

⁴⁰Ca(⁴⁰Ca,2 α 2 γ) **2002Ra42**

Type	Author	Citation	Literature Cutoff Date
Full Evaluation	G. Gürdal, E. A. Mccutchan	NDS 136, 1 (2016)	1-Jul-2016

2002Ra42: E(⁴⁰Ca)=185 MeV. 99.96% enriched self-supporting ⁴⁰Ca target with a thickness of 0.9 mg/cm². γ -rays detected using Euroball III comprised of 15 Cluster and 26 Clover detectors. Charged particles detected with the silicon ball ISIS consisting of 40 Δ E-E telescopes. Measured E γ , I γ , $\gamma\gamma$, $\gamma\gamma\gamma$ and $\gamma(\theta)$. Multipolarities could not be deduced because $\gamma(\theta)$ found to be nearly isotropic within statistical uncertainties. J π based on literature, systematics and γ -coincidences. Additional experimental details provided in **2002RaZU**.

⁷⁰Se Levels

E(level) [†]	J π [‡]	E(level) [†]	J π [‡]	E(level) [†]	J π [‡]	E(level) [†]	J π [‡]
0 [#]	0 ⁺	4187.5 [@] 8	(8 ⁺)	7554.1 ^a 5	(13 ⁻)	11778.6 ^a 11	(19 ⁻)
944.52 [#] 5	2 ⁺	4410.8 3	(8 ⁻)	7940.94 [#] 22	(14 ⁺)	12267.8 ^{&} 5	(20 ⁺)
1600.02 [@] 11	2 ⁺	4607.0 ^{&} 3	(8 ⁺)	8017.8 ^b 4	(15 ⁻)	13160.6 [#] 14	(20 ⁺)
2038.93 [#] 11	4 ⁺	4896.84 ^b 24	(9 ⁻)	8029 [@] 5	(14 ⁺)	13181.5 ^b 10	(21 ⁻)
2382.6 [@] 3	4 ⁺	5205.86 [#] 17	10 ⁺	8316.3 ^{&} 3	(14 ⁺)	13727.0 ^a 13	(21 ⁻)
2518.7 4	3 ⁻	5209.1 ^a 3	(9 ⁻)	8771.9 ^a 6	(15 ⁻)	14257.8 ^{&} 10	(22 ⁺)
3003.32 [#] 12	6 ⁺	5308.2 [@] 10	(10 ⁺)	9430.3 ^{&} 3	(16 ⁺)	15252 ^b 3	(23 ⁻)
3218.5 [@] 5	(6 ⁺)	5693.2 ^b 3	(10 ⁺)	9496.3 [#] 4	(16 ⁺)	15806 ^a 7	(23 ⁻)
3387.52 22	5 ⁻	5805.5 ^b 3	(11 ⁻)	9624.2 ^b 5	(17 ⁻)	16490 ^{&} 3	(24 ⁺)
3524.1 3	5 ⁻	6490.1 ^a 4	(11 ⁻)	10084.2 ^a 7	(17 ⁻)	17870 ^b 4	(25 ⁻)
3644 10	(6 ⁺)	6510.32 [#] 19	12 ⁺	10646.2 ^{&} 4	(18 ⁺)	17966 ^a 7	(25 ⁻)
3788.9 3	6 ⁻	6602 [@] 5	(12 ⁺)	11120.6 7	(18 ⁺)	19218 ^{&} 5	(26 ⁺)
3915.53 ^a 15	7 ⁻	6873.1 ^b 4	(13 ⁻)	11268.6 [#] 10	(18 ⁺)	20246 ^a 8	(27 ⁻)
4037.73 [#] 16	8 ⁺	6956.9 ^{&} 4	(12 ⁺)	11532.3 ^b 9	(19 ⁻)		

[†] From a least-squares fit to E γ 's, by evaluators.
[‡] From **2002Ra42**, based on literature, systematics and γ -coincidences.
[#] Band(A): g.s. yrast band.
[@] Band(B): Band based on 1600, 2⁺.
[&] Band(C): Band based on 4607, (8⁺).
^a Band(D): Band based on 3915, 7⁻.
^b Band(E): Band based on 4896, (9⁻).

$\gamma(^{70}\text{Se})$

E γ [†]	I γ [†]	E _i (level)	J π _i	E _f	J π _f	E γ [†]	I γ [†]	E _i (level)	J π _i	E _f	J π _f
126.6 3	1.7 6	3915.53	7 ⁻	3788.9	6 ⁻	835.9 4	4.6 5	3218.5	(6 ⁺)	2382.6	4 ⁺
215 5	0.5 3	3218.5	(6 ⁺)	3003.32	6 ⁺	868.8 4	4.1 6	3387.52	5 ⁻	2518.7	3 ⁻
264.8 3	5.4 5	3788.9	6 ⁻	3524.1	5 ⁻	908.7 2	13.9 7	5805.5	(11 ⁻)	4896.84	(9 ⁻)
438.9 5	0.7 6	2038.93	4 ⁺	1600.02	2 ⁺	912.2 1	30 1	3915.53	7 ⁻	3003.32	6 ⁺
486.0 3	2.9 9	4896.84	(9 ⁻)	4410.8	(8 ⁻)	944.51 5	100.0 6	944.52	2 ⁺	0	0 ⁺
495.3 3	5.1 9	4410.8	(8 ⁻)	3915.53	7 ⁻	964.39 5	71 3	3003.32	6 ⁺	2038.93	4 ⁺
528.0 2	8.6 6	3915.53	7 ⁻	3387.52	5 ⁻	969.0 6	4.0 2	4187.5	(8 ⁺)	3218.5	(6 ⁺)
569 2	0.9 4	4607.0	(8 ⁺)	4037.73	8 ⁺	981.3 2	10.1 7	4896.84	(9 ⁻)	3915.53	7 ⁻
620.7 9	2.2 4	3003.32	6 ⁺	2382.6	4 ⁺	1005.5 7	1.4 4	3524.1	5 ⁻	2518.7	3 ⁻
655.5 1	4.4 9	1600.02	2 ⁺	944.52	2 ⁺	1034.4 1	45 1	4037.73	8 ⁺	3003.32	6 ⁺
691.5 6	2.8 4	4607.0	(8 ⁺)	3915.53	7 ⁻	1064.0 3	9.6 6	7554.1	(13 ⁻)	6490.1	(11 ⁻)
782.6 3	7.2 8	2382.6	4 ⁺	1600.02	2 ⁺	1067.5 2	11.7 6	6873.1	(13 ⁻)	5805.5	(11 ⁻)

Continued on next page (footnotes at end of table)

$^{40}\text{Ca}(^{40}\text{Ca},2\alpha2p\gamma)$ **2002Ra42** (continued) $\gamma(^{70}\text{Se})$ (continued)

E_γ^\dagger	I_γ^\dagger	$E_i(\text{level})$	J_i^π	E_f	J_f^π	E_γ^\dagger	I_γ^\dagger	$E_i(\text{level})$	J_i^π	E_f	J_f^π
1086.2 2	10.6 7	5693.2	(10 ⁺)	4607.0	(8 ⁺)	1574.1 9	4 1	2518.7	3 ⁻	944.52	2 ⁺
1094.4 1	89 3	2038.93	4 ⁺	944.52	2 ⁺	1600.1 7	1.1 2	1600.02	2 ⁺	0	0 ⁺
1114.0 3	6.3 6	9430.3	(16 ⁺)	8316.3	(14 ⁺)	1603.7 6	5.0 6	4607.0	(8 ⁺)	3003.32	6 ⁺
1120.7 6	2.9 6	5308.2	(10 ⁺)	4187.5	(8 ⁺)	1606.4 3	5.0 4	9624.2	(17 ⁻)	8017.8	(15 ⁻)
1144.7 2	5.7 4	8017.8	(15 ⁻)	6873.1	(13 ⁻)	1621.5 3	5.5 5	12267.8	(20 ⁺)	10646.2	(18 ⁺)
1168.12 8	29.5 5	5205.86	10 ⁺	4037.73	8 ⁺	1624.3 6	2.4 4	11120.6	(18 ⁺)	9496.3	(16 ⁺)
1215.9 2	9.1 17	10646.2	(18 ⁺)	9430.3	(16 ⁺)	1649.2 4	2.6 3	13181.5	(21 ⁻)	11532.3	(19 ⁻)
1217.8 3	9.7 6	8771.9	(15 ⁻)	7554.1	(13 ⁻)	1655.4 9	4.3 6	5693.2	(10 ⁺)	4037.73	8 ⁺
1261 10	0.5 2	3644	(6 ⁺)	2382.6	4 ⁺	1694.4 9	3.7 3	11778.6	(19 ⁻)	10084.2	(17 ⁻)
1263.6 3	6.3 6	6956.9	(12 ⁺)	5693.2	(10 ⁺)	1750.9 9	2.3 3	6956.9	(12 ⁺)	5205.86	10 ⁺
1280.9 2	10.3 6	6490.1	(11 ⁻)	5209.1	(9 ⁻)	1772.3 9	2.3 3	11268.6	(18 ⁺)	9496.3	(16 ⁺)
1293.6 3	15.0 8	5209.1	(9 ⁻)	3915.53	7 ⁻	1806.0 6	2.4 3	8316.3	(14 ⁺)	6510.32	12 ⁺
1294 5	1.1 6	6602	(12 ⁺)	5308.2	(10 ⁺)	1892 1	0.6 2	13160.6	(20 ⁺)	11268.6	(18 ⁺)
1304.45 9	26.3 9	6510.32	12 ⁺	5205.86	10 ⁺	1908.1 7	3.6 3	11532.3	(19 ⁻)	9624.2	(17 ⁻)
1312.3 3	6.9 5	10084.2	(17 ⁻)	8771.9	(15 ⁻)	1948.4 6	1.1 3	13727.0	(21 ⁻)	11778.6	(19 ⁻)
1348.6 4	7.2 8	3387.52	5 ⁻	2038.93	4 ⁺	1990.0 9	1.9 3	14257.8	(22 ⁺)	12267.8	(20 ⁺)
1359.4 3	6.7 5	8316.3	(14 ⁺)	6956.9	(12 ⁺)	2070 3	1.5 2	15252	(23 ⁻)	13181.5	(21 ⁻)
1427.2 9	1.1 6	8029	(14 ⁺)	6602	(12 ⁺)	2079 7	0.9 3	15806	(23 ⁻)	13727.0	(21 ⁻)
1430.6 1	18.6 8	7940.94	(14 ⁺)	6510.32	12 ⁺	2160 2	0.6 2	17966	(25 ⁻)	15806	(23 ⁻)
1438.1 7	6 3	2382.6	4 ⁺	944.52	2 ⁺	2232 3	0.5 3	16490	(24 ⁺)	14257.8	(22 ⁺)
1485.2 5	6.3 8	3524.1	5 ⁻	2038.93	4 ⁺	2280 4	0.5 3	20246	(27 ⁻)	17966	(25 ⁻)
1489.4 3	4.0 4	9430.3	(16 ⁺)	7940.94	(14 ⁺)	2618 2	0.6 4	17870	(25 ⁻)	15252	(23 ⁻)
1555.3 3	5.8 4	9496.3	(16 ⁺)	7940.94	(14 ⁺)	2728 4	0.4 2	19218	(26 ⁺)	16490	(24 ⁺)

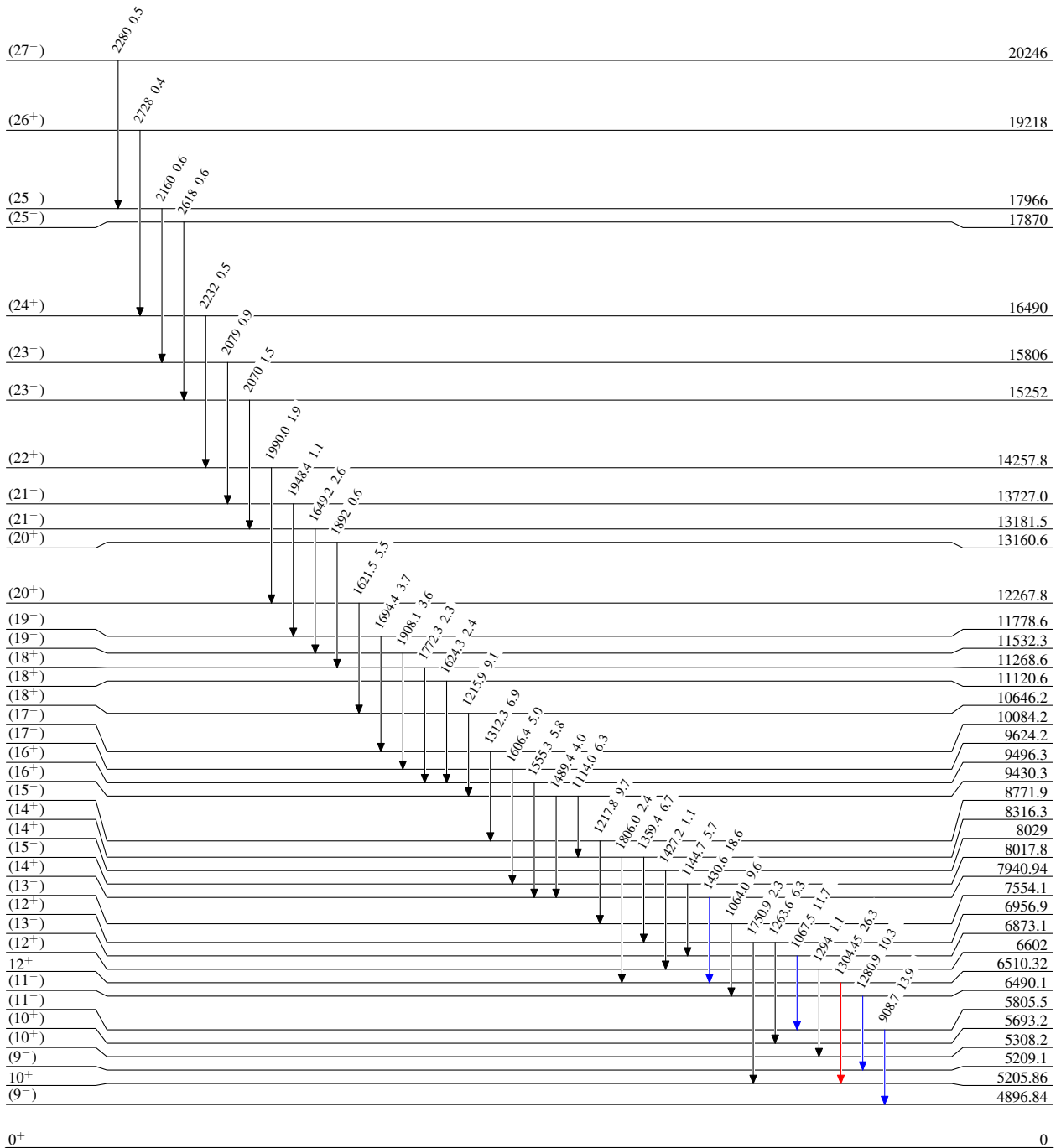
† From 2002RaZU.

$^{40}\text{Ca}(^{40}\text{Ca},2\alpha2p\gamma)$ 2002Ra42

Level Scheme
Intensities: Relative I_γ

Legend

- $I_\gamma < 2\% \times I_\gamma^{max}$
- $I_\gamma < 10\% \times I_\gamma^{max}$
- $I_\gamma > 10\% \times I_\gamma^{max}$



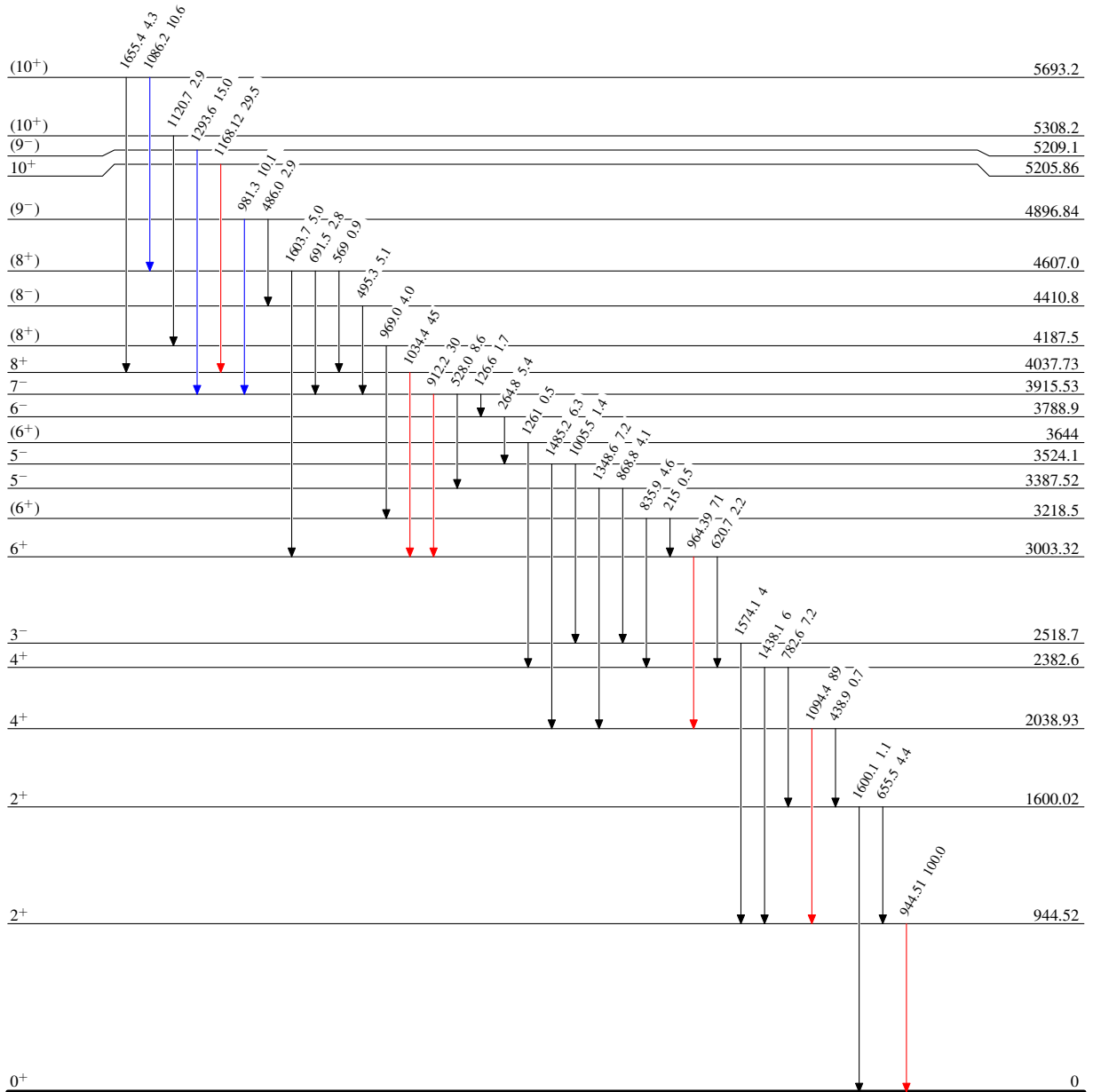
⁴⁰Ca(⁴⁰Ca,2 α 2p γ) 2002Ra42

Level Scheme (continued)

Intensities: Relative I _{γ}

Legend

- I _{γ} < 2% × I _{γ} ^{max}
- I _{γ} < 10% × I _{γ} ^{max}
- I _{γ} > 10% × I _{γ} ^{max}



⁷⁰Se₃₆

$^{40}\text{Ca}(^{40}\text{Ca}, 2\alpha 2p\gamma) \quad 2002\text{Ra}42$ 