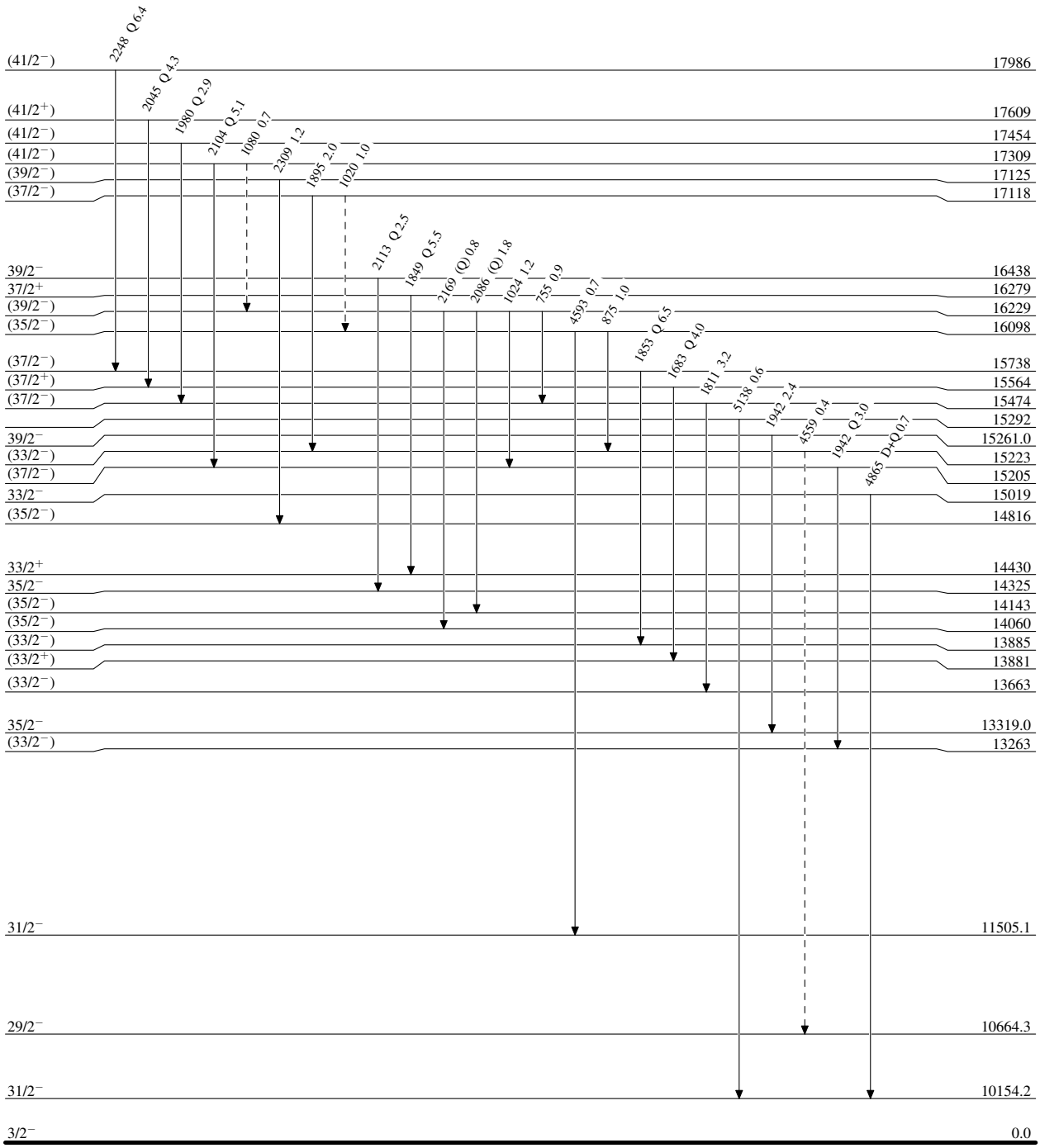
^{28}Si(^{36}Ar,2pnγ) 2009An01

Level Scheme (continued)

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)



$^{61}_{30}Zn_{31}$

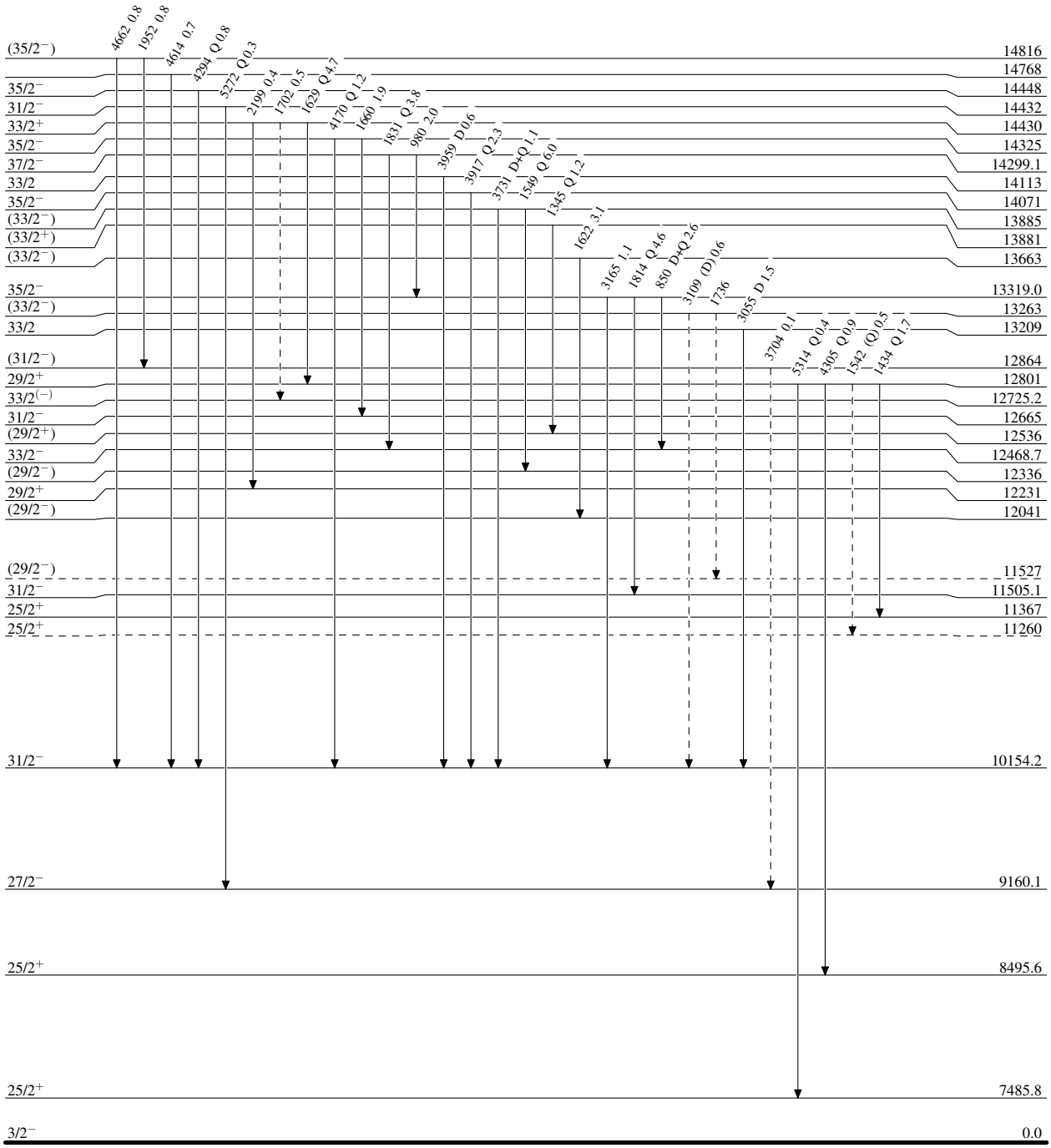
^{28}Si(^{36}Ar,2pnγ) 2009An01

Level Scheme (continued)

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)



$^{61}_{30}Zn_{31}$

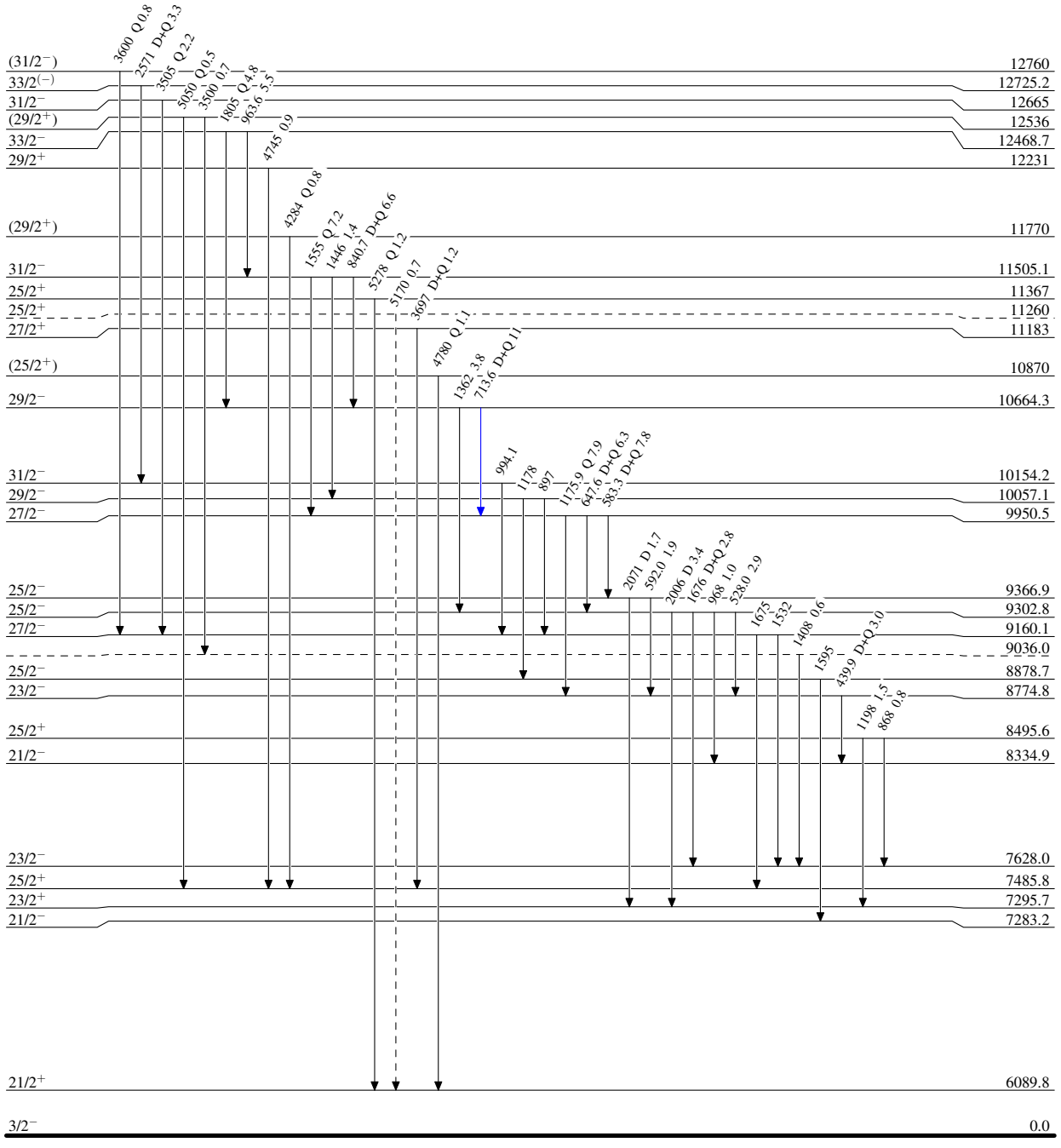
^{28}Si(^{36}Ar,2pnγ) 2009An01

Level Scheme (continued)

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)



$^{61}_{30}Zn_{31}$

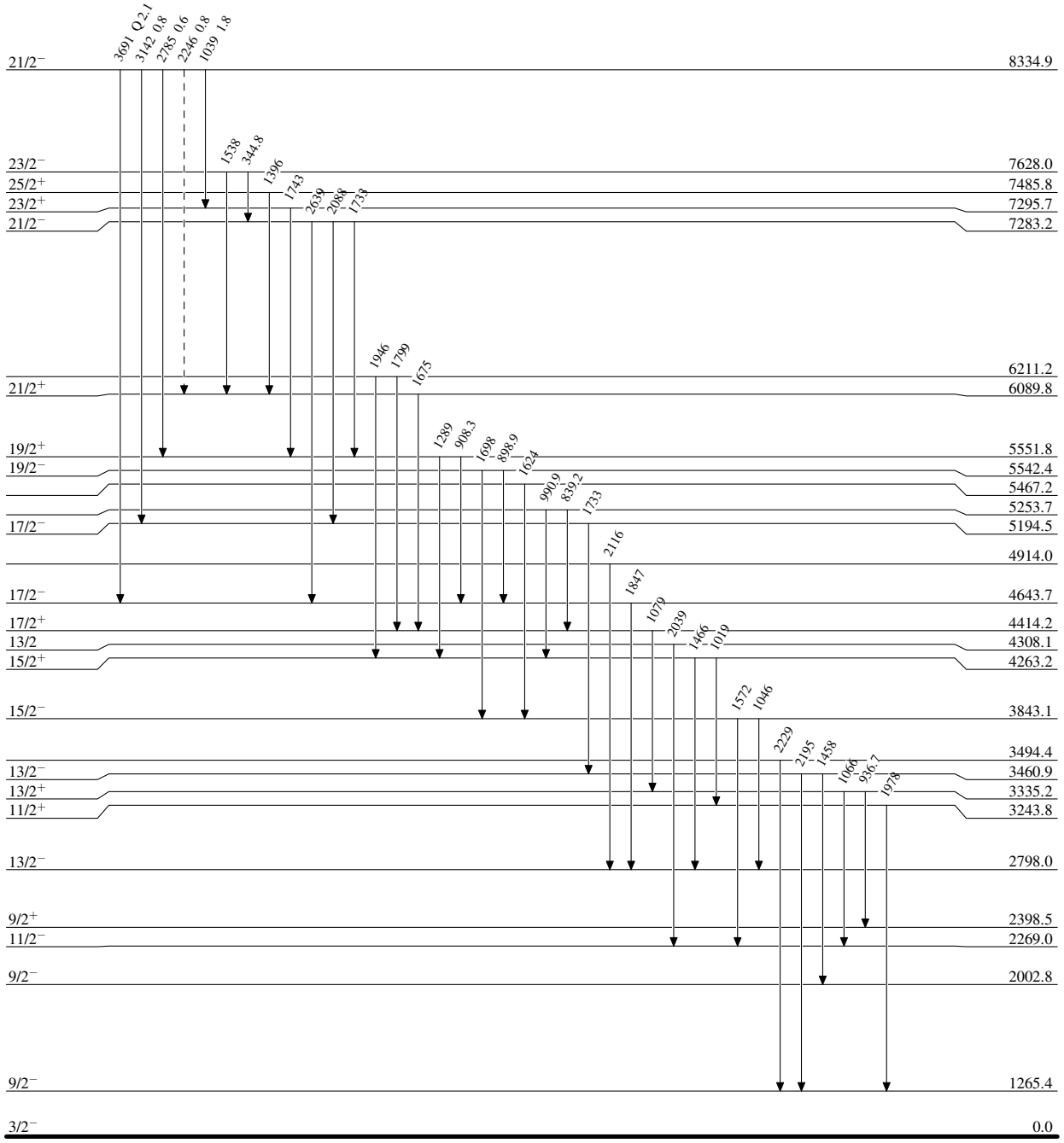
^{28}Si(^{36}Ar,2pnγ) **2009An01**

Level Scheme (continued)

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)



$^{61}_{30}Zn_{31}$

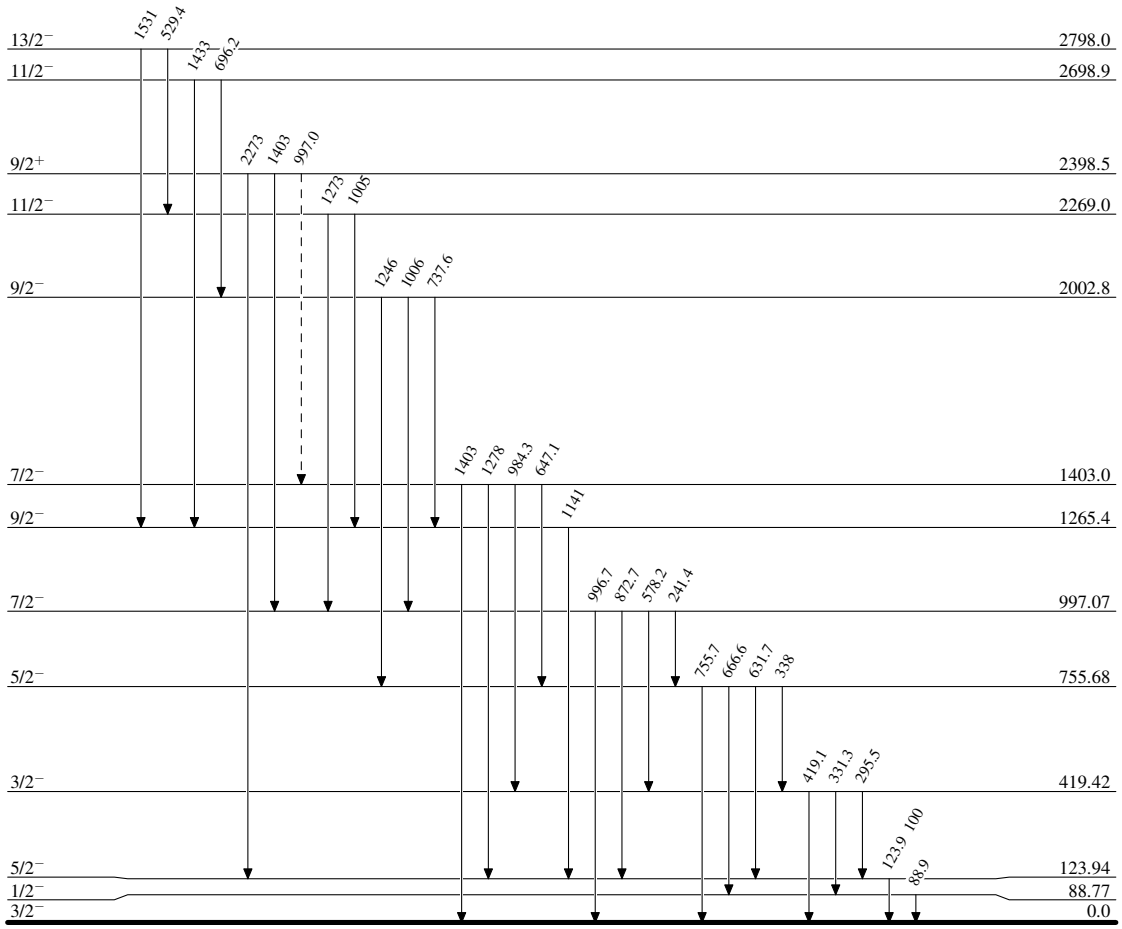
^{28}Si(^{36}Ar,2pnγ) 2009An01

Legend

Level Scheme (continued)

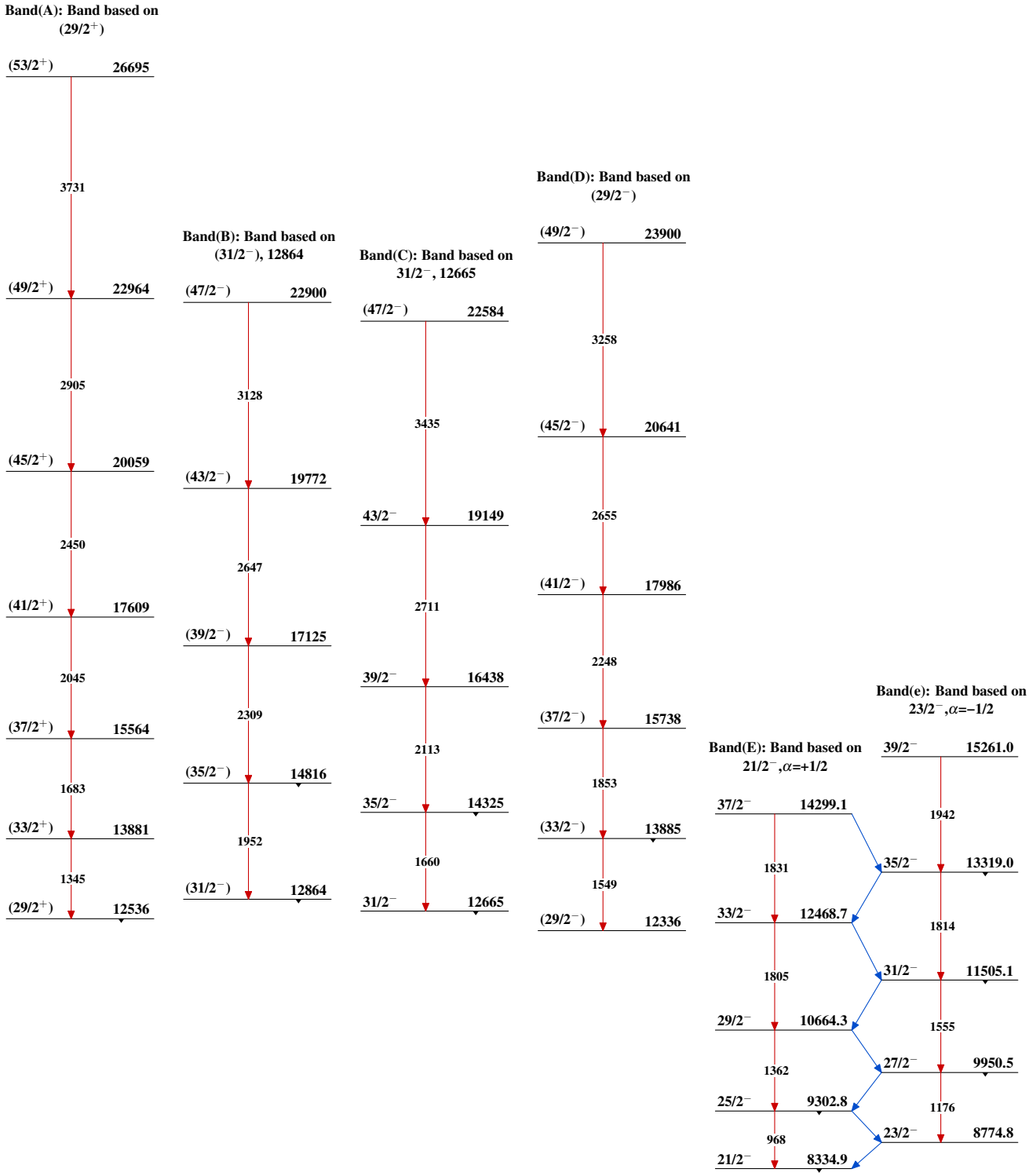
Intensities: Relative I_γ

γ Decay (Uncertain)



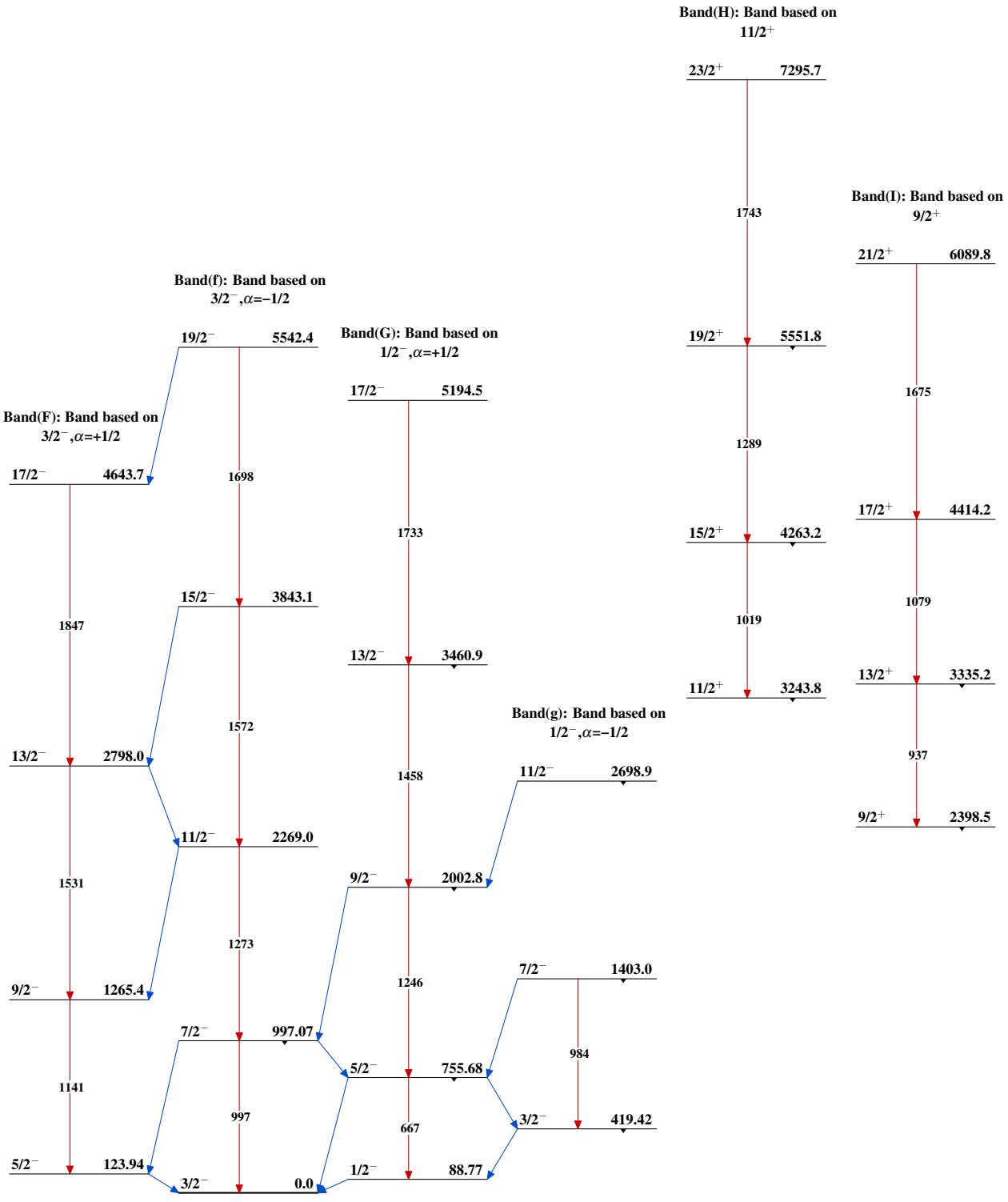
$^{61}_{30}Zn_{31}$

^{28}Si(^{36}Ar,2pnγ) 2009An01



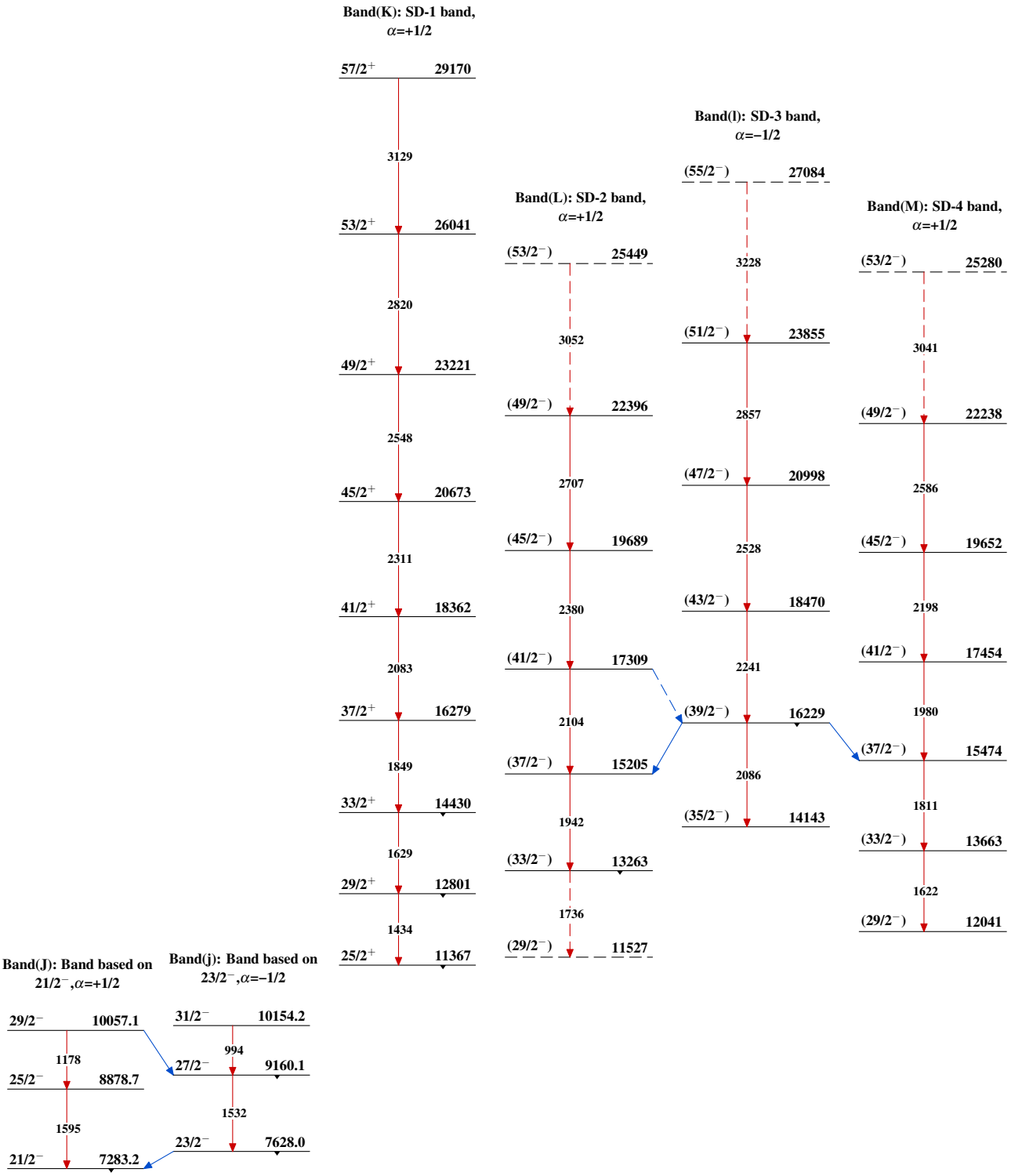
$^{61}_{30}Zn_{31}$

$^{28}Si(^{36}Ar,2pn\gamma)$ 2009An01 (continued)



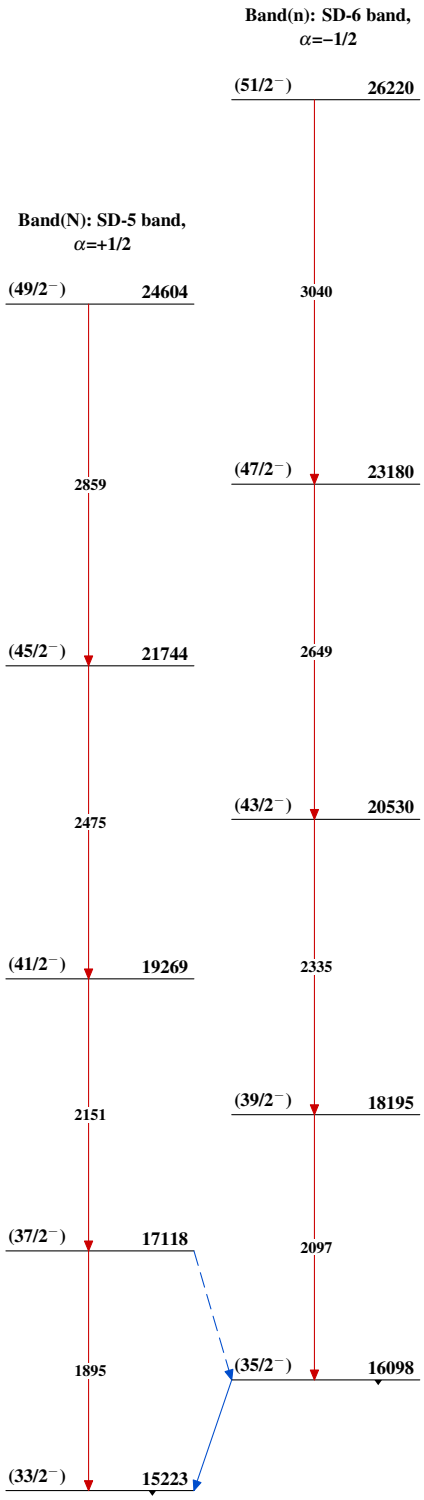
$^{61}_{30}Zn_{31}$

$^{28}Si(^{36}Ar,2pn\gamma)$ 2009An01 (continued)



$^{61}_{30}Zn_{31}$

$^{28}Si(^{36}Ar,2pn\gamma)$ 2009An01 (continued)



$^{61}_{30}Zn_{31}$