

ISTITUTO NAZIONALE DI FISICA NUCLEARE

Sezione di Trieste

INFN/BE-91/11

16 dicembre 1991

Ugo Abbondanno

A COLLECTION OF DATA ON RESONANCES IN HEAVY-ION REACTIONS

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Dipartimento di Fisica dell'Università di Trieste

and

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A collection of experimental data on heavy-ion resonances (updated to December 1991) is presented. The compilation is limited to resonances for which both the center of mass wiz. excitation energy and spin have been determined. The compilation contains nineteen groups of data (Tables 1 to 19), in which the center-of-mass energies E_{cm} , the excitation energies E_x and the angular momenta L of resonances are reported for each nuclear system in which resonant behaviour has been observed. Each Table is accompanied by the corresponding reference list.

Table 1.
RESONANCES IN THE $^{12}\text{C}+^{12}\text{C}$ SYSTEM

E_{cm} (MeV)	E_x (MeV)	L-value	References
4.25	18.18	0	1
4.46	18.39	4	1
4.62	18.55	2	1
4.88	18.81	2	1
5.00	18.93	2	1
5.37	19.30	2	2
5.64	19.57	2	1,2
5.77	19.70	4	12
5.80	19.73	0	5
5.80	19.73	2	12
5.96	19.89	4	1,3,8
5.97	19.90	0	12
6.01	19.94	2	12
6.25	20.18	2	1,3,8
6.49	20.42	6	3
6.63	20.56	2	3,8,10
6.85	20.78	4	3,9,10
7.05	20.98	2	3
7.30	21.23	4	3,11
7.45	21.38	4	3,11
7.55	21.48	6	3,7,11
7.71	21.64	4	3,6,9,11
7.90	21.83	4	3,8,9,11
8.26	22.19	4	3,9,11
8.45	22.38	4	3,7,8,9,11
8.86	22.79	6	3,7,9,11
9.05	22.98	6	3,4,9,11
9.33	23.26	6	3
9.65	23.58	8	3,11
9.84	23.77	8	3,6,9,11
9.98	23.91	6	4
10.30	24.23	8	4
10.45	24.38	6	4
10.63	24.56	8	4
10.90	24.83	8	4,9
11.20	25.13	8	14
11.38	25.31	8	4,9

Table 1.-Continued
 RESONANCES IN THE $^{12}\text{C}+^{12}\text{C}$ SYSTEM

E_{cm} (MeV)	E_x (MeV)	L-value	References
11.90	25.83	8	4
12.36	26.29	8	4
12.98	26.91	8	4
13.35	27.28	10	4,13
13.80	27.73	10	4,13,14
14.30	28.23	10	4,13
15.30	29.23	10	4,13
17.75	31.68	12	4,13
18.30	32.23	12	15
18.40	32.33	12	4,13,16
19.25	33.18	12	4,13,17
19.30	33.23	14	18
19.45	33.38	12	13,17
19.5	33.43	14	17
19.8	33.73	14	18
20.2	34.13	14	15
20.4	34.33	14	18
22.	35.93	14	17
24.	37.93	16	19
24.3	38.23	16	20
30.	43.93	18	19
36.	49.93	20	19

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Phys. Lett. **128B** (1983) 375

Table 2.
RESONANCES IN THE $^{12}\text{C}+^{14}\text{C}$ SYSTEM

E_{cm} (MeV)	E_x (MeV)	L-value	References
23.77	43.00	18	1

References

- 1) D. Konnerth, W. Trombik, K.G. Bernhardt, K.A. Eberhard, R. Singh, A. Strzalkowski and W. Trautmann
 Nucl. Phys. **A436** (1985) 538

Table 3.
RESONANCES IN THE $^{13}\text{C}+^{13}\text{C}$ SYSTEM

E_{cm} (MeV)	E_x (MeV)	L-value	References
11.25	33.71	10	1
11.75	34.21	11	1

References

- 1) G.P. Gilfoyle and H.T. Fortune
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Table 4.
RESONANCES IN THE $^{14}\text{C}+^{14}\text{C}$ SYSTEM

E_{cm} (MeV)	E_x (MeV)	L-value	References
15.70	36.76	12	1,2,3
19.45	40.51	14	1,2,3
23.95	45.01	16	1,2,3
27.95	49.01	18	1,2,3

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- 3) D. Konnerth, W. Trombik, K.G. Bernhardt, K.A. Eberhard, R. Singh, A. Strzalkowski and W. Trautmann
 Nucl. Phys. **A436** (1985) 538

Table 5.
 RESONANCES IN THE $^{12}\text{C}+^{16}\text{O}$ SYSTEM

E_{cm} (MeV)	E_x (MeV)	L-value	References
7.72	24.47	4	1
8.45	25.20	4	1
9.26	26.01	6	1
10.15	26.9	8	1
10.90	27.65	5	2
11.81	28.56	8	1
12.7	29.5	7	3
12.77	29.52	8	4
12.90	29.65	6	5
13.14	29.89	8	1,6,7,8
13.30	30.05	8	8
13.70	30.45	8	3,6,7,8
13.7	30.5	9	9
14.0	30.8	9	3
14.25	31.00	9	8
14.35	31.10	9	3
14.7	31.5	9	10
14.8	31.6	9	3
15.60	32.35	6	11
16.7	33.5	10	8
17.3	34.1	11	12
17.3	34.1	12	8
17.9	34.7	10	11
17.98	34.73	11	8
18.3	35.1	10	13
18.55	35.30	10	8
18.87	35.62	10	14
19.15	35.90	11	14
19.70	36.45	14	9,15,16,17,18
19.9	36.7	12	14,19
20.5	37.3	12	18
20.7	37.5	13	12
20.89	37.64	13	14
21.14	37.89	12	14
21.47	38.22	13	14
22.0	38.8	13	18
22.0	38.8	15	9,18,20
22.0	38.8	16	9
22.1	38.9	15	17
22.6	39.4	14	14

Table 5.-Continued
 RESONANCES IN THE $^{12}\text{C}+^{16}\text{O}$ SYSTEM

E_{cm} (MeV)	E_x (MeV)	L-value	References
22.6	39.4	15	14
22.8	39.6	14	12
22.9	39.7	13	14
23.6	40.4	14	21
24.6	41.4	14	21
26.5	43.3	13	11
28.4	45.2	15	21
29.6	46.4	16	22

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Table 6.
RESONANCES IN THE $^{12}\text{C}+^{18}\text{O}$ SYSTEM

E_{cm} (MeV)	E_x (MeV)	L-value	References
11.6	35.2	10	1,2
12.0	35.6	10	3
12.7	36.3	10	1
14.0	37.6	12	3
14.4	38.0	11	1
16.6	40.2	14	3
16.7	40.3	13	1
19.0	42.6	15	4
20.0	43.6	16	3
21.8	45.4	17	4

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Table 7.
RESONANCES IN THE $^{14}\text{C}+^{16}\text{O}$ SYSTEM

E_{cm} (MeV)	E_z (MeV)	L-value	References
12.85	35.56	11	1
13.81	36.52	10	1
14.51	37.22	11	1
16.29	39.00	11	1
18.2	40.9	11	2
19.1	41.8	13	2
22.9	45.6	17	2
23.8	46.5	15	2

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Table 8.
RESONANCES IN THE $^{12}\text{C}+^{19}\text{F}$ SYSTEM

E_{cm} (MeV)	E_z (MeV)	L-value	References
18.0	40.9	14	1
20.7	43.7	16	1
22.1	45.1	17	1

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 Phys. Rev. Lett. **53** (1984) 548

Table 9.
RESONANCES IN THE $^{16}\text{O}+^{16}\text{O}$ SYSTEM

E_{cm} (MeV)	E_x (MeV)	L-value	References
9.7	26.2	2	1
10.7	27.2	4	1
11.3	27.8	6	1
12.0	28.5	8	1
14.35	30.89	10	2
14.39	30.93	6	2
14.57	31.11	10	2
14.79	31.33	10	2
15.1	31.6	10	2
15.2	31.7	10	3,4
15.8	32.3	10	2,5
15.9	32.4	8	2,5
16.0	32.5	8	4
16.10	32.6	8	2,5
16.32	32.86	12	6
17.0	33.5	12	4
17.3	33.8	12	2,6
17.67	34.21	10	6
18.0	34.5	12	4
19.8	36.3	14	4
25.6	42.1	16	7
29.3	45.8	18	7
33.6	50.1	22	7
38.2	54.7	24	7

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Table 10.
RESONANCES IN THE $^{12}\text{C}+^{20}\text{Ne}$ SYSTEM

E_{cm} (MeV)	E_x (MeV)	L-value	References
12.9	31.9	8	1
13.2	32.2	10	1
13.6	32.6	9	1
14.1	33.1	8	1
14.4	33.4	11	1

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 Phys. Rev. C**32** (1985) 1911

Table 11.
RESONANCES IN THE $^{12}\text{C}+^{24}\text{Mg}$ SYSTEM

E_{cm} (MeV)	E_x (MeV)	L-value	References
14.2	30.5	8	1
18.1	34.4	11	2
18.40	34.70	10	3
18.93	35.23	11	3
19.33	35.63	12	3
19.73	36.03	12	3
21.07	37.37	14	3

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Table 12.
RESONANCES IN THE $^{16}\text{O}+^{20}\text{Ne}$ SYSTEM

E_{cm} (MeV)	E_x (MeV)	L-value	References
17.4	35.8	12	1
18.5	36.9	12	1
24.2	42.6	17	1
24.5	42.9	18	2
24.7	43.1	17	1
27.9	46.3	20	2
31.7	50.1	22	2
35.5	53.9	24	2

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Table 13.
RESONANCES IN THE $^{16}\text{O}+^{24}\text{Mg}$ SYSTEM

E_{cm} (MeV)	E_x (MeV)	L-value	References
21.4	37.6	14	1
21.6	37.8	15	2
23.1	39.3	16	1
25.1	41.3	18	1
27.9	44.1	20	1,3,4,5
28.0	44.2	21	2,6
30.7	46.9	23	1,5
31.0	47.2	23	4,6
34.0	50.2	25	6
36.2	52.4	26	3,5
37.5	53.7	27	7
40.2	56.4	29	7
43.5	59.7	31	7
45.7	61.9	30	5

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Table 14.
RESONANCES IN THE $^{12}\text{C}+^{28}\text{Si}$ SYSTEM

E_{cm} (MeV)	E_x (MeV)	L-value	References
21.5	34.9	13	1
23.2	36.6	15	1,2
23.6	37.0	14	3
24.5	37.9	15	3
26.0	39.4	16	3
26.0	39.4	18	1,2
27.5	40.9	18	3
30.2	43.6	21	3
30.2	43.6	18	1,2
33.6	47.0	19	1,2
34.1	47.5	24	3

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Table 15.
RESONANCES IN THE $^{16}\text{O}+^{28}\text{Si}$ SYSTEM

E_{cm} (MeV)	E_x (MeV)	L-value	References
21.0	32.3	9	1,2
22.3	33.6	11	1
22.9	34.2	15	3
24.5	35.8	14	1
26.0	37.3	17	1
26.7	38.0	19	3
27.1	38.4	17	1
28.5	39.8	21	3
29.4	40.7	18	1
29.4	40.7	19	3
30.5	41.8	22	3
32.0	43.2	22	1
32.3	43.6	21	1
33.7	45.0	25	3
34.7	46.0	22	1
35.0	46.3	24	1

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Table 16.
RESONANCES IN THE $^{12}\text{C}+^{32}\text{S}$ SYSTEM

E_{cm} (MeV)	E_x (MeV)	L-value	References
25.8	37.3	12	1
28.1	39.6	16	1
29.6	41.1	18	1
32.6	44.1	18	1

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Table 17.
RESONANCES IN THE $^{24}\text{Mg}+^{24}\text{Mg}$ SYSTEM

E_{cm} (MeV)	E_x (MeV)	L-value	References
45.7	60.6	36	1,2
46.6	61.6	36	2
47.2	62.2	36	2

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Table 18.
RESONANCES IN THE $^{24}\text{Mg}+^{28}\text{Si}$ SYSTEM

E_{cm} (MeV)	E_x (MeV)	L-value	References
38.3	51.2	25	1
50.51	63.41	33	2
52.53	65.43	38	2

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Table 19.
RESONANCES IN THE $^{28}\text{Si}+^{28}\text{Si}$ SYSTEM

E_{cm} (MeV)	E_x (MeV)	L-value	References
50.5	61.4	34	1
53.0	63.9	36	1
55.5	66.4	38	1
59.0	69.9	40	1
64.0	74.9	42	1

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