Energy Levels of Light Nuclei
$A = 6$

F. Ajzenberg-Selove

University of Pennsylvania, Philadelphia, Pennsylvania 19104-6396

Abstract: An evaluation of $A = 5$–10 was published in *Nuclear Physics A*490 (1988), p. 1. This version of $A = 6$ differs from the published version in that we have corrected some errors discovered after the article went to press. The introduction and introductory tables have been omitted from this manuscript. Reference key numbers have been changed to the NNDC/TUNL format.

(References closed June 1, 1988)

The original work of Fay Ajzenberg-Selove was supported by the US Department of Energy [DE-FG02-86ER40279]. Later modification by the TUNL Data Evaluation group was supported by the US Department of Energy, Office of High Energy and Nuclear Physics, under: Contract No. DEFG05-88-ER40441 (North Carolina State University); Contract No. DEFG05-91-ER40619 (Duke University).

Table of Contents for $A = 6$

Below is a list of links for items found within the PDF document. The introductory Table 2 *is available on this website via the link.*

^{6}n
(Not illustrated)

^{6}n has not been observed: see (1979AJ01). See also (1984DE52) and (1987BE45; theor.).

^{6}H
(Fig. 4)

^{6}H has been reported in the ^{7}Li(^{7}Li, ^{8}B)^{6}H reaction at $E(^{7}\text{Li}) = 82$ MeV (1984AL08, 1985AL1G) [$\sigma(\theta) \approx 60$ nb/sr at $\theta = 10°$] and in the ^{9}Be(^{11}B, ^{14}O)^{6}H reaction at $E(^{11}\text{B}) = 88$ MeV(1986BE35) [$\sigma(\theta) \approx 16$ nb/sr at $\theta \approx 8°$]. ^{6}H is unstable with respect to breakup into $^{3}\text{H} + 3\text{n}$ by 2.7 ± 0.4 MeV, $\Gamma = 1.8 \pm 0.5$ MeV (1984AL08), 2.6 ± 0.5 MeV, $\Gamma = 1.3 \pm 0.5$ MeV (1986BE35). We adopt 2.7 ± 0.3 MeV, $\Gamma = 1.6 \pm 0.4$ MeV. See also (1987BO40). The atomic mass excess of ^{6}H using the (1988WA18) masses for ^{3}H and n, is then 41.9 ± 0.3 MeV. However, there is no evidence for the formation of ^{6}H in the ^{6}Li(π^-, π^+) reaction at $E_{\pi^-} = 220$ MeV (1987SE1C, 1988SEZJ; prelim.). The ground state of ^{6}H is calculated to have $J^\pi = 2^-$. Excited states are predicted at 1.78, 2.80 and 4.79 MeV with $J^\pi = 1^-$, 0^- and 1^+ [$(0+1)\ \hbar\omega$ model space] (1985PO10) [see also for $(0+2)\ \hbar\omega$ calculations]. See also (1986BE44, 1987GOZN), (1983PO1D, 1984AJ01, 1986FL1A, 1987AJ1A, 1987PE1C, 1988HA44) and (1987HA40, 1987KUZI; theor.).

^{6}He
(Figs. 1 and 4)

GENERAL: See also (1984AJ01).

Model calculations: (1983GA12, 1983LE14, 1984FI14, 1984PA08, 1984VA06, 1985EM01, 1985FI1E, 1986EM02, 1986FI07, 1986KU08, 1986KU1F, 1986VA13, 1986VO09, 1987DA1H, 1988KA1J).

Special states: (1984FI14, 1984FIZW, 1984VA06, 1985EM01, 1985FI1E, 1986EM02, 1986FI07, 1986KU08, 1986VA13, 1986VO09, 1986WI04, 1987BL18, 1987DA1G, 1987DA1H, 1987KO39, 1987KUZI, 1988DA1E).

Electromagnetic transitions: (1984VA1B, 1985FI1E, 1986FI07).

Complex reactions involving ^{6}He: (1982AL33, 1983AN13, 1983KU1B, 1983OL1A, 1984BA1H, 1984GL06, 1984KO1A, 1984LA27, 1984WE03, 1985BA1C, 1985BO1J, 1985JA18, 1985MA02, 1985MA13, 1985WO11, 1986AV1B, 1986CS1A, 1986EN1B, 1986MA1V, 1986SA30, 1986SIZS, 1986WE1C, 1987BA1I, 1987BA38, 1987BA39, 1987BO40, 1987GR11, 1987GU1L, 1987KO1Z, 1987PE1C, 1987TAZU, 1987WI09, 1987YA16, 1988AL1G, 1988LI1A, 1988ST06, 1988TA1A, 1988WO10).

Table 6.1: Energy levels of ^{6}He

E_x (MeV $\pm$ keV)	$J^\pi; T$	$\tau_{1/2}$ or Γ_{cm}	Decay	Reactions
g.s.	0^+; 1	$\tau_{1/2} = 806.7 \pm 1.5$ ms	β^-	1, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12, 13, 14, 15, 16, 17, 18, 20
1.797 ± 25	$(2)^+$; 1	$\Gamma = 113 \pm 20$ keV	n, α	3, 4, 5, 7, 8, 10, 11, 12, 13, 14, 15, 16, 20
(13.6 ± 500)	$(1^-, 2^-)$; 1	broad		4, 11, 14, 16
(15.5 ± 500)		4 ± 2 MeV		5, 6, 10, 11, 15, 16
(25 ± 1000)		8 ± 2 MeV		6
(32)		≤ 2 MeV		15
(36)		≤ 2 MeV		15

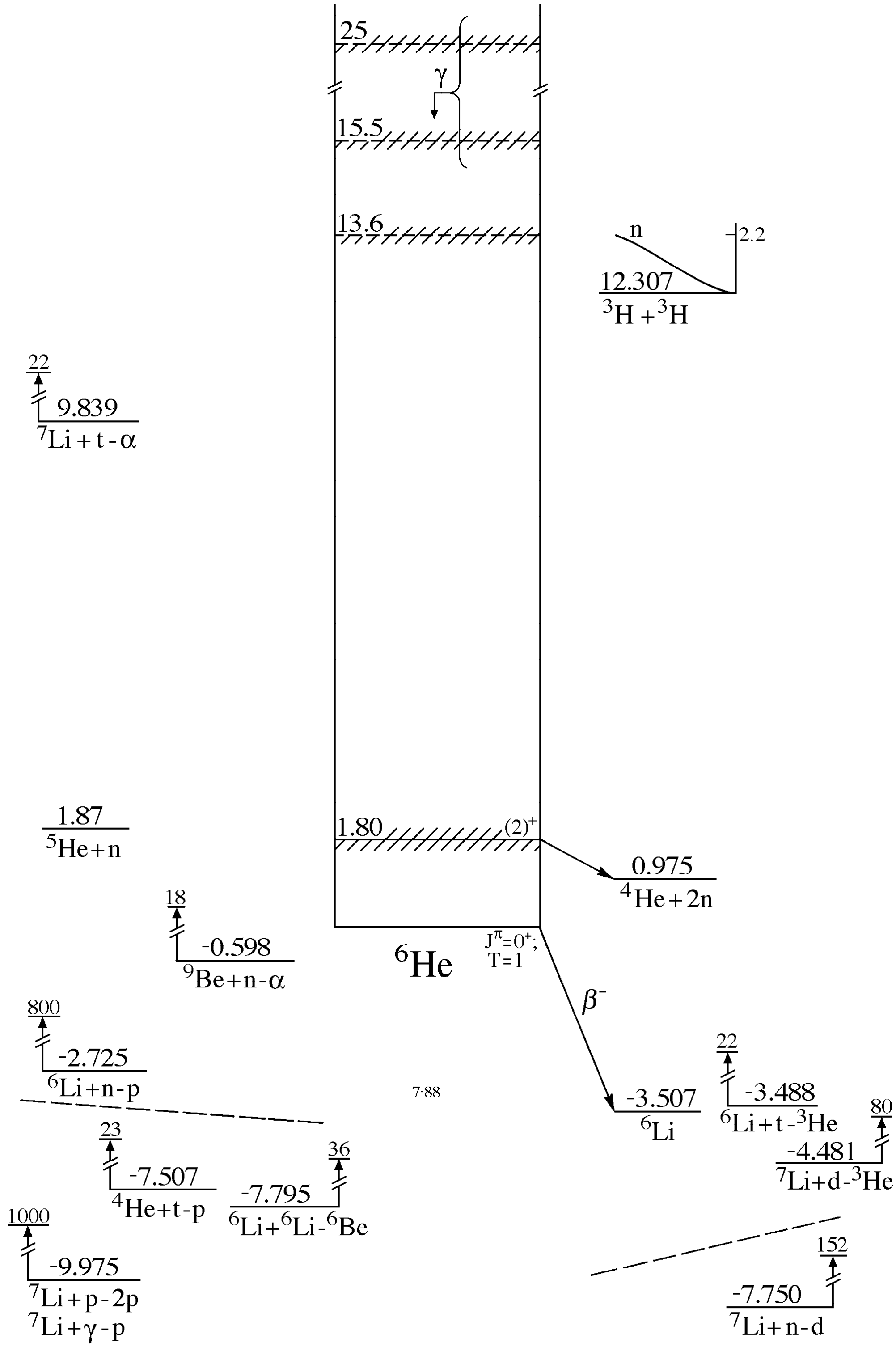
Applications: (1985TA1D).

Muon and neutrino capture and reactions: (1983JU01, 1984WA1J).

Reactions involving pions, other mesons and baryon states (see also reactions 4 and 5): (1982BE1D, 1984KO16, 1984RE1C, 1984ZA1A, 1985ER06, 1985RE1B, 1986AK1A, 1986HA1L, 1987FA1H, 1987JA1C).

Hypernuclei: (1982KA1D, 1982MO1B, 1982WA1A, 1983BA1D, 1983MO1C, 1983SH1E, 1984BO1D, 1984BO1G, 1984BO1H, 1984CH1G, 1984DZ1A, 1984KE1C, 1984MI1E, 1984MO1H, 1984ZH1B, 1985BA1E, 1985GU1J, 1985IK1A, 1985MO1F, 1986BO1E, 1986DA1B, 1986PO1G, 1986PO1H, 1986WA1J, 1986ZH1B, 1987BO1L, 1987BO1O, 1987CO1S, 1987DZ1B, 1987JI1A, 1987PO1H, 1987SU1K, 1987WA36, 1987YA1M, 1988GI1B, 1988JI1A, 1988PO1H, 1988TA29).

Fig. 1: Energy levels of ^{6}He. In these diagrams, energy values are plotted vertically in MeV, based on the ground state as zero. Uncertain levels or transitions are indicated by dashed lines; levels which are known to be particularly broad are cross-hatched. Values of total angular momentum J, parity, and isobaric spin T which appear to be reasonably well established are indicated on the levels; less certain assignments are enclosed in parentheses. For reactions in which ^{6}He is the compound nucleus, some typical thin-target excitation functions are shown schematically, with the yield plotted horizontally and the bombarding energy vertically. Bombarding energies are indicated in laboratory coordinates and plotted to scale in cm coordinates. Excited states of the residual nuclei involved in these reactions have generally not been shown; where transitions to such excited states are known to occur, a brace is sometimes used to suggest reference to another diagram. For reactions in which the present nucleus occurs as a residual product, excitation functions have not been shown; a vertical arrow with a number indicating some bombarding energy, usually the highest, at which the reaction has been studied, is used instead. Further information on the levels illustrated, including a listing of the reactions in which each has been observed, is contained in the master table, entitled “Energy levels of ^{6}He”.


25
γ
15.5
13.6
n
2.2
12.307
$^3H + ^3H$
22
9.839
$^7Li + t - \alpha$
1.87
$^5He + n$
1.80
(2)+
0.975
$^4He + 2n$
18
-0.598
$^9Be + n - \alpha$
^6He
$J^\pi = 0^+$; T=1
β-
800
-2.725
$^6Li + n - p$
7.88
-3.507
^6Li
22
-3.488
$^6Li + t - ^3He$
80
-4.481
$^7Li + d - ^3He$
23
-7.507
$^4He + t - p$
36
-7.795
$^6Li + ^6Li - ^6Be$
1000
-9.975
$^7Li + p - 2p$
$^7Li + \gamma - p$
152
-7.750
$^7Li + n - d$

Other topics: (1983BA1L, 1984FI14, 1985AN28, 1986KO1N, 1986KU1F, 1987AJ1A, 1988DA1E).

Ground state of ^{6}*He*: (1983ANZQ, 1983GR26, 1983LE14, 1984FR13, 1984PA08, 1985AN28, 1985FI1E, 1985SA32, 1986KU08, 1986VO09, 1987BL18, 1987HA30, 1987HA34, 1987SA15, 1988DAZW, 1988JO1C).

The interaction nuclear radius of ^{6}He is 2.18 ± 0.02 fm (1985TA18, 1985TA13) [see also for derived nuclear matter, charge and neutron matter rms radii].

1. ^{6}He(β^{-})^{6}Li $\qquad Q_{\rm m} = 3.507$

The decay proceeds to the ground state of ^{6}Li [$J^{\pi} = 1^{+}$] via a super-allowed Gamow-Teller transition. The half-life is 806.7 ± 1.5 msec; $\log ft = 2.910 \pm 0.002$: see (1984AJ01). See also (1986RO27), (1985GR1A) and (1983LE14, 1984BO03, 1984PA08, 1988SA2J; theor.).

2. (a) ^{3}H(t, n)^{5}He $\qquad Q_{\rm m} = 10.44 \qquad E_{\rm b} = 12.307$

(b) ^{3}H(t, 2n)^{4}He $\qquad Q_{\rm m} = 11.33216$

(c) ^{3}H(t, t)^{3}H

The cross section for reaction (b) has recently been measured for $E_{\rm t} = 30$ to 115 keV by (1986BR20, 1985JA16) who have also calculated the astrophysical S-factors [the extrapolated $S(0) \approx 180$ keV·b] and discussed the earlier measurements. See also (1974AJ01, 1979AJ01) and (1986JA1E; applied). For muon-catalyzed fusion see (1985ZI1C, 1987BR1V, 1987PO1M). See also (1984BY1A, 1984BY1B, 1984FI1F, 1985BU1B, 1985GU1G, 1985KA1M, 1985VA1B, 1986BA73, 1986BY1A, 1987PR08, 1987WY1A, 1988RYZW; theor.).

3. ^{4}He(t, p)^{6}He $\qquad Q_{\rm m} = -7.507$

Angular distributions of the protons to ^{6}He*(0, 1.80) have been measured at $E_{\rm t} = 22$ and 23 MeV. [No L-values were assigned.] No other states are observed with $E_{\rm x} \leq 4.2$ MeV: see (1979AJ01).

4. ^{6}Li(e, π^{+})^{6}He $\qquad Q_{\rm m} = -143.075$

(1986SH14) report breaks in (e, π^{+}) spectra at $E_{\rm e} = 202$ MeV corresponding to $E_{\rm x} = 7$, 9, 12, 13.6, 17.7 and 24.0 MeV. Using the shape of the virtual photon spectrum results in groups whose angular distributions suggest that the states at 13.6, 17.7 and 24.0 MeV are spin-dipole isovector states [$J^\pi = 1^-, 2^-$]. For the earlier work see (1984AJ01). [Note: The states reported here at 7, 9 and 12 MeV are inconsistent with the work reported in reactions 7, 8, 14 and 15, and with the work on the analog region in ^{6}Be].

5. (a) ^{6}Li(π^-, γ)^{6}He $\qquad Q_m = 136.062$
(b) ^{6}Li(π^-, π^0)^{6}He $\qquad Q_m = 1.097$

The excitation of ^{6}He*(0, 1.8) and possibly of (broad) states at $E_x = 15.6 \pm 0.5$, 23.2 ± 0.7 and 29.7 ± 1.3 MeV has been reported: see (1979AJ01). (1986PE05) have recently studied the capture branching ratios to ^{6}He*(0, 1.8). For reaction (b) see (1984AJ01).

6. ^{6}Li(n, p)^{6}He $\qquad Q_m = -2.725$

Angular distributions of the p_0 group have been reported at $E_n = 4.7$ to 6.8 MeV, at 14 MeV and at 59.6 MeV [see (1979AJ01, 1984AJ01)] and at 118 MeV (1987PO18; prelim.). At $E_n = 59.6$ MeV broad structures in the spectra are ascribed to states at $E_x = 15.5 \pm 0.5$ and 25 ± 1 MeV with $\Gamma = 4 \pm 1.5$ and 8 ± 2 MeV (1983BR32, 1984BR03) [see for discussions of the GDR strength]. The ground state reaction has also been studied at $E_n = 198$ MeV (1988JA01). See also (1986ALZJ, 1986POZX, 1988MIZX), (1986AU1D, 1987BR32, 1987HE22, 1988HA12) and (1983GM1A, 1985ER06, 1986ER1A; theor.).

7. ^{6}Li(d, 2p)^{6}He $\qquad Q_m = -4.949$

At $E_d = 55$ MeV, ^{6}He*(0, 1.8) [the latter weak] are populated: no other states are observed with $E_x \leq 25$ MeV [see (1984AJ01)].

8. ^{6}Li(t, ^{3}He)^{6}He $\qquad Q_m = -3.488$

The ground-state angular distribution has been studied at $E_t = 17$ MeV. At $E_t = 22$ MeV only ^{6}He*(0, 1.8) are populated for $E_x \leq 8.5$ MeV: see (1979AJ01). Differential cross sections for the transition to ^{6}He*(1.8) are reported at $E(^6\text{Li}) = 65$ MeV (1987AL23).

9. ^{6}Li(^{6}Li, ^{6}Be)^{6}He $\qquad Q_m = -7.795$

Angular distributions have been studied for $E(^6\text{Li}) = 32$ and 36 MeV for the transitions to $^6\text{He}_{\text{g.s.}}$, $^6\text{Be}_{\text{g.s.}}$ and, in inelastic scattering of ^{6}Li [see ^{6}Li], to the analog state ^{6}Li*(3.56): for a discussion of these see the references quoted in (1979AJ01).

10. (a) ^{7}Li(γ, p)^{6}He $\qquad Q_{\text{m}} = -9.975$

(b) ^{7}Li(e, ep)^{6}He $\qquad Q_{\text{m}} = -9.975$

At $E_\gamma = 60$ MeV, the proton spectrum shows two prominent peaks attributed to ^{6}He*($0 + 1.8$, 18 ± 3): see (1979AJ01). Reactions (a) and (b) have been studied by (1985SE17). See also ^{7}Li, (1984AJ01) and (1986BA2G; theor.).

11. ^{7}Li(n, d)^{6}He $\qquad Q_{\text{m}} = -7.750$

At $E_{\text{n}} = 60$ MeV, the deuteron spectrum shows two prominent peaks attributed to states centered at $E_{\text{x}} = 13.6$, 15.4 and 17.7 MeV (± 0.5 MeV) and a possible state or states (populated with an l_{p} transfer ≥ 2) at $E_{\text{x}} = 23.7$ MeV. DWBA analyses of the d_0 and d_1 groups are consistent with $l_{\text{p}} = 1$ and $S(1\text{p}_{3/2}) = 0.62$ for $^6\text{He}_{\text{g.s.}}$ and to $S(1\text{p}_{3/2}) = 0.37$, $S(1p_{1/2} = 0.32$ for ^{6}He*(1.8): see (1979AJ01).

12. ^{7}Li(p, 2p)^{6}He $\qquad Q_{\text{m}} = -9.975$

At $E_{\text{p}} = 1$ GeV the separation energy between 6–7 MeV broad $1\text{p}_{3/2}$ and $1\text{s}_{1/2}$ peaks is reported to be 14.1 ± 0.7 MeV (1985BE30, 1985DO16). See also (1983GO06) and (1979AJ01).

13. ^{7}Li(d, ^{3}He)^{6}He $\qquad Q_{\text{m}} = -4.481$

Angular distributions of the ^{3}He ions to ^{6}He*(0, 1.8) have been measured at $E_{\text{d}} = 14.4$ and 22 MeV: they have an $l_{\text{p}} = 1$ character and therefore these two states have $J^\pi = (0–3)^+$. There is no evidence for any other states of ^{6}He with $E_{\text{x}} < 10.7$ MeV: see (1979AJ01). (1987BO39) [$E_{\text{d}} = 30.7$ MeV] deduce that the branching ratio of ^{6}He*(1.8) into a dineutron [n^2: $T = 1$, $S = 0$] and an α-particle is 0.75 ± 0.10. See also (1985BO55) and (1987DA31; theor.).

14. ^{7}Li(t, α)^{6}He $\qquad Q_{\text{m}} = 9.839$

The energy of the first-excited state is 1.797 ± 0.025 MeV, $\Gamma = 113 \pm 20$ keV. ^{6}He*(1.80) decays into ^{4}He + 2n. The branching ratio $\Gamma_\gamma/\Gamma_\alpha \leq 2 \times 10^{-6}$: for $\Gamma_{\rm c.m.} = 113 \pm 20$ keV, $\Gamma_\gamma \leq 0.23$ eV. Angular distributions of the α_0 and α_1 groups have been measured at $E_{\rm t} = 13$ and 22 MeV. No other α-groups are reported corresponding to ^{6}He states with $E_{\rm x} < 24$ MeV (region between $E_{\rm x} \approx 13$ and 16 MeV was obscured by the presence of breakup α-particles): see (1979AJ01). Angular distributions have been recently reported at $E_{\rm t} = 0.151$ and 0.272 MeV (1987AB09; α_0, α_1) and at $E(^7\text{Li}) = 31$ MeV. (1987AL23; to ^{6}He*(0, 1.8, 13.6)).

15. ^{7}Li(^{3}He, p^{3}He)^{6}He $\qquad Q_{\rm m} = -9.975$

At $E(^3\text{He}) = 120$ MeV the missing mass spectra show ^{6}He*(0, 1.8) and a strong, broad peak corresponding to ^{6}He*(16) [possibly due to unresolved states]. There is no indication of a state near 23.7 MeV but there is some evidence of structures at $E_{\rm x} = 32.0$ and 35.7 MeV, with $\Gamma \leq 2$ MeV (1985FR01).

16. (a) ^{7}Li(^{6}Li, ^{7}Be)^{6}He $\qquad Q_{\rm m} = -4.369$
(b) ^{7}Li(^{7}Li, ^{8}Be)^{6}He $\qquad Q_{\rm m} = 7.280$

In reaction (a) at $E(^6\text{Li}) = 93$ MeV a broad peak ($\Gamma = 5.5$ MeV) is reported at $E_{\rm x} = 14$ MeV. A second structure may also be present at 15.5 MeV (1987GLZW, 1988BUZH; prelim.). ^{6}He*(0, 1.8) are also populated (1988BUZH). For reaction (b) see ^{8}Be. See also ^{7}Be, (1984AJ01), (1988BU1Q) and (1984BA53; theor.).

17. ^{9}Be(n, α)^{6}He $\qquad Q_{\rm m} = -0.598$

Angular distributions have been reported for $E_{\rm n} = 12.2$ to 18.0 MeV (α_0, α_1). No other states are observed with $E_{\rm x} \leq 7$ MeV: see (1979AJ01). For a study of possible dineutron breakup of ^{6}He*(1.8) see (1983OT02). See also ^{10}Be and (1983SH1J).

18. ^{9}Be(^{6}Li, ^{9}B)^{6}He $\qquad Q_{\rm m} = -4.575$

See ^{9}B.

19. ^{10}B(n, pα)^{6}He $\qquad Q_{\rm m} = -7.184$

Not observed: see (1984TU02).

20. ^{11}B(^{7}Li, ^{12}C)^{6}He $\qquad Q_{\rm m} = 5.983$

At $E(^{11}{\rm B}) = 88$ MeV the population of the ground state and the first-excited state at $E_{\rm x} = 1.8 \pm 0.3$ MeV ($\Gamma \leq 0.2$ MeV) is reported (1987BEYI). See also (1988BEYJ).

^{6}Li

(Figs. 2 and 4)

GENERAL: See also (1984AJ01).

Shell model: (1983LE14, 1983VA31, 1984AS07, 1984PA08, 1984REZZ, 1984VA06, 1984ZW1A, 1985ER06, 1985FI1E, 1985LO1A, 1986AV08, 1986LE21, 1987KI1C, 1988WO04).

Cluster and α-particle models: (1981PL1A, 1982WE15, 1983CA13, 1983DZ1A, 1983FO03, 1983GA12, 1983GO17, 1983SA39, 1983SM04, 1984BE37, 1984CO08, 1984DU17, 1984GL02, 1984JO1A, 1984KH05, 1984KR10, 1984KU03, 1984LA33, 1984MI1F, 1984PA08, 1984PL1A, 1984WA02, 1984WA1H, 1985BE60, 1985BO05, 1985BO11, 1985FI1E, 1985KH07, 1985KW02, 1985KW03, 1985LE08, 1985LI1F, 1985LO02, 1985ME02, 1985OS03, 1985SA1B, 1985ZH1A, 1986AV08, 1986BU07, 1986CHZX, 1986ESZY, 1986FI07, 1986GE05, 1986KR12, 1986KR1E, 1986KU08, 1986KU1F, 1986SA15, 1986SA1D, 1986SR02, 1986VA13, 1986VO09, 1987IM04, 1987KR07, 1987LE33, 1987LO16, 1987TA06, 1987ZH1E, 1988CH05, 1988CO1B, 1988FR1E, 1988KA1J, 1988KU1C, 1988US1A).

Special states: (1981PL1A, 1983BI1C, 1983RO12, 1983VA31, 1984AS07, 1984DU17, 1984FI14, 1984FIZW, 1984OH01, 1984REZZ, 1984VA06, 1984WA02, 1984ZW1A, 1985AL12, 1985BA68, 1985BE60, 1985FI1E, 1985GO07, 1985KW03, 1985ME02, 1985MI10, 1985OS03, 1985PO09, 1985WI1A, 1985ZH1A, 1986AK1C, 1986BU07, 1986EL1A, 1986FI07, 1986GE05, 1986KU08, 1986SA15, 1986VA13, 1986VO09, 1987KI1C, 1987KO39, 1987KR07, 1987KUZI, 1987SV1A, 1987WA36, 1987ZH1E, 1988US1A).

Electromagnetic transitions and giant resonances: (1983GM1A, 1984AS07, 1985FI1E, 1985GO23, 1985ME02, 1986AK1C, 1986ER1A, 1986FI07, 1986ME13, 1986SR02, 1986VA13, 1987KI1C, 1987KR07, 1987ZH1E).

Astrophysical questions: (1982AU1A, 1982CA1A, 1982GR1A, 1982WA1B, 1984RA1E, 1984TR1C, 1985BO1E, 1985BO1K, 1985HO1A, 1985MI1E, 1985SC1C, 1985WA1K, 1986HU1D, 1986LA27, 1986RE1C, 1987AL1C, 1987AR1J, 1987AR1C, 1987AU1A, 1987HO1M, 1987MA2C, 1987PA1F, 1987RO25, 1988RE1B).

Complex reactions involving ^{6}*Li*: (1983CH23, 1983GU1A, 1983GU1B, 1983KU1B, 1983MA53, 1983MU08, 1983NA08, 1983OL1A, 1983SA39, 1983ST1A, 1984BA1H, 1984BE1E, 1984CO08, 1984EC01, 1984EV1A, 1984GO03, 1984GR08, 1984HI1A, 1984KH05, 1984MO29, 1984NE1A, 1984RE14, 1984ST1B, 1984TS03, 1984UM04, 1985BO11, 1985FA02, 1985GL06, 1985GO20, 1985GU11, 1985JA18, 1985MA02, 1985MA13, 1985MO17, 1985MO24, 1985PO09, 1985ST1B, 1985WI1A, 1985WO11, 1986CH10, 1986CS1A, 1986HA1B, 1986JO1A, 1986KA1C, 1986KA1R, 1986LIZP, 1986ME06, 1986RA02, 1986SA1K, 1986SA1N, 1986SA30, 1986SAZJ, 1986SAZK, 1986SAZL, 1986SIZS, 1986SR02, 1986TA1G, 1986TA1M, 1986WE1C, 1986XU1B, 1986YA1L, 1987AR19, 1987AU1C, 1987BA38, 1987BA39, 1987BL13, 1987BL1K, 1987CH08, 1987CH26, 1987CH33, 1987CH32, 1987DE37, 1987DO13, 1987DU07, 1987FA01, 1987FA02, 1987FE1A, 1987FR1G, 1987GE1B, 1987GL05, 1987GR11, 1987HA45, 1987JA06, 1987JE03, 1987KO15,

Table 6.2: Energy levels of ^{6}Li

E_x (MeV $\pm$ keV)	$J^\pi; T$	Γ_{cm} (MeV)	Decay	Reactions
g.s.	$1^+; 0$		stable	1, 2, 3, 4, 7, 8, 9, 10, 11, 12, 13, 14, 15, 16, 17, 18, 19, 20, 21, 22, 23, 24, 25, 26, 27, 28, 29, 30, 31, 32, 33, 34, 35, 36, 37, 38, 40, 41, 42, 43, 44, 45, 46, 47, 48, 49, 50, 51, 52, 53, 54
2.186 ± 2	$3^+; 0$	0.024 ± 0.002	γ, d, α	1, 2, 3, 6, 7, 8, 12, 13, 14, 15, 16, 18, 19, 20, 21, 24, 25, 28, 29, 30, 31, 32, 33, 35, 37, 39, 40, 41, 42, 48, 49
3.56288 ± 0.10	$0^+; 1$	$(8.2 \pm 0.2) \times 10^{-6}$	γ	1, 3, 11, 12, 13, 15, 16, 17, 18, 20, 29, 31, 32, 33, 35, 37, 54
4.31 ± 22	$2^+; 0$	1.7 ± 0.2 [a]	γ, d, α	1, 6, 12, 13, 15, 16, 24, 31, 35, 48
5.366 ± 15	$2^+; 1$	0.540 ± 0.020	γ, n, p, α	1, 12, 15, 31, 32, 33, 35
5.65 ± 50	$1^+; 0$	1.5 ± 0.2	d, α	6, 15, 33, 35
(15.8)	$3^+; 0$	17.8 ± 0.8	d, α	6
21.0	$2^-; 1$	broad	t, ^{3}He	1
21.5	$0^-; 1$	broad	t, ^{3}He	1
(23 ± 2000)	$4^+; 0$	12 ± 2	d, α	1, 6
25.0 ± 1000	$4^-; 1$	≈ 4	γ, n, t, ^{3}He	1
26.6 ± 400 [b]	$3^-; 0$	broad	γ, n, d, t, ^{3}He, α	1
(31)	(3^+)	broad	d, t, ^{3}He, α	1

[a] See also Tables 6.4 and 6.5.

[b] See also Table 6.3. For other possible states at high E_x see reactions 6, 31, 33 and 38.

1987LY04, 1987LY1D, 1987NA01, 1987PO23, 1987RO10, 1987SA21, 1987TAZU, 1987TR05, 1987VE1D, 1987WA09, 1987YA16, 1988BE09, 1988BL09, 1988CA06, 1988CEZZ, 1988FR1B, 1988FR1F, 1988GO1H, 1988KI05, 1988RU01, 1988SA19, 1988SH1E, 1988ST06, 1988TA1A, 1988TS03, 1988VA1E, 1988WO10).

Polarization of ^{6}Li (See also "Complex reactions" and "Applications"): (1984JO1A, 1984NI01, 1986CH1Q, 1986SA15, 1986TA1G, 1987FI1D, 1988FR1E).

Applications: (1983AM1A, 1983AS03, 1986AU1A, 1986CL1C, 1986EN1A, 1986FI1D, 1986MA1S, 1986SA1M, 1986ST1E, 1986SU1K, 1986ZA1C, 1987DO07).

Muon and neutrino capture and reactions: (1983GM1A, 1983GU10, 1983JU01, 1983MI14, 1984RO1B, 1984WA1J, 1987KU23, 1987SU06).

Reactions involving pions, other mesons and baryon states (See also reactions 3, 13, 29 and 30): (1982BE1D, 1982RA28, 1983AB1B, 1983AS1B, 1983BA26, 1983BA1A, 1983BA1G, 1983DZ1A, 1983FE07, 1983GE12, 1983GM1A, 1983HE17, 1983LO10, 1983PO1D, 1984ABZY, 1984BA1U, 1984BO1H, 1984BR22, 1984EF03, 1984GE1B, 1984GL02, 1984GL09, 1984JI03, 1984KO16, 1984KR10, 1984KU13, 1984MO09, 1984MO1H, 1984NA1D, 1984RE1C, 1984TR1B, 1984ZA1A, 1985BE1C, 1985CA1B, 1985DO19, 1985ER06, 1985LA20, 1985MA1G, 1985MO1F, 1985RE1B, 1985RO17, 1985ST1A, 1986AK1A, 1986AS1A, 1986BA1W, 1986CE04, 1986CH1I, 1986ER1A, 1986FI1A, 1986GE05, 1986HA1L, 1986HU1B, 1986PE05, 1986RA1J, 1986RO03, 1986SH14, 1986SZ1A, 1986WH01, 1986YO06, 1986ZO1A, 1987BE2A, 1987BO1P, 1987BU20, 1987CH10, 1987GM02, 1987GM04, 1987HA40, 1987JA1C, 1987LE1E, 1987LE1B, 1987MA1I, 1987NA04, 1987PO1H, 1987RA1I, 1987SE1C, 1987WE1A, 1987YO01, 1988BA1F, 1988BA1G, 1988FR1E, 1988GA1A, 1988GIZT, 1988GIZU, 1988KA1J, 1988ROZZ).

Reactions involving antiprotons: (1984GU06, 1985DU05, 1985LE1B, 1986DU10, 1986KO1E, 1987AS06, 1987GR1I, 1987PO05).

Hypernuclei: (1982KA1D, 1982MO1B, 1983FE07, 1983MA1F, 1983MO1C, 1983PO1D, 1983SH38, 1984BO1H, 1984HA1D, 1984MA1G, 1984MO09, 1985MO1F, 1986BA1W, 1986ER1A, 1986HU1B, 1986MA1C, 1986SZ1A, 1987PO1H, 1988BA1F, 1988BA1G, 1988GA1A, 1988HA44).

Other topics: (1983BI1C, 1983FO03, 1983RO12, 1984FI14, 1984NA19, 1984OH01, 1985AN28, 1985GO07, 1985GO23, 1985MI10, 1985PO09, 1986KO1N, 1986KU1F, 1986MA1X, 1987AJ1A, 1987SV1A, 1988HA1K).

Ground-state properties of ^{6}Li: (1983ANZQ, 1983FO03, 1983GR26, 1983KU06, 1983LE14, 1983VA31, 1984BE37, 1984BR25, 1984DU17, 1984GE05, 1984GL02, 1984KO1H, 1984KU03, 1984KU06, 1984MI1A, 1984MI1F, 1984MIZM, 1984NI01, 1984OH01, 1984PA08, 1985AL12, 1985AN28, 1985BE60, 1985BO05, 1985CL1A, 1985FI1E, 1985HA18, 1985KH07, 1985LO1A, 1985ME02, 1985SA32, 1985SH1A, 1985WI1A, 1985ZH1A, 1985ZI05, 1986ESZY, 1986GL1A, 1986KO1U, 1986KU08, 1986LA27, 1986LE21, 1986ME13, 1986OS07, 1986RO03, 1986SY1A, 1986VO09, 1987HA34, 1987KI1C, 1987KR07, 1987LE1C, 1987LO16, 1987SV1A, 1988CH05, 1988CO1B, 1988POZS, 1988VA03, 1988WO04).

$\mu = +0.8220467(6)$ nm, $+0.8220560(4)$ nm: see (1978LEZA),
$Q = -0.83$ mb (1984SU09).

The interaction nuclear radius of ^{6}Li is 2.09 ± 0.02 fm (1985TA18) [see also for derived matter, charge and neutron matter rms radii].

Isotopic abundance: (7.5 ± 0.2)% (1984DE53). See also (1987LA1J, 1988LA1C).

For estimates of the parity-violating α-decay width of ^{6}Li*(3.56) [0^+; $T = 1$] see (1983RO12, 1984BU01, 1986BU07).

1. (a) ^{3}He(^{3}H, γ)^{6}Li $\quad Q_m = 15.7955$
   (b) ^{3}He(^{3}H, n)^{5}Li $\quad Q_m = 10.13 \quad E_b = 15.7955$
   (c) ^{3}He(^{3}H, d)^{4}He $\quad Q_m = 14.32049$
   (d) ^{3}He(^{3}H, ^{3}H)^{3}He

Capture γ-rays (reaction (a)) to the first three states of ^{6}Li [γ_0, γ_1, γ_2] have been observed for E(^{3}He) $= 0.5$ to 25.8 MeV, while the yields of γ_3 and γ_4 have been measured for E(^{3}He) $= 12.6$ to 25.8 MeV. The γ_2 excitation function does not show resonance structure. However, the γ_0, γ_1, γ_3 and γ_4 yields do show broad maxima at E(^{3}He) $= 5.0 \pm 0.4$ [γ_0, γ_1], 20.6 ± 0.4 [γ_1], ≈ 21 [γ_3] and 21.8 ± 0.8 [γ_4] MeV. The magnitude of the ground-state-capture cross section is well accounted for by a direct-capture model; that for the γ_1 capture indicates a non-direct contribution above E(^{3}He) $= 10$ MeV, interpreted as a resonance due to a state with $E_x = 25 \pm 1$ MeV, $\Gamma_{cm} = 4$ MeV, $T = 1$ (because the transition is E1, to a $T = 0$ final state) [the E1 radiative width $|M|^2 \geq 5.2/(2J + 1)$ W.u.], $J^\pi = (2, 3, 4)^-$, $\alpha + p + n$ parentage. The γ_4 resonance is interpreted as being due to a broad state at $E_x = 26.6$ MeV with $T = 0$. $J^\pi = 3^-$ is consistent with the measured angular distribution. The ground and first excited state reduced widths for ^{3}He + t parentage, $\theta_0^2 = 0.8 \pm 0.2$ and $\theta_1^2 = 0.6 \pm 0.3$: see (1974AJ01). See also (1985MOZZ, 1986MOZQ, 1987MO1I; theor.).

The angular distribution and polarization of the neutrons in reaction (b) have been measured at E(^{3}He) $= 2.70$ and 3.55 MeV. The excitation function for E(^{3}He) $= 0.7$ to 3.8 MeV decreases monotonically with energy. The excitation function for n_0 has been measured for E(^{3}He) $= 2$ to 6 MeV and for E(^{3}He) $= 14$ to 26 MeV; evidence for a broad structure at E(^{3}He) $= 20.5 \pm 0.8$ MeV is reported [^{6}Li*(26.1)]: see (1979AJ01).

Angular distributions of deuterons (reaction (c)) have been measured for $E_t = 1.04$ to 3.27 MeV and at E(^{3}He) $= 0.29$ to 32 MeV. Polarization measurements are reported for $E_t = 9.02$ to 17.27 MeV [see (1979AJ01)], as well as at $E(^3\vec{\mathrm{He}}) = 18.0$ and 33.0 MeV (1986RA1C). See also (1986KO1K) and (1985CA41).

Elastic scattering (reaction (d)) angular distributions have been measured at E(^{3}He) $= 5.00$ to 32.3 MeV and excitation functions have been reported for E(^{3}He) $= 4.3$ to 33.4 MeV: see (1979AJ01). At the lower energies the elastic yield is structureless and decreases monotonically with energy. Polarization measurements are reported for $E_t = 9.02$ to 33.3 MeV. A strong change

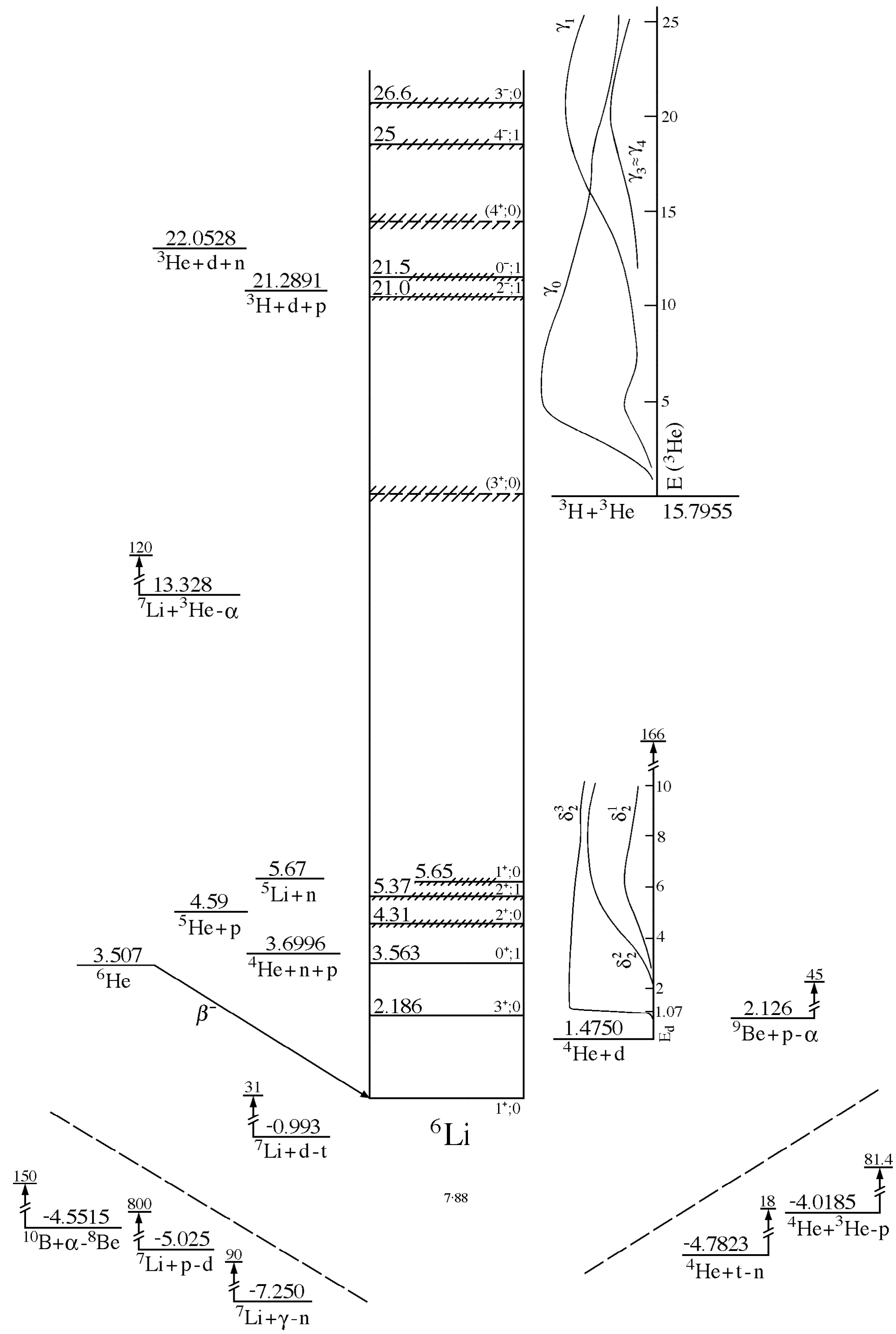


Fig. 2: Energy levels of ^{6}Li. For notation see Fig. 1.

occurs in the analyzing power angular distributions at $E_{\rm t} = 15$ MeV. A phase-shift analysis [single level R-matrix formalism, $L \leq 4$] yields P-states [0^-, 2^-; $T = 1$] at $E_{\rm x} \approx 21.5$ and 21.0 MeV and F-states [3^-, 4^-; $T = 1$] at $E_{\rm x} \approx 26.7$ and 25.7 MeV. There is some indication also of $T = 0$, 3^-, 5^- and 3^+ states at $E_{\rm x} \approx 25$, 29.5 and 31.5 MeV whose decay is presumably primarily by $\rm d + \alpha$: see (1979AJ01).

For other channels see (1984AJ01). See also (1984KR1B; theor.).

2. ^{3}H(α, n)^{6}Li $\qquad Q_{\rm m} = -4.7823$

^{6}Li*(0, 2.19) have been populated: see (1974AJ01). See also ^{7}Li, (1983CO1E) and (1983FU11; theor.).

3. ^{3}He(^{3}He, π^+)^{6}Li $\qquad Q_{\rm m} = -123.792$

Differential cross sections are reported for the transitions to ^{6}Li*(0, 2.19) for E(^{3}He) $= 350$, 420, 500 and 600 MeV (1983LE26). See also (1984AJ01), (1983BR31, 1983JA13) and (1984GE05; theor.).

4. ^{4}He(d, γ)^{6}Li $\qquad Q_{\rm m} = 1.4750$

No resonance has been observed corresponding to formation of ^{6}Li*(3.56) [0^+; $T = 1$]: the parity-forbidden $\Gamma_\alpha \leq 6 \times 10^{-7}$ eV (1984RO04). See also Table 6.2.

The cross section for the capture cross section has been measured for $E_\alpha = 3$ to 25 MeV by detecting the recoiling ^{6}Li ions: the direct capture is overwhelmingly E2 with a small E1 contribution. The spectroscopic overlap between the ^{6}Li$_{\rm g.s.}$ and $\alpha + \rm d$ is 0.85 ± 0.04: see (1984AJ01). See also (1982KI11), (1985CA41, 1986LA22, 1986LA27) and (1984AK01, 1985AK1B, 1986AK1C, 1986BA1R; theor.).

5. (a) ^{4}He(d, np)^{4}He $\qquad Q_{\rm m} = -2.22459 \qquad E_{\rm b} = 1.4750$

(b) ^{4}He(d, t)^{3}He $\qquad Q_{\rm m} = -14.32049$

Reaction (a) has been studied to $E_\alpha = 165$ MeV and to $E_{\rm d} = 21.0$ MeV: see (1979AJ01, 1984AJ01). Recent measurements are reported at $E_{\vec{\rm d}} = 5.4$, 6.0 and 6.8 MeV (1985LU08; VAP, TAP), 6 to 11 MeV (1985OS02; VAP), 10.05 MeV (1983BR23; VAP, TAP) and 12.0 and 21.0 MeV (1983IS10; VAP, TAP) and at $E_\alpha = 11.3$ MeV (1987BR07). It is clear that Coulomb effects need to be taken into account to understand the data. See also (1986DO1K).

(1986BR1N, 1986VUZZ, 1986VU1B, 1987VU1A; prelim.) have measured VAP and TAP at $E_{\vec{d}} = 35$ and 45 MeV in reaction (b). See also (1987GAZZ). For the earlier work, and for the other breakup channels, see (1974AJ01, 1979AJ01, 1984AJ01). See also (1988PUZZ) and (1983BA42, 1985DO03, 1986KO1J, 1987KA1M, 1987KUZI, 1987MI06, 1988KA1J, theor.).

6. ^{4}He(d, d)^{4}He $E_b = 1.4750$

Elastic differential cross-section and polarization measurements have been carried out up to $E_\alpha = 166$ MeV and $E_d = 45$ MeV: see (1974AJ01, 1979AJ01, 1984AJ01). Recent measurements are reported at $E_d = 0.87$ to 1.43 MeV (1984BA19, 1985BAYZ; prelim.), at $E_{\vec{d}} = 11.9$ MeV (1988EL01; TAP), 21 MeV (see 1986MI1E; VAP, TAP), 24.0 and 38.2 MeV (1986GR1D; TAP; prelim.), 31.8 to 39.0 MeV (1986KO1M; TAP; prelim.), 56 MeV (1985NI01; VAP, TAP) and at $E_\alpha = 7.0$ GeV/c (1984SA39). For a study of the inclusive inelastic scattering at $E_\alpha = 7.0$ GeV/c see (1987BA13).

Phase-shift analyses, particularly that by (1983JE03) which uses all available differential cross section, vector and tensor analyzing power measurements and $L \leq 5$, in the range $E_d = 3$ to 43 MeV lead to the results displayed in Table 6.3. It is found that the d-wave shifts are split and exhibit resonances at $E_x = 2.19$ ($^3D_3$), 4.7 ($^3D_2$) and 5.65 MeV ($^3D_1$). (1983JE03) suggest very broad G_3 and G_4 resonances at $E_d = (19.3)$ and 33 MeV, a D_3 resonance at 22 MeV and F_3 and F_2 resonances at ≈ 34 and ≈ 39 MeV, corresponding to states which are primarily of $(d + \alpha)$ parentage.

(1985JE04) have investigated the points where $A_{yy} = 1$ and report four such points at $E_d = 4.30$ $[\theta_{cm} = 120.7°]$, 4.57 (58.0°), 11.88 (55.1°) and 36.0 ± 1.0 MeV ($150.1 \pm 0.3°$). [For the latter see also (1986KO1M)]. The correspondence of these polarization maxima to ^{6}Li states is discussed by (1985JE04). For a discussion of the M-matrix see (1988EL01). For recent work on $(\alpha + d)$ correlations involving ^{6}Li*(0, 2.19, $4.31 + 5.65$) see (1987CH08, 1987CH33, 1987PO03) and (1987FO08).

See also (1984AJ01, 1984PL1A, 1987GR08) and (1983HAYX, 1983SA39, 1983SU1B, 1984KA1E, 1984LO1C, 1984SC1A, 1984WA1H, 1985FI01, 1985FR1F, 1985HA04, 1985KA20, 1985LI1F, 1985MI1F, 1985SA1B, 1985ZH1A, 1986BO01, 1986FI07, 1986FR12, 1986KO1J, 1986MI1D, 1986MI1E, 1986SA1D, 1987HA34, 1987KU1G, 1987LE1C, 1987MI06, 1987PR08, 1987SA1C, 1988BR1E, 1988BU1G, 1988KA1J, 1988VA18; theor.).

7. (a) ^{4}He(^{3}He, p)^{6}Li $Q_m = -4.0185$
(b) ^{4}He(^{3}He, pd)^{4}He $Q_m = -5.49354$

Angular distributions have been measured at $E(^3\text{He}) = 8$ to 18 MeV and $E_\alpha = 42$, 71.7 and 81.4 MeV: see (1974AJ01). At $E_\alpha = 28$, 63.7, 71.7 and 81.4 MeV the α-spectra show that the sequential decay (reaction (b)) involves ^{6}Li*(2.19) and possibly ^{5}Li: see (1979AJ01).

Table 6.3: Levels of ^{6}Li from ^{4}He(d, d)^{4}He [a]

E_d (MeV)	$J^\pi; T$	E_x (MeV)	$\Gamma_{c.m.}$ (MeV)	Γ_d/Γ [b]	γ_d^2 [c]
1.070 ± 0.003	$3^+; 0$	2.187			0.27
4.34 ± 0.04	$2^+; 0$	4.36	1.32 ± 0.04	0.967	0.511
5.7 ± 0.1 [d]	$1^+; 0$	5.3	1.9 ± 0.1	0.74	0.34
(19.3 ± 1.3)	$3^+; 0$	(14.3)	26.7 ± 1.0	0.34	1.69
(21.6 ± 1.1)	$3^+; 0$	(15.8)	17.8 ± 0.8	0.76	0.77
33 ± 2	4^+	23	12 ± 2	0.15	0.14
34 ± 5	3^-	24	16 ± 3	0.30	0.24
39^{+3}_{-9}	2^-	27	22 ± 7	0.43	0.42

[a] The data in this table are mostly from the S-matrix analysis of (1983JE03). The results are unique up to $E_d = 15$ MeV. See also Table 6.4 in (1974AJ01), and Tables 6.3 in (1979AJ01) and (1984AJ01).

[b] The errors in Γ_d/Γ are typically 0.03.

[c] In units of the Wigner limit $\gamma_w^2 = 2.93$ MeV for a radius of 4.0 fm. I am indebted to W. Gruebler for pointing out an error to me.

[d] 6.26 MeV (R-matrix analysis): $E_x = 5.65$ MeV.

8. (a) ^{4}He(α, d)^{6}Li $\qquad Q_m = -22.3717$
   (b) ^{4}He(α, pn)^{6}Li $\qquad Q_m = -24.5963$
   (c) ^{4}He(α, αd)^{2}H $\qquad Q_m = -23.84674$

Reactions (a) and (b) have been studied to $E_\alpha = 158.2$ MeV [see (1979AJ01, 1984AJ01)] and at 198.4 MeV (1985WO11). The dependence of the cross section on energy shows that the $\alpha + \alpha$ process does not contribute significantly to ^{6}Li (and ^{7}Li) synthesis above $E_\alpha = 250$ MeV (1985WO11) [and see for additional comments on astrophysical problems]. For reaction (c) [and excited states of ^{4}He] see (1984AJ01): ^{6}Li*(2.19) is involved in the process.

9. ^{6}He(β^-)^{6}Li $\qquad Q_m = 3.507$

See ^{6}He, reaction 1.

10. (a) ^{6}Li(γ, n)^{5}Li $\qquad Q_m = -5.67$
    (b) ^{6}Li(γ, p)^{5}He $\qquad Q_m = -4.59$

(c) ^{6}Li(γ, d)^{4}He $\quad Q_{\rm m} = -1.4750$

(d) ^{6}Li(γ, t)^{3}He $\quad Q_{\rm m} = -15.7955$

The (γ, n) and (γ, Xn) cross sections increase from threshold to a maximum at $E_\gamma \approx 12$ MeV then decrease to $E_\gamma = 32$ MeV: see (1984AJ01) and (1988DI02). (1984DY01) also report a broad peak at 16 MeV. The cross section for photoproton production (reaction (b)) is generally flat up to 90 MeV. [The previously reported hump at $E_\gamma \approx 16$ MeV is almost certainly due to oxygen contamination: see (1984AJ01).] See also (1988CA11) and ^{5}He. The cross section for reaction (c) is ≤ 5 μb in the range $E_\gamma = 2.6$ to 17 MeV consistent with the expected inhibition of dipole absorption by isospin selection rules: see (1966LA04). The onset of quasideuteron photodisintegration between 25 and 65 MeV is suggested by the study of (1984WA18; $E_{\rm bs} =$ 67 MeV). The $90°$ differential cross section for reaction (d) decreases monotonically for $E_\gamma = 18$ to 70 MeV: reaction (d) contributes $\approx \frac{1}{3}$ of the total cross section for ^{6}Li + γ, consistent with a ^{3}H + ^{3}He cluster description of ^{6}Li$_{\rm g.s.}$ with $\theta^2 \approx 0.68$. The agreement with the inverse reaction, ^{3}H(^{3}He, γ) [see reaction 1] is good: see (1984AJ01). See also (1986LI1F).

The absorption cross section has been studied in the range $E_\gamma \approx 100$ to 340 MeV; it shows a broad bump centered at ≈ 125 MeV and a fairly smooth increase to a maximum at ≈ 320 MeV: see (1984AJ01). For spallation studies see (1974AJ01, 1984AJ01). For pion production see (1986GL07, 1987GL01) and (1984AJ01). See also (1987GA22, 1987LI32, 1987PI06) and (1983BU1A, 1984BU1C, 1984IR1A, 1985LO02, 1985KO22, 1985VA1C, 1986AH03, 1986AK1B, 1986AV06, 1987BA2C, 1987BU04, 1987DU09, 1987LU1B, 1988BU1D; theor.).

11. ^{6}Li(γ, γ)^{6}Li

The width, Γ_γ, of ^{6}Li*(3.56) $= 8.1 \pm 0.5$ eV: see (1974AJ01) and Table 6.4 in (1979AJ01); $E_{\rm x} = 3562.88 \pm 0.10$ keV: see (1984AJ01). See also (1987PI06).

12. (a) ^{6}Li(e, e)^{6}Li

(b) ^{6}Li(e, ep)^{5}He $\quad Q_{\rm m} = -4.59$

(c) ^{6}Li(e, ed)^{4}He $\quad Q_{\rm m} = -1.4750$

The elastic scattering has been studied for $E_{\rm e} = 85$ to 600 MeV: see (1974AJ01, 1979AJ01, 1984AJ01). The results appear to require that the ground state be viewed as an α-d cluster in which the deuteron cluster is deformed and aligned. The ground-state M1 current density has also been calculated (1982BE11). A model-independent analysis of the elastic scattering yields $r_{\rm rms} = 2.51 \pm 0.10$ fm. See also the discussion in (1984DO20).

Table 6.4 here and Table 6.4 in (1984AJ01) summarize the results obtained in the inelastic scattering of electrons. Form factors have been measured for ^{6}Li*(2.19, 3.56, 5.37) as well as for

Table 6.4: Levels of ^{6}Li from ^{6}Li(e, e′) and ^{6}Li(γ, γ') [a]

E_x (MeV)	$J^\pi; T$	Γ_{γ_0} (eV)	Multipolarity
2.183 ± 0.009 [b]	$3^+; 0$	$(4.40 \pm 0.34) \times 10^{-4}$	E2
3.563 ± 0.010	$0^+; 1$	8.19 ± 0.17 [c]	M1
4.27 ± 0.04	$2^+; 0$	$(5.4 \pm 2.8) \times 10^{-3}$	E2
5.379 ± 17 [c, d]	$2^+; 1$	0.27 ± 0.05	M1

[a] See Tables 6.4 in (1979AJ01, 1984AJ01) for references and for the earlier work.

[b] $B(\mathrm{E2})\!\uparrow = 21.8 \pm 4.8\ e^2 \cdot \mathrm{fm}^4$.

[c] Weighted mean of values shown in Table 6.4 in (1979AJ01).

[d] $\Gamma = 540 \pm 20$ keV.

the $\mathrm{t} + {}^3$He continuum up to 4 MeV above threshold [no narrow structures corresponding to ^{6}Li states are observed]: see (1984AJ01).

For reaction (b) see ^{5}He and (1987VA08) and (1987VA1N). Angular distributions for the d_0 group in the (e, d_0) reaction have been measured for $E_x = 10$ to 28 MeV. The deduced E1 and E2 components of the (γ, d_0) cross section show no structure. The E1 strength implies non-negligible isospin mixing in this energy region (1986TA06). At $E_e = 480$ MeV (reaction (c)) the α-d momentum distribution in the ground state of ^{6}Li has been studied. The results are well accounted for by an αNN model. The α-d probability in the ground state of ^{6}Li is 0.73 [estimated ± 0.1]. The data are consistent with the expected $2S$ character of the α-d relative wave function (1986EN05). See also (1986EV1A). π^0 production involving ^{6}Li*(2.19, 3.56, 5.37) is reported at $E_e = 500$ MeV (1987NA1I; prelim.).

For the earlier work see (1979AJ01, 1984AJ01). See also (1986BA85), (1986PE05, 1987DE43) and (1983RE15, 1983SA39, 1984CH20, 1984CO08, 1984KO16, 1984KR10, 1984KU03, 1984PA08, 1984YP01, 1984ZH1A, 1985CH01, 1985ER06, 1985KH07, 1985LO1A, 1986AK1A, 1986AZ01, 1986BE1L, 1986CHZX, 1986DO11, 1986KE1F, 1986KR12, 1986KR1E, 1986RE1D, 1986SA1D, 1987KR07, 1987LE1C, 1987LO16, 1987SA1C, 1988CH1D, 1988KU1C; theor.).

13. (a) ^{6}Li($\pi^\pm$, $\pi^\pm$)^{6}Li
   (b) ^{6}Li(π^+, π^+p)^{5}He $Q_m = -4.59$
   (c) ^{6}Li(π^+, ^{3}He)^{3}He $Q_m = 123.792$
   (d) ^{6}Li(π^+, π^+d)^{4}He $Q_m = -1.4750$

Elastic angular distributions have been measured at $E_{\pi^+} \approx 50$ MeV [see (1984AJ01)] and at $E_{\pi^\pm} = 100$, 180 and 240 MeV (1986AN04; also to ^{6}Li*(2.19)). Differential cross sections are also reported for $E_{\pi^+} = 100$ to 260 MeV to ^{6}Li*(0, 2.19, 3.56, 4.25). The excitation function for the unnatural-parity transition to ^{6}Li*(3.56) has an anomalous energy dependence (1984KI16). For reaction (b) see (1987HU02) and for reaction (c) see (1983BA26, 1983LO10, 1985MC05, 1986MC11). For a study of reaction (d) at $E_{\pi^+} = 130$ MeV see (1987HU13). For the (π^+, 2p) reaction at $E_{\pi^+} = 59.4$ MeV to states in ^{4}He see (1986RI01). See also p. 32.

14. (a) ^{6}Li(n, n)^{6}Li
    (b) ^{6}Li(n, nd)^{4}He $\qquad Q_m = -1.4750$

Angular distributions involving the groups to ^{6}Li*(0, 2.19) have been reported at $E_n = 1.0$ to 14.6 MeV [see (1984AJ01)] and at 4.2, 5.4 and 14.2 MeV (1985CH37; n_0, n_1), 7.5 to 14 MeV (1983DA22; n_0), 8.9 MeV (1984FE1A; n_0), 8.0 and 24 MeV (1986HAZR; n_0, n_1) and at $E_{\vec{n}} = 5$ to 17 MeV (1986PF1A; prelim.; n_0). For reaction (b) see (1985CH37, 1984AJ01). See also ^{7}Li, (1987SC08) and (1984UD1A, 1985HO1E, 1985LI1F, 1986BE1L; theor.).

15. (a) ^{6}Li(p, p)^{6}Li
    (b) ^{6}Li(p, 2p)^{5}He $\qquad Q_m = -4.59$
    (c) ^{6}Li(p, pd)^{4}He $\qquad Q_m = -1.4750$
    (d) ^{6}Li(p, p^{3}H)^{3}He $\qquad Q_m = -15.7955$
    (e) ^{6}Li(p, pn)^{5}Li $\qquad Q_m = -5.67$

Proton angular distributions have been measured for $E_p = 0.5$ to 800 MeV [p_0, p_1, p_2, p_3] [see (1966LA04, 1974AJ01, 1984AJ01)] and at $E_{\vec{p}} = 5$ to 17 MeV (1986PF1A; prelim.; p_0). Double-differential cross sections for the continuum yield [$E_x = 1.5$–3.5 MeV] are reported at $E_p = 65$ MeV (1987TO06; prelim.). See also (1983GLZZ, 1983PO1B, 1983POZX). For a summary of the results on excited states see Table 6.5.

Reaction (b) has recently been studied at 70 MeV (1983GO06), at 50–100 MeV (1984PA1B, 1985PA1B; prelim.) and 1 GeV (1985BE30): see ^{5}He and (1984AJ01) for the earlier work. Reaction (c) has been studied at $E_p = 9$ MeV to 1 GeV [see (1974AJ01, 1979AJ01, 1984AJ01)] and at 20 and 42 MeV (1983CA13) [report involvement of ^{6}Li*(4.31, 5.65)], at 70 MeV (1983GO06, 1985PAZL, 1985PA04) and at 119.6 and 200.2 MeV (1984WA09, 1985WA25). In the latter experiments the spectroscopic factors for ^{6}Li$_{g.s.}$ are deduced to be 0.76 [at 119.6 MeV] and 0.84 [at 200.2 MeV] using DWIA and a bound-state Woods-Saxon $2S$ wave function (1984WA09, 1985WA25).

Work on reaction (d) has suggested that the ^{3}He$+$t parentage of ^{6}Li is comparable with the α+d parentage: see (1984AJ01). See also (1985PAZL). For reaction (e) see ^{5}Li, ^{6}Be and (1985BE30). The (p, 3p) reaction has been studied by (1984NA17). For antiproton studies see (1987AS06) and p. 32. See also (1984AJ01) for the earlier work and ^{7}Be, (1983AN18, 1986SA1Q, 1987GAZM, 1987SA46, 1988MIZX), (1984LA33, 1985AL16, 1986CH1J, 1986WA11, 1987LE33) and (1982CH28,

Table 6.5: Parameters of levels of ^{6}Li [a]

E_x (MeV ± keV)	$\Gamma_{c.m.}$ (keV)	Reactions
2.185 ± 3	20.0 ± 2.8	^{4}He(d, d)^{4}He
2.187 ± 3		^{4}He(d, d)^{4}He
2.188 ± 6	24 ± 2 [c]	^{6}Li(p, p′), (d, d′), ^{7}Li(d, t)^{6}Li
2.203 ± 6		^{9}Be(p, α)^{6}Li
2.186 ± 2	24 ± 2	"best" values
3.56288 ± 0.10	$(8.2 \pm 0.2) \times 10^{-3}$	Table 6.4
4.34 ± 40		^{4}He(d, d)^{6}Li
4.27 ± 40		^{6}Li(e, e′)^{6}Li
4.40 ± 120	1490 ± 150	^{6}Li(p, p′)^{6}Li
4.32 ± 40	1820 ± 110	^{6}Li(d, d′)^{6}Li
4.3 ± 100	600 ± 100	^{7}Li(^{3}He, α)^{6}Li
4.3 ± 200	1600 ± 300	^{7}Li(^{3}He, αd)^{4}He
4.30 ± 10	850 ± 50, 480 ± 80	^{9}Be(p, α)^{6}Li
4.312 ± 22	1700 ± 100	"best" values
5.379 ± 17 [d]	540 ± 20 [d]	^{6}Li(e, e′)^{6}Li
5.33 ± 80	560^{+340}_{-100}	^{6}Li(p, p′)^{6}Li
5.34 ± 20	560 ± 40 [b]	^{7}Li(^{3}He, α)^{6}Li
5.325 ± 5	270 ± 12	^{9}Be(p, α)^{6}Li
5.366 ± 15	540 ± 20	"best" values
5.65 ± 50 [e]		^{4}He(d, d)^{4}He
5.7	1000^{+600}_{-400} [b]	^{6}Li(p, p′)^{6}Li
5.65 ± 200	1650 ± 300	^{7}Li(^{3}He, αd)^{4}He
5.65 ± 40	900 ± 60, 1260 ± 120	^{9}Be(p, α)^{6}Li
5.65 ± 50	1500 ± 200	"best" values

[a] For references and other values see Tables 6.5 in (1979AJ01, 1984AJ01).

[b] See references (c) and (d) in Table 6.5 in (1979AJ01).

[c] And C.P. Browne, private communication.

[d] See Table 6.4 in (1979AJ01).

[e] See Table 6.3 in (1979AJ01).

1983GO17, 1983KA1A, 1983SM04, 1984GU14, 1984KO1E, 1984KU03, 1984KU06, 1984MU01, 1985BE60, 1985DO16, 1985KA1D, 1985PA03, 1986CHZX, 1986IM1A, 1986IM01, 1986OS08, 1986VL1A, 1986ZH03, 1987FA1H, 1987HA01, 1987IM1F, 1987IM04, 1987VD01, 1987ZH1D, 1988CH06, 1988VD1A; theor.).

16. (a) ^{6}Li(d, d)^{6}Li

(b) ^{6}Li(d, pn)^{6}Li $\quad Q_m = -2.22459$

(c) ^{6}Li(d, 2d)^{4}He $\quad Q_m = -1.4750$

(d) ^{6}Li(d, αp)^{3}H $\quad Q_m = 2.5577$

Angular distributions of deuterons have been measured at $E_d = 4.5$ to 19.6 MeV [see (1979AJ01)] and at 50 MeV (1988KO1C; prelim.). The $T = 1$, 0^+ state, ^{6}Li*(3.56) is not appreciably populated. For a summary of the results on excited states see Table 6.5.

At $E_d = 21$ MeV reaction (b) shows spectral peaking (characteristic of ^{1}S$_0$ for the pn system [$T = 1$]) when ^{6}Li*(3.56) is formed, in contrast with the much broader shape (characteristic of ^{3}S$_1$) seen when ^{6}Li*(0, 2.19) are populated. A study of reaction (c) at $E_d = 52$ MeV shows that the α-clustering probability, $N_{\text{eff}} = 0.12^{+0.12}_{-0.06}$ if a Hankel function is used. The α-particle and the deuteron clusters in ^{6}Li have essentially a relative orbital momentum of $l = 0$. The D-state probability of the ground state of ^{6}Li is $\approx 5\%$ of the S-state. Quasi-free scattering is an important process even for $E_d = 6$ to 11 MeV. Interference effects are evident in reaction (c) proceeding through ^{6}Li*(2.19, 4.31): this is due to the experiment being unable to determine whether the detected particle was emitted first or second in the sequential decay. Reactions (c) and (d) studied at $E_d = 7.5$ to 10.5 MeV indicate that the three-body breakup of ^{6}Li at these low energies is dominated by sequential decay processes. See (1979AJ01) for references.

See also ^{8}Be, (1987AL23) and (1982CH28, 1983GO24, 1983LY04, 1984BL21, 1984KU15, 1985LI1C, 1986AV01; theor.).

17. ^{6}Li(t, t)^{6}Li

At $E_t = 17$ MeV angular distributions have been measured for the tritons to ^{6}Li*(0, 3.56): see (1979AJ01).

18. (a) ^{6}Li(^{3}He, ^{3}He)^{6}Li

(b) ^{6}Li(^{3}He, pα)^{4}He $\quad Q_m = 16.8782$

Angular distributions have been measured at $E(^3\text{He}) = 8$ to 217 MeV [see (1979AJ01, 1984AJ01)] and at 34, 50, 60 and 72 MeV (1986BR31; elastic). For reaction (b) see ^{5}Li (1984AR17, 1987ZA07). See also ^{9}B.

19. (a) ^{6}Li(α, α)^{6}Li

(b) ^{6}Li(α, 2α)^{2}H $\qquad Q_{\rm m} = -1.4750$

Angular distributions (reaction (a)) have been measured at $E_\alpha = 1.39$ to 166 MeV [see (1974AJ01, 1979AJ01, 1984AJ01)] and at $E_\alpha = 36.6$ and 50.5 MeV (1986BR31). See also (1987BU27, 1986ROZK). See also ^{10}B.

Reaction (b) has been studied at $E_\alpha = 6.6$ to 700 MeV: see (1974AJ01, 1979AJ01, 1984AJ01). At the latter energy and using a width parameter of 60.6 MeV/c the effective number of $\alpha + {\rm d}$ clusters for ^{6}Li$_{\rm g.s.}$, $n_{\rm eff} = 0.98 \pm 0.05$. The results are very model dependent: see (1984AJ01). At $E_\alpha = 27.2$ MeV ^{6}Li*(2.19) is very strongly populated (1985KO29). See also (1982CH28, 1983AV02, 1983BE51, 1983BU15, 1985BE60, 1986GA1F, 1986ZE01, 1987KO1L, 1988LE06; theor.).

20. (a) ^{6}Li(^{6}Li, ^{6}Li)^{6}Li

(b) ^{6}Li(^{6}Li, 2d)2 ^{4}He $\qquad Q_{\rm m} = -2.9501$

(c) ^{6}Li(^{6}Li, α)2 ^{4}He $\qquad Q_{\rm m} = 20.897$

Angular distributions of ^{6}Li ions have been studied for $E(^6{\rm Li}) = 3.2$ to 36 MeV [see (1974AJ01, 1979AJ01, 1984AJ01)] and at $E(^6{\rm Li}) = 2.0$ to 5.5 MeV (1983NO08) and 156 MeV (1985SA36; ^{6}Li*(0, 2.19)), (1985MI05; elastic; ^{6}Li*(2.19, 3.56) are also populated), (1987EY01; several states in ^{12}C). Reaction (b) has been studied for $E(^6{\rm Li}) = 36$ to 47 MeV: enhancements in yield, due to double spectator poles, have been observed in d-d and α-α but not in α-d double coincidence spectra. The widths of the peaks are smaller than those predicted from the momentum distribution of $\alpha + {\rm d}$ clusters in ^{6}Li. ^{6}Li*(2.19) was also populated. See references in (1984AJ01). Recent work on reaction (b) is reported by (1984LA19: 2.4 and 4.2 MeV) and by (1985NO1A). For reaction (c) see (1987LA25). See also ^{12}C in (1985AJ01), (1983CH59) and (1984CH1E, 1986KA1B, 1986SA1D, 1987AR13, 1987SA1C; theor.).

21. ^{6}Li(^{7}Li, ^{7}Li)^{6}Li

Angular distributions have been measured at $E(^7{\rm Li}) = 78$ MeV to ^{6}Li*(0, 2.19) (1986GLZU; prelim.).

22. ^{6}Li(^{9}Be, ^{9}Be)^{6}Li

The elastic scattering has been studied at $E(^6{\rm Li}) = 4.0$, 6.0 and 24 MeV [see (1979AJ01)], at 32 MeV (1985CO09) and at 50 MeV (1988TRZY; prelim.; also inelastic). For the interaction cross section at $E(^6{\rm Li}) = 790$ MeV/A see (1985TA18).

23. ^{6}Li(^{10}B, ^{10}B)^{6}Li

The elastic scattering has been studied at $E(^{6}\text{Li}) = 5.8$ and 30 MeV: see (1979AJ01).

24. (a) ^{6}Li(^{12}C, ^{12}C)^{6}Li
(b) ^{6}Li(^{13}C, ^{13}C)^{6}Li
(c) ^{6}Li(^{14}C, ^{14}C)^{6}Li

The elastic scattering (reaction (a)) has been studied at $E(^{6}\text{Li}) = 4.5$ to 156 MeV [see (1984AJ01)] and at $E(^{6}\text{Li}) = 19.2$ MeV (1983RU09), 36 and 45 MeV [and $E(^{12}\text{C}) = 72$ and 90 MeV] (1984VI02, 1985VI03; also to ^{6}Li*(2.19, 4.31) and to various states of ^{12}C), 90 MeV (1987DE02; also to various states of ^{12}C), 123.5 and 168.6 MeV (1988KA09; and to various states of ^{12}C), 150 MeV (1987TA21; also VAP), 156 MeV (1987EY01; and to various states in ^{12}C) and at 210 MeV (1988NA02). See also (1986SHZP, 1987PA12). At $E(^{6}\text{Li}) = 34$ MeV the d-α angular correlations involve ^{6}Li*(0, 2.19) (1985CU04). See also ^{12}C in (1985AJ01, 1990AJ01). For pion production see (1984CH16). For the interaction cross section at $E(^{6}\text{Li}) = 790$ MeV/A see (1985TA18). For VAP measurements at $E(^{6}\vec{\text{Li}}) = 30$ MeV see (1988VAZY).

The elastic scattering (reaction (b)) has been studied for $E(^{7}\text{Li}) = 5.8$ to 40 MeV: see (1984AJ01). The elastic scattering (reaction (c)) has been measured for $E(^{6}\text{Li}) = 93$ MeV (1987DE02). See also ^{18}F and ^{19}F in (1987AJ02), (1986MCZZ, 1988MCZY), (1983BI13, 1984HA53) and (1982GU21, 1983BU15, 1983DE48, 1983OS03, 1983SH24, 1984BR08, 1984GR05, 1984MU1D, 1984SA1B, 1985CO21, 1985SH1A, 1986BE45, 1986IO01, 1986KA1B, 1986MI24, 1986SA1D, 1986SAZJ, 1986SAZK, 1986SAZL, 1987AR13, 1987KA1I, 1987SA1C, 1987SA21, 1988DEZU, 1988DE1F, 1988SA15; theor.).

25. ^{6}Li(^{16}O, ^{16}O)^{6}Li

Elastic angular distributions have been reported at $E(^{6}\text{Li}) = 4.5$ to 50.6 MeV [see (1984AJ01)], at $E(^{6}\text{Li}) = 35.3$ and $E(^{16}\text{O}) = 94.2$ MeV (1984VI02) and at 50 MeV (1988TRZY; prelim.; also inelastic). At $E(^{6}\text{Li}) = 25.7$ and $E(^{16}\text{O}) = 68.6$ MeV (1985VI03, 1984VI01) report some $\sigma(\theta)$ to ^{6}Li*(2.19) [and to ^{16}O*(6.13)]. See (1985VI03, 1986SC28) for studies of the breakup. The VAP has been measured at $E(^{6}\text{Li}) = 25.7$ MeV, and also using ^{16}O ions (1987VAZY; prelim.). For fusion cross sections see (1986MA19). See also ^{16}O in (1986AJ04), (1986MO1E, 1987PA12) and (1983BU15, 1983JO1A, 1984WI08, 1985CO21, 1985SA13, 1986SAZS; theor.).

26. (a) ^{6}Li(^{24}Mg, ^{24}Mg)^{6}Li
(b) ^{6}Li(^{25}Mg, ^{25}Mg)^{6}Li
(c) ^{6}Li(^{26}Mg, ^{26}Mg)^{6}Li
(d) ^{6}Li(^{27}Al, ^{27}Al)^{6}Li

The elastic scattering has been studied at $E(^6\text{Li}) = 88$ MeV, and at 36 MeV for reaction (c): see (1984AJ01). For the interaction cross section at $E(^6\text{Li}) = 790$ MeV/A (reaction (d)) see (1985TA18).

27. (a) ^{6}Li(^{28}Si, ^{28}Si)^{6}Li
    (b) ^{6}Li(^{30}Si, ^{30}Si)^{6}Li

The elastic scattering has been studied at $E(^6\text{Li}) = 13$ to 154 MeV [see (1984AJ01)], at 27 and 34 MeV (1983VI03) and at 210 MeV (1988NAZX). For a study of the decay see (1987NI04). See also (1984PU1A, 1985PU1B, 1986GR1A) and (1978GR22, 1982BR25, 1983DE48, 1983JO1A, 1983SA39, 1983SA1D, 1984BR1B, 1984BR28, 1984KI08, 1984WI08, 1985BR14, 1985SA1D, 1986BE45, 1986GR1G, 1986KA22, 1986SA1D, 1986SAZJ, 1986SAZK, 1986SAZL, 1987GR1N, 1987SA1C, 1987SA21; theor.). For reaction (b) see (1987AR13; theor.).

28. (a) ^{6}Li(^{39}K, ^{39}K)^{6}Li
    (b) ^{6}Li(^{40}Ca, ^{40}Ca)^{6}Li
    (c) ^{6}Li(^{44}Ca, ^{44}Ca)^{6}Li
    (d) ^{6}Li(^{48}Ca, ^{48}Ca)^{6}Li

Elastic scattering has been studied for $E(^6\text{Li}) = 26$ to 99 MeV: see (1984AJ01), and at $E(^6\text{Li}) = 34$ MeV (reaction (b)) by (1987VA31) and at 210 MeV (1988NAZX; reaction (b)). ^{6}Li*(2.19) has been studied at $E(^{40}\text{Ca}) = 227$ MeV (1987VA31). For fusion measurements (reaction (b)) see (1984BR04). For breakup measurements (reaction (b)) see (1984GR20). See also (1986PL01) and (1983SA39, 1984GU09, 1985BL18, 1985SA1D, 1986GR1G, 1986SA1D, 1987SA21, 1986SAZJ, 1986SAZK, 1986SAZL; theor.).

29. (a) ^{7}Li(γ, n)^{6}Li　　$Q_{\rm m} = -7.250$
    (b) ^{7}Li(γ, pπ^-)^{6}Li　　$Q_{\rm m} = -146.036$

Transitions to ^{6}Li*(0, 2.19, 3.56) have been observed in reaction (a): see (1979AJ01, 1984AJ01). Differential cross sections are reported for $E_{\rm bs} = 60$ to 120 MeV for the $\rm n_0 + n_2$ groups (1985SE17). Reaction (b) at 0.9 GeV involves ^{6}Li*(2.19) (1985RE1A; prelim.). See also ^{7}Li, (1986GO1M) and (1985ST1A, 1986BA2G; theor.).

30. ^{7}Li(π^+, p)^{6}Li　　$Q_{\rm m} = 133.101$

Differential cross sections have been measured at $E_{\pi^+} = 75$ and 175 MeV for the transitions to ^{6}Li*(0, 2.19): see (1984AJ01).

31. (a) ^{7}Li(p, d)^{6}Li $\quad Q_m = -5.025$

(b) ^{7}Li(p, pn)^{6}Li $\quad Q_m = -7.250$

Angular distributions of deuterons (reaction (a)) have been studied for $E_p = 167$ to 800 MeV [see (1979AJ01, 1984AJ01)] and at 18.6 MeV (1986GO23, 1987GO27; d_0, d_1, d_2; see for spectroscopic factors), 200 and 400 MeV (1985KR13; d_0, d_1; d_2 is weakly populated at 200 MeV) and at 800 MeV (1984SM04; d_0, d_1). The ratio of the intensities of the groups to ^{6}Li*(2.19) and ^{6}Li$_{\rm g.s.}$ increases with energy. It is suggested that this can be understood in terms of a small admixture of 1f orbital in these states (1985KR13). A DWBA analysis of $E_p = 185$ MeV data leads to $C^2S = 0.87$, 0.67, 0.24, (0.05), 0.14, respectively for ^{6}Li*(0, 2.19, 3.56, 4.31, 5.37). No other states were seen below $E_x \approx 20$ MeV: see (1979AJ01). In reaction (b) at $E_p = 1$ GeV the separation energy between ≈6.5 MeV broad $1p_{3/2}$ and $1s_{1/2}$ groups is reported to be 18.0 ± 0.8 MeV (1985BE30, 1985DO16). See also (1983LY04, 1988BE1I, 1988GUZW; theor.).

32. ^{7}Li(d, t)^{6}Li $\quad Q_m = -0.993$

A study at $E_d = 23.6$ MeV of the relative cross sections of the analog reactions ^{7}Li(d, t)^{6}Li (to the first two $T = 1$ states at 3.56 and 5.37 MeV) and ^{7}Li(d, ^{3}He)^{6}He (to the ground and 1.80 MeV excited states) shows that ^{6}Li*(3.56, 5.37) have high isospin purity ($\alpha^2 < 0.008$): this is explained in terms of antisymmetrization effects which prevent mixing with nearby $T = 0$ states: see (1979AJ01). (1987BO39) [$E_d = 30.7$ MeV] deduce that the branching ratio of ^{6}Li*(4.31) [2^+] into a dinucleon [$T = 1$, $S = 0$] is (85 ± 10)%: see also reactions 13 in ^{6}He and 4 in ^{6}Be. See also (1987GUZZ; $E_d = 18$ MeV; angular distributions to ^{6}Li*(0, 2.19, 3.56); prelim.) and (1984BL21, 1986AV01, 1988GUZW; theor.).

33. (a) ^{7}Li(^{3}He, α)^{6}Li $\quad Q_m = 13.328$

(b) ^{7}Li(^{3}He, dα)^{4}He $\quad Q_m = 11.8527$

Angular distributions have been reported at $E(^3\text{He}) = 5.1$ to 33.3 MeV [see (1974AJ01, 1984AJ01): the lower energy work has not been published]. Excited states observed in this reaction are displayed in Table 6.5. No other states are reported below $E_x = 10$ MeV: see (1979AJ01). (1986AN04) have analyzed unpublished data which suggest the involvement of several broad highly excited states of ^{6}Li. See also (1987AL23).

Several attempts have been made to look at the isospin decay of ^{6}Li*(5.37) [$J^\pi; T = 2^+; 1$] via ^{7}Li(^{3}He, α)^{6}Li*→ $d + \alpha$: the branching is $< 1\%$. $\Gamma_p/\Gamma = 0.35 \pm 0.10$ and $\Gamma_{p+n}/\Gamma = 0.65 \pm 0.10$

for ^{6}Li*(5.37): see (1979AJ01). ^{4}He + d spectra suggest the excitation of ^{6}Li*(4.3) [$E_x = 4.3 \pm 0.2$ MeV, $\Gamma = 1.6 \pm 0.3$ MeV] and ^{6}Li*(5.7) [$E_x = 5.65 \pm 0.2$ MeV, $\Gamma = 1.65 \pm 0.3$ MeV]: see (1984AJ01). See also (1985DA29). At $E(^3\mathrm{He}) = 120$ MeV the missing mass spectra for (^{3}He, 2d) and (^{3}He, pt) reflects the population of ^{6}Li*(0, 2.19) and suggests broad structures at $E_x = 28.5$ and 32.9 MeV (1985FR01). See also ^{10}B, (1988BO1J) and (1983KU17; theor.).

34. (a) ^{7}Li(^{6}Li, ^{7}Li)^{6}Li

(b) ^{7}Li(^{7}Li, ^{8}Li)^{6}Li $\qquad Q_m = -5.217$

At $E(^6\mathrm{Li}) = 93$ MeV a broad group ($\Gamma \approx 11$ MeV) centered at $E_x = 20$ MeV is reported in addition to other peaks at $E_x = 17.1 \pm 0.3$, 18.9 ± 0.3 and 21.2 ± 0.3 MeV (1987GLZW; prelim.). See (1984KO25) for reaction (b).

35. (a) ^{9}Be(p, α)^{6}Li $\qquad Q_m = 2.126$

(b) ^{9}Be(p, 2α)^{2}H $\qquad Q_m = 0.651$

(c) ^{9}Be(p, pt)^{6}Li $\qquad Q_m = -17.688$

Angular distributions of α-particles (reaction (a)) have been measured at $E_p = 0.11$ to 45 MeV. [see (1974AJ01, 1979AJ01)] and at $E_p = 22.5$, 31 and 41 MeV (1986HA27; α_0, α_1, α_2; see for spectroscopic factors). See also Table 6.5 and (1984AJ01). ^{6}Li*(3.56) decays by γ-emission consistent with M1; $\Gamma_\alpha/\Gamma < 0.025$ [forbidden by spin and parity conservation]: see (1984AJ01). At $E_p = 9$ MeV the yield of reaction (b) is dominated by FSI through ^{8}Be*(0, 2.9) and ^{6}Li*(2.19) with little or no yield from direct three-body decay: see (1979AJ01). Reactions (b) and (c) at $E_p = 58$ MeV involve ^{6}Li*(0, 2.19) (1985DE17). See also ^{10}B, (1986AN26) and (1985MAZG, 1986KA26; theor.).

36. ^{9}Be(d, ^{5}He)^{6}Li $\qquad Q_m = -9.92$

See ^{5}He.

37. ^{9}Be(t, ^{6}He)^{6}Li $\qquad Q_m = -5.381$

Angular distributions of $^6\mathrm{He}_{\mathrm{g.s.}} + {}^6\mathrm{Li}_{\mathrm{g.s.}}$ and $^6\mathrm{He}_{\mathrm{g.s.}} + {}^6\mathrm{Li}^*_{3.56}$ [both listed ions were detected] have been measured at $E_t = 21.5$ and 23.5 MeV. In the latter case the final state is composed of two isobaric analog states: angular distributions are symmetric about $90°$ cm, within the overall experimental errors. In the reaction leading to the ground states of ^{6}He and ^{6}Li differences from symmetry of as much as 40% are observed at forward angles. Angular distributions involving ^{6}He$_{\rm g.s.}$ + ^{6}Li*(2.19) and ^{6}Li$_{\rm g.s.}$ + ^{6}He*(1.8) have also been measured. This reaction appears to proceed predominantly by means of the direct pickup of a triton or ^{3}He from ^{9}Be. Differential cross sections are also reported at $E_{\rm t} = 17$ MeV: see (1984AJ01) for references.

38. ^{9}Be(^{3}He, ^{6}Li)^{6}Li $\qquad Q_{\rm m} = -1.892$

Angular distributions of ^{6}Li ions have been obtained at $E(^3{\rm He}) = 6$ to 10 MeV: see (1974AJ01). A study of the continuum suggests the population of ^{6}Li states at $E_{\rm x} = 8$–12, ≈ 21 and 21.5 MeV: see (1984AJ01).

39. ^{10}B(n, ^{5}He)^{6}Li $\qquad Q_{\rm m} = -5.35$

Differential cross sections are reported at $E_{\rm n} = 14.4$ MeV involving ^{6}Li*(2.19) and ^{5}He$_{\rm g.s.}$ (1984TU02).

40. ^{10}B(d, ^{6}Li)^{6}Li $\qquad Q_{\rm m} = -2.985$

Angular distributions involving ^{6}Li*(0, 2.19) have been studied at $E_{\rm d} = 13.6$ MeV (1983DO10) and at 19.5 MeV [see (1974AJ01)]. See also (1984SHZJ; theor.).

41. ^{10}B(^{3}He, ^{7}Be)^{6}Li $\qquad Q_{\rm m} = -2.872$

Angular distributions involving ^{6}Li*(0, 2.19) have been measured at $E(^3{\rm He}) = 30$ MeV: see (1974AJ01).

42. ^{10}B(α, ^{8}Be)^{6}Li $\qquad Q_{\rm m} = -4.5515$

At $E_\alpha = 72.5$ MeV only ^{6}Li*(0, 2.19) are observed: the latter is excited much more strongly than is the ground state [S_α for the ground state is 0.4 that for ^{6}Li*(2.19)]. The angular distributions for both transitions are flat: see (1979AJ01). See also (1984AJ01).

43. ^{11}B(d, ^{7}Li)^{6}Li $\qquad Q_{\rm m} = -7.189$

See (1984AJ01).

44. ^{11}B(^{3}He, ^{8}Be)^{6}Li $\qquad Q_m = 4.572$

Angular distributions are reported at $E(^3\text{He}) = 71.8$ MeV involving several states in ^{8}Be (1986JA02, 1986JA14).

45. ^{12}C(p, ^{7}Be)^{6}Li $\qquad Q_m = -22.566$

Angular distributions involving ^{7}Be*(0, 0.43) have been measured at $E_p = 40.3$ MeV (1985DE05). For the earlier work at $E_p = 30.6$ to 56.8 MeV see (1974AJ01, 1979AJ01). See also (1983DE1C), (1984RE14) and (1987KW01, 1987KW03; theor.).

46. ^{12}C(d, ^{8}Be)^{6}Li $\qquad Q_m = -5.892$

Angular distributions involving several states in ^{8}Be have been studied at $E_d = 19.5$ and 51.8 MeV [see (1974AJ01)] and at 50 MeV (1985GO1G), 54.2 MeV (1984UM04) and 78 MeV (1986JA14), as well as at $E_{\vec{d}} = 18$ and 22 MeV (1987TA07) and 51.7 MeV (1986YA12). See also (1984NE1A, 1987GO1S) and (1987KA1L, theor.).

47. ^{12}C(^{3}He, ^{9}B)^{6}Li $\qquad Q_m = -11.570$

Angular distributions have been obtained at $E(^3\text{He}) = 28$ to 40.7 MeV [see (1974AJ01)] and at $E(^3\vec{\text{He}}) = 33.4$ MeV (1986CL1B; also A_y). See also ^{9}B.

48. (a) ^{12}C(α, ^{10}B)^{6}Li $\qquad Q_m = -23.712$
(b) ^{12}C(α, dα)^{10}B $\qquad Q_m = -25.1868$

Angular distributions (reaction (a)) at $E_\alpha = 42$ MeV involve ^{6}Li*(0, 2.19): see (1974AJ01). At $E_\alpha = 65$ MeV reaction (b) goes via ^{6}Li*(2.19, 4.31): see (1984AJ01). See also ^{10}B and (1987GA20).

49. ^{12}C(^{10}B, ^{16}O)^{6}Li $\qquad Q_m = 2.702$

See ^{16}O in (1986AJ04).

50. ^{12}C(^{12}C, ^{12}C)2 ^{6}Li $\qquad Q_{\rm m} = -28.171$

The fragmentation of ^{12}C into 2 ^{6}Li ions has been observed at $E(^{12}\text{C}) = 2.1$ GeV/A (1986LIZP).

51. ^{12}C(^{14}N, ^{20}Ne)^{6}Li $\qquad Q_{\rm m} = -4.174$

See ^{20}Ne in (1987AJ02).

52. ^{13}C(p, ^{8}Be)^{6}Li $\qquad Q_{\rm m} = -8.613$

See (1974AJ01).

53. ^{16}O(d, ^{12}C)^{6}Li $\qquad Q_{\rm m} = -5.687$

Angular distributions involving ^{6}Li ions and several ^{12}C states are reported at $E_{\vec{\rm d}} = 22$ MeV (1987TA07) and 51.7 MeV (1986YA12) and at $E_{\rm d} = 54.2$ MeV (1984UM04). See also (1984NE1A), and ^{12}C in (1990AJ01) for polarization studies.

54. ^{19}F(^{3}He, ^{16}O)^{6}Li $\qquad Q_{\rm m} = 4.095$

Angular distributions have been measured at $E(^{3}\text{He}) = 11$ to 40.7 MeV involving ^{6}Li*(0, 3.56) and various states of ^{16}O: see (1974AJ01, 1977AJ02).

^{6}Be

(Figs. 3 and 4)

GENERAL: See also (1984AJ01).

Model calculations: (1986KU1F, 1986VO09, 1987DA1H, 1988DA1D, 1988DA1E, 1988DA1F, 1988KA1J).

Other topics: (1983ANZQ, 1983GR26, 1983SH38, 1984BA1H, 1985AN28, 1986HU1D, 1986KO1N, 1987BA1I, 1987KUZI, 1987SA15).

1. (a) ^{3}He(^{3}He, γ)^{6}Be	$Q_{\rm m} = 11.489$	
(b) ^{3}He(^{3}He, p)^{5}Li	$Q_{\rm m} = 10.89$	$E_{\rm b} = 11.489$
(c) ^{3}He(^{3}He, 2p)^{4}He	$Q_{\rm m} = 12.85966$	
(d) ^{3}He(^{3}He, ^{3}He)^{3}He		
(e) ^{3}He(^{3}He, pd)^{3}He	$Q_{\rm m} = -5.49354$	

The yield of γ-rays to ^{6}Be*(1.7) (reaction (a)) increases smoothly from 0.4 to 9.3 μb (assuming isotropy) for $0.86 < E$(^{3}He)< 11.8 MeV ($90°$). No transitions are observed to ^{6}Be(0) [$\sigma < 0.01$ μb at E(^{3}He) $= 1.4$ MeV]. This is understood in terms of a direct capture of ^{3}He by ^{3}He in the singlet spin state and with zero angular momentum: the $0^{+} \rightarrow 0^{+}$ γ-transition is forbidden. Reaction (a) is thus of negligible astrophysical importance compared to reaction (c): see (1979AJ01). The capture cross section from E(^{3}He) $=$ 12 MeV to 27 MeV continues to increase smoothly with energy at first and then shows a broad structure centered at E(^{3}He) $= 23 \pm 1$ MeV [$E_{\rm x} = 23.0 \pm 0.5$ MeV], $\Gamma_{\rm cm} \approx 5$ MeV. This appears to be a ^{33}F cluster resonance which decays by an E1 transition to ^{6}Be*(1.7). The γ-ray angular distributions are consistent with $J^{\pi} = 3^{-}$: see (1979AJ01).

Table 6.6: Energy levels of ^{6}Be

$E_{\rm x}$ (MeV $\pm$ keV)	$J^{\pi}; T$	$\Gamma_{\rm cm}$	Decay	Reactions
g.s.	0^{+}; 1	92 ± 6 keV	p, α	2, 3, 4
1.67 ± 50 [a]	$(2)^{+}$; 1	1.16 ± 0.06 MeV	p, α	1, 2, 3, 4
23	4^{-}	broad	γ, ^{3}He	1, 3
26	2^{-}	broad	^{3}He	1, 3
27	3^{-}	broad	^{3}He	1

[a] See Table 6.8 in (1974AJ01).

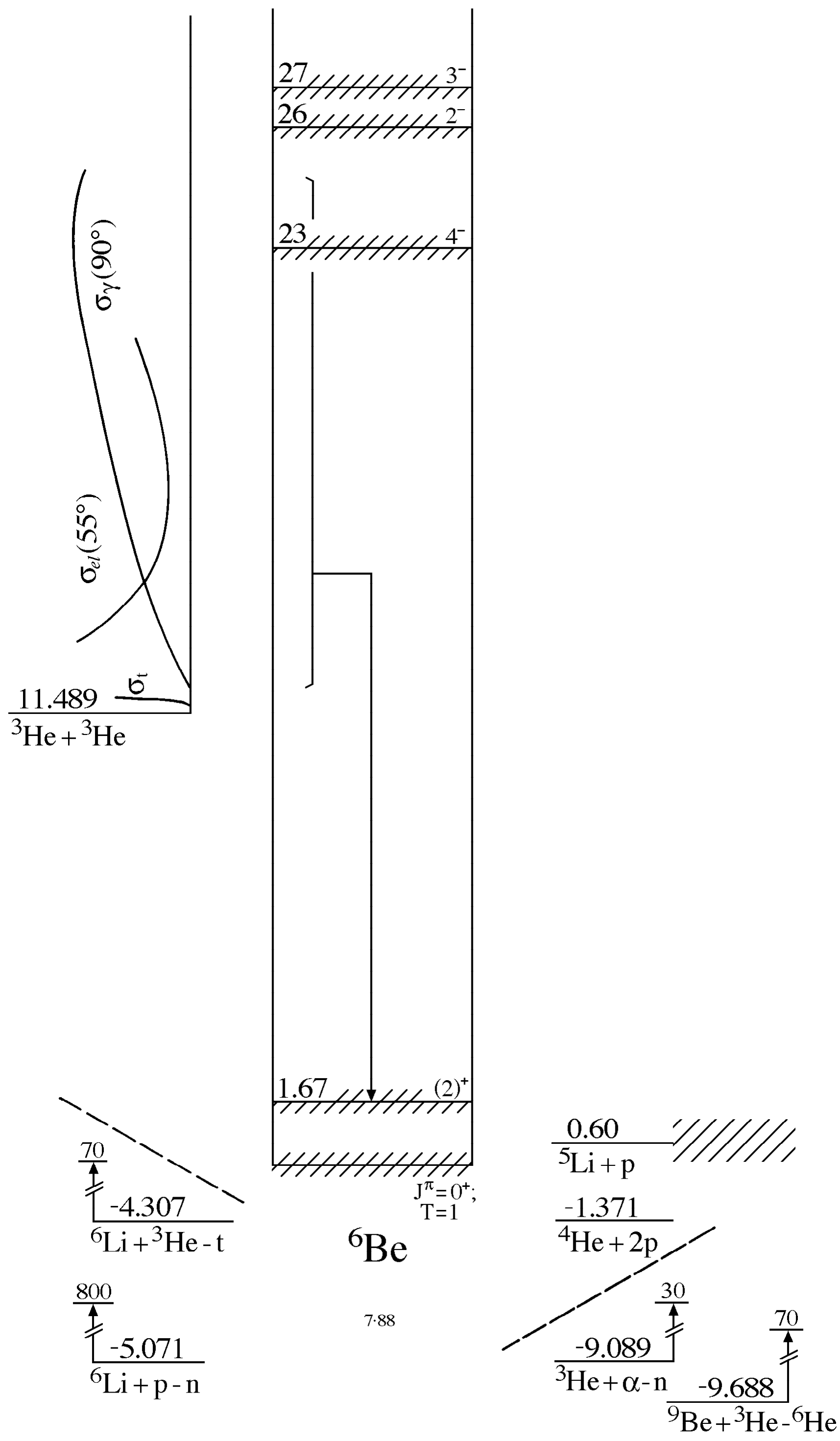


Fig. 3: Energy levels of ^{6}Be. For notation see Fig. 1.

A_y has been measured for $E(^3\text{He}) = 14$ to 30 MeV [reaction (b)] by (1983KI10) using a polarized target. See also ^{5}Li.

Measurements of the total cross section for reaction (c) have been carried out for $E(^3\text{He}) = 60$ keV to 2.2 MeV [see (1979AJ01)] and for 36 to 685 keV (1987KR09). The measurements are consistent with a non-resonant reaction mechanism, at least down to $E_{\text{cm}} = 24.5$ keV. Upper limits for $\omega\gamma$ for a resonance below that energy (and with E_{R} (cm) as low as 16.2 keV) [which might help explain the low observed flux of solar neutrinos], are given in (1987KR09). [It should be noted that a corresponding mirror state in ^{6}He has not been observed.] The best fit to the data is given by $S(0) = 5.57 \pm 0.31$ MeV $\cdot$ b (1987KR09). See (1979AJ01) for the earlier work. See also (1966LA04, 1974AJ01). For recent work on astrophysical considerations see (1982BA1J, 1982KA1E, 1983FO1A, 1983VO1C, 1984BO1C, 1984DA1H, 1984HA1M, 1985CA41, 1985SC1A, 1986FI15, 1987AS05, 1987RO25, 1988BA86, 1988FO1A). (1985SI12) report α-d correlation measurements at $E(^3\text{He}) = 13.6$ MeV, which suggest the breakup of the diproton (^{2}He) into $^2\text{H} + \text{e}^+ + \nu$.

The elastic scattering (reaction (d)) has been studied for $E(^3\text{He}) = 3$ to 32 MeV and at 120 MeV. The excitation function shows a smooth monotonic behavior except for an anomaly at $E(^3\text{He}) = 25$ MeV in the $L = 3$ partial wave corresponding to a broad state in ^{6}Be at $E_{\text{x}} \approx 24$ MeV. Polarization measurements have been carried out at $E(^3\vec{\text{He}}) = 17.9$ to 32.9 MeV. A two level R-matrix analysis of the phase shifts ($L \leq 5$) suggests three broad F-wave states at $E_{\text{x}} \approx 23.4$ (4^-), 26.2 (2^-) and 26.7 MeV (3^-), in disagreement with the capture γ-ray results described above: see (1979AJ01). See also (1984AJ01) and (1986FO04).

A kinematically complete experiment (reaction (e)) has been performed at $E(^3\text{He}) = 120$ MeV: large peaks were observed which appear to correspond to ^{3}He-d quasi-free scattering followed by p-d FSI: see (1984AJ01).

The total reaction cross sections $\sigma_{\text{R}} = 156.7 \pm 3.8$, 250 ± 14 and 296 ± 12 mb at $E(^3\text{He}) = 17.9$, 21.7 and 24.0 MeV (1987BR02) [see also for partial cross sections for the breakup reactions and for unpublished results for σ_{R} for $E(^3\text{He}) = 3.0$ to 17.9 MeV]. See also (1984AJ01), (1986GOZL, 1986WI1A; applications) and (1983PR09, 1984HA25, 1985HA14, 1986OS1D, 1987AS05, 1988RYZW; theor.).

2. $^4\text{He}(^3\text{He, n})^6\text{Be}$ $\qquad Q_{\text{m}} = -9.089$

Neutron groups to ^{6}Be*(0, 1.7) have been observed at $E(^3\text{He}) = 19.4$ to 38.61 MeV: see Table 6.8 in (1974AJ01) for the parameters of the first-excited state. There is no evidence for other states of ^{6}Be with $E_{\text{x}} \leq 5$ MeV, nor for a state near the ^{3}He threshold at 11.5 MeV: see (1979AJ01).

3. (a) $^6\text{Li(p, n)}^6\text{Be}$ $\qquad Q_{\text{m}} = -5.071$

(b) $^6\text{Li(p, pn)}^5\text{Li}$ $\qquad Q_{\text{m}} = -5.67$

Neutron groups have been observed to ^{6}Be*(0, 1.7) as has the ground-state threshold. The width of the ground state is 95 ± 28 keV. The parameters of ^{6}Be*(1.7) are displayed in Table 6.8 of (1974AJ01). Angular distributions have been reported at $E_{\rm p} = 8.3$ to 144 MeV [see (1979AJ01, 1984AJ01)] and at 800 MeV (1986KI12). The transverse spin transfer coefficient, $D_{\rm NN}$ $(0°)$, at $E_{\vec{\rm p}} = 160$ MeV for the ground-state transition is -0.37 ± 0.04 in agreement with results in other light nuclei (1984TA07). See also ^{7}Be, (1986SA1Q, 1987SA46, 1988HE08), (1984TAZS, 1985GO1F, 1986TA1E, 1987RA32) and (1985SH1C; theor.). In reaction (b) some evidence has been reported at $E_{\rm p} = 47$ MeV for sequential decay via ^{6}Be*(15.5 ± 2, 24 ± 2): see (1979AJ01). See also (1988MIZX).

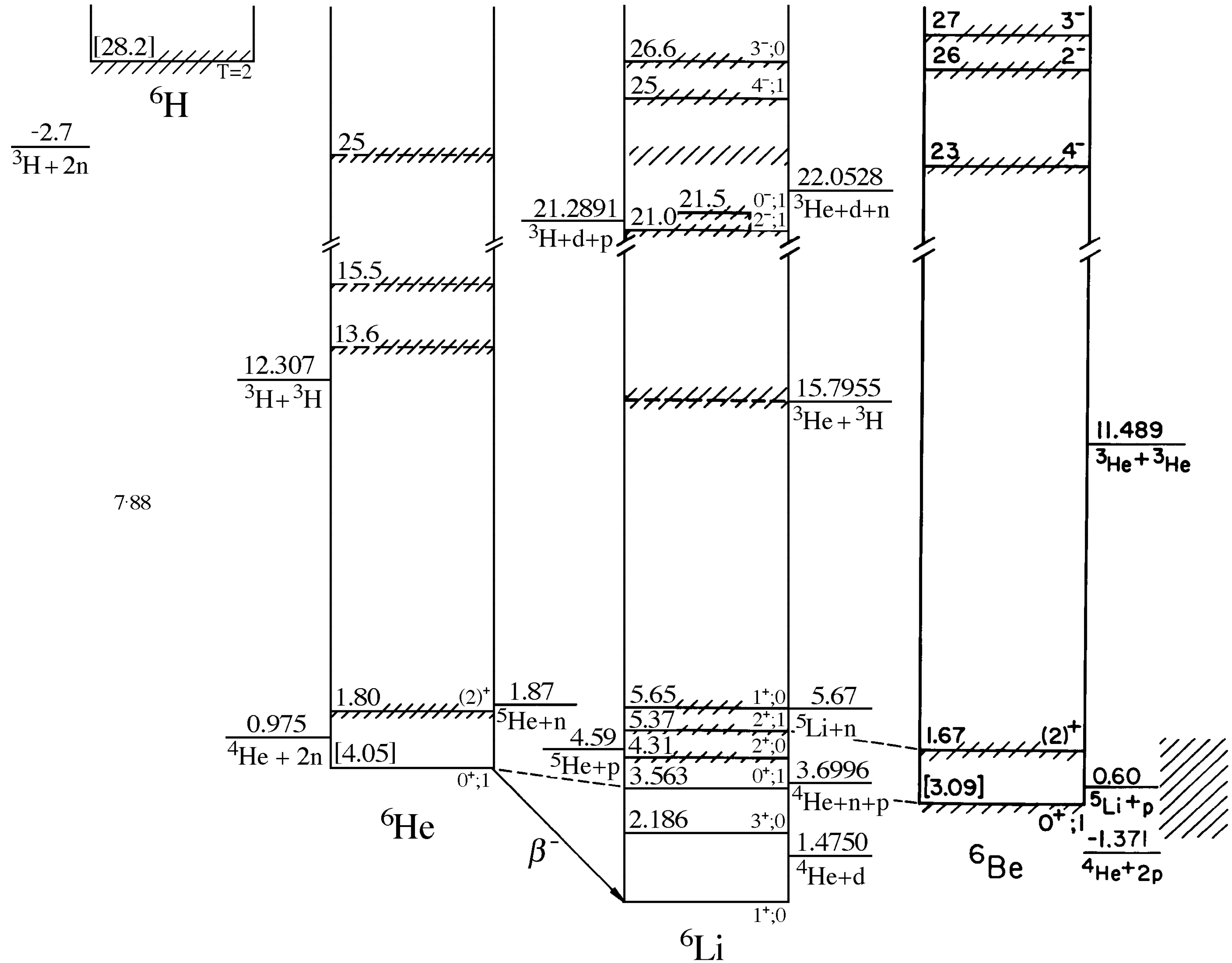
4. ^{6}Li(^{3}He, t)^{6}Be $\qquad$ $Q_{\rm m} = -4.307$

Triton groups have been observed to ^{6}Be*(0, 1.7). The width of the ground state is 89 ± 6 keV. The parameters of the excited state are displayed in Table 6.8 of (1974AJ01). No other excited states have been seen with $E_{\rm x} < 13$ MeV. There is no evidence for a state near 11.5 MeV: see (1979AJ01). (1987BO39) have studied the decay of ^{6}Be*(1.7) at $E(^3{\rm He}) = 38.7$ MeV: they report that the branching ratio for decay via the emission of ^{2}He [$T = 1$, $S = 0$] is 0.60 ± 0.15: see also reactions 13 in ^{6}He and 32 in ^{6}Li and (1985BO56, 1984BO49, 1988BO1J). See also (1984AJ01), (1987DA31; theor.) and ^{9}B.

^{6}B, ^{6}C

(Not illustrated)

Not observed: see (1979AJ01, 1984AJ01).



7·88

Fig. 4: Isobar diagram, $A = 6$. The diagrams for individual isobars have been shifted vertically to eliminate the neutron-proton mass difference and the Coulomb energy, taken as $E_C = 0.60Z(Z-1)/A^{1/3}$. Energies in square brackets represent the (approximate) nuclear energy, $E_N = M(Z,A) - ZM(\text{H}) - NM(\text{n}) - E_C$, minus the corresponding quantity for ^{6}Li: here M represents the atomic mass excess in MeV. Levels which are presumed to be isospin multiplets are connected by dashed lines.

References

(Closed 1 June 1988)

References are arranged and designated by the year of publication followed by the first two letters of the first-mentioned author's name and then by two additional characters. Most of the references appear in the National Nuclear Data Center files (Nuclear Science References Database) and have NNDC key numbers. Otherwise, TUNL key numbers were assigned with the last two characters of the form 1A, 1B, etc. In response to many requests for more informative citations, we have, when possible, included up to ten authors per paper and added the authors' initials.

1966LA04 T. Lauritsen and F. Ajzenberg-Selove, Nucl. Phys. 78 (1966) 1

1974AJ01 F. Ajzenberg-Selove and T. Lauritsen, Nucl. Phys. A227 (1974) 1

1977AJ02 F. Ajzenberg-Selove, Nucl. Phys. A281 (1977) 1

1978GR22 K.A. Gridnev, N.Z. Darvish, A.S. Demyanova, V.M. Semenov, V.B. Subbotin and E.F. Khefter, Izv. Akad. Nauk SSSR Ser. Fiz. 42 (1978) 2361; Bull. Acad. Sci. USSR Phys. Ser. 42 (1978) 124

1978LEZA C.M. Lederer, V.S. Shirley, E. Browne, J.M. Dairiki, R.E. Doebler, A.A. Shihab-Eldin, L.J. Jardine, J.K. Tuli and A.B. Buyrn, Table of Isotopes 7th Ed. (1978)

1979AJ01 F. Ajzenberg-Selove, Nucl. Phys. A320 (1979) 1

1981PL1A G.R. Plattner, Nukleonika 26 (1981)1005

1982AL33 D.V. Aleksandrov, Yu.A. Glukhov, A.S. Demyanova, V.I. Dukhanov, I.B. Mazurov, B.G. Novatsky, A.A. Ogloblin, S.B. Sakuta and D.N. Stepanov, Yad. Fiz. 36 (1982) 1351; Sov. J. Nucl. Phys. 36 (1982) 783

1982AU1A Audouze and Reeves, Essays in Nucl. Astrophys. (1982) 355

1982BA1J Bahcall and Davis, Essays in Nucl. Astrophys. (1982) 243

1982BE11 J.C. Bergstrom, S.B. Kowalski and R. Neuhausen, Phys. Rev. C25 (1982) 1156

1982BE1D A.M. Bernstein, Proc. Int. School of Intermediate Energy Nucl. Phys., Verona, Italy, July 1981; Eds., R. Bergere, S. Costa and C. Schaerf (1982) 125

1982BR25 V.N. Bragin, Yad. Fiz. 36 (1982) 656; Sov. J. Nucl. Phys. 36 (1982) 382

1982CA1A Cameron, Essays in Nucl. Astrophys. (1982) 23

1982CH28 B. Chen, Chin. J. Nucl. Phys. 4 (1982) 244

1982GR1A Greenstein, Essays in Nucl. Astrophys. (1982) 45

1982GU21 I.S. Gurbanovich and N.S. Zelenskaya, Yad. Fiz. 36 (1982) 1180; Sov. J. Nucl. Phys. 36 (1982) 688

1982KA1D K. Kar and J.C. Parikh, Pramana 19 (1982) 555

1982KA1E Kavanagh, Essays in Nucl. Astrophys. (1982) 159

1982KI11 J.C. Kim, J. Korean Phys. Soc. 15 (1982) 101

1982MO1B Motoba, Proc. Workshop on Hypernucl. Phys., Japan (1982) 36

1982RA28 G.M. Radutsky and V.A. Serdyutsky, Yad. Fiz. 36 (1982) 857; Sov. J. Nucl. Phys. 36 (1982) 501

1982WA1A W. Wang, Y. Zhang and R. Wang, Kexue Tongbao 27 (1982) 711

1982WA1B Wagoner, Essays in Nucl. Astrophys. (1982) 495

1982WE15 K. Wen, P. Zhang and Z. Sun, Chin. J. Nucl. Phys. 4 (1982) 289

1983AB1B Abramov et al., Sov. J. Nucl. Phys. 38 (1983) 491

1983AM1A G. Amsel and J.A. Davies, Nucl. Instrum. Meth. Phys. Res. 218 (1983) 177

1983AN13 L. Anderson, W. Bruckner, E. Moeller, S. Nagamiya, S. Nissen-Meyer, L. Schroeder, G. Shapiro and H. Steiner, Phys. Rev. C28 (1983) 1224; Erratum Phys. Rev. C28 (1983) 1246

1983AN18 M.N. Andronenko, E.N. Volnin, A.A. Vorobev, V.T. Grachev, A.A. Lobodenko, I.I. Straskovsky and L.N. Uvarov, Pisma Zh. Eksp. Teor. Fiz. 37 (1983) 446; JETP Lett. (USSR) 37 (1983) 530

1983ANZQ Y. Ando, M. Uno and M. Yamada, JAERI-M-83-025 (1983)

1983AS03 J. Asher and M.T. Swinhoe, Nucl. Instrum. Meth. 213 (1983) 503

1983AS1B Aslanides et al., in Florence (1983) 642

1983AV02 G.V. Avakov, E.I. Dolinsky and V.V. Turovtsev, Yad. Fiz. 37 (1983) 322; Sov. J. Nucl. Phys. 37 (1983) 192

1983BA1A Backenstoss et al., in Florence (1983) 372

1983BA1D H. Bando, Prog. Theor. Phys. 69 (1983) 1731

1983BA1G Backenstoss et al., Sin Newsl. 15 (1983) 31

1983BA1L Bando and Nagata, in Florence (1983) 688

1983BA26 P.D. Barnes, B. Bassalleck, R.A. Eisenstein, G. Franklin, R. Grace, C. Maher, P. Pile, R. Rieder, J. Szymanski, W.R. Wharton et al., Nucl. Phys. A402 (1983) 397

1983BA42 J. Bang, J.-J. Benayoun, C. Gignoux and I.L. Thompson, Nucl. Phys. A405 (1983) 126

1983BE51 T.L. Belyaeva, N.S. Zelenskaya and I.B. Teplov, Yad. Fiz. 38 (1983) 901; Sov. J. Nucl. Phys. 38 (1983) 540

1983BI13 J.R. Birkelund and J.R. Juizenga, Ann. Rev. Nucl. Part. Sci. 33 (1983) 265

1983BI1C P.G. Bizzeti, Riv. Nuovo Cim. 6 (1983) 1

1983BR23 M. Bruno, F. Cannata, M. D’Agostino, B. Jenny, W. Gruebler, V. Konig, P.A. Schmelzbach and P. Doleschall, Nucl. Phys. A407 (1983) 29

1983BR31 D.A. Bromley, Nucl. Phys. A400 (1983) 3c

1983BR32 F. Brady, G.A. Needham, J.L. Romero, C.M. Castaneda, T.D. Ford, J.L. Ullmann and M.L. Webb, Phys. Rev. Lett. 51 (1983) 1320

1983BU15 V.V. Burov, O.M. Knyazkov, A.A. Shirokova and K.V. Shitikova, Z. Phys. A313 (1983) 319

1983BU1A Burkova and Zhusupov, in Florence (1983) 345

1983CA13 G. Calvi, M. Lattuada, F. Riggi, C. Spitaleri, D. Vinciguerra and D. Miljanic, Lett. Nuovo Cim. 37 (1983) 279

1983CH23 B. Chambon, D. Drain, C. Pastor, A. Dauchy, A. Giorni and C. Morand, Z. Phys. A312 (1983) 125

1983CH59 B. Chen, J. Chen, B. Tian and S. Jin, Chin. J. Nucl. Phys. 5 (1983) 63

1983CO1E H. Conde, T. Andersson, L. Nilsson and C. Nordborg, in Antwerp 82 (1983) 447

1983DA22 J.H. Dave and C.R. Gould, Phys. Rev. C28 (1983) 2212

1983DE1C R. DeLeo, G. D’Erasmo, S. Micheletti, A. Pantaleo, V. Paticchio, M. Pignanelli and V. Variale, Rept. INFN/BE-83/9, 1st. Naz. Fis. Nucl., Bari, Italy (1983)

1983DE48 A.S. Demyanova and V.I. Manko, Yad. Fiz. 38 (1983) 1189; Sov. J. Nucl. Phys. 38 (1983) 716

1983DO10 V.N. Dobrikov, O.F. Nemets, A.S. Gass and A.A. Shvedov, Izv. Akad. Nauk SSSR, Ser. Fiz. 47 (1983) 943; Bull. Acad. Sci. USSR Phys. Ser. 47 (1983) 114

1983DZ1A R.I. Dzhibuti, Fiz. Elem. Chastits At. Yadra 14 (1983) 741; Sov. J. Part. Nucl. 14 (1983) 309

1983FE07 V.N. Fetisov, L. Majling, J. Zofka and R.A. Eramzhyan, Z. Phys. A314 (1983) 239

1983FO03 R. Fonte, Lett. Nuovo Cim. 38 (1983) 237

1983FO1A Fowler, AIP Conf. Proc. 96 (1983) 80

1983FU11 Y. Fujiwara and Y.C. Tang, Phys. Rev. C28 (1983) 1869

1983GA12 F.A. Gareev, S.A. Goncharov, S.N. Ershov, G.S. Kazacha and E. Bang, Yad. Fiz. 38 (1983) 73; Sov. J. Nucl. Phys. 38 (1983) 41

1983GE12 P.M. Gensini, Lett. Nuovo Cim. 38 (1983) 469

1983GLZZ C.W. Glover, C.C. Foster, P. Schwandt, J.R. Comfort, J. Rapaport, T.N. Taddeucci, D. Wong, J. Seubert and G. Wagner, Bull. Amer. Phys. Soc. 28 (1983) 996, EC3

1983GM1A M. Gmitro, H.R. Kissener, P. Truol and R.A. Eramzhyan, Fiz. Elem. Chastits At. Yadra 14 (1983) 773; Sov. J. Part. Nucl. 14 (1983) 323

1983GO06 O.K. Gorpinich, E.P. Kadkin, S.N. Kondratev, Yu.N. Lobach, M.V. Pasechnik, L.S. Saltykov and V.V. Tokarevsky, Izv. Akad. Nauk SSSR Ser. Fiz. 47 (1983) 185; Bull. Acad. Sci. USSR Phys. Ser. 47 (1983) 179

1983GO17 V.V. Goryachy and V.V. Peresypkin, Izv. Akad. Nauk SSSR Ser. Fiz. 47 (1983) 1013; Bull. Acad. Sci. USSR Phys. Ser. 47 (1983) 186

1983GO24 V.V. Goryachy and V.V. Peresypkin, Yad. Fiz. 38 (1983) 895; Sov. J. Nucl. Phys. 38 (1983) 536

1983GR26 D.H.E. Gross and M.C. Nemes, Phys. Lett. B130 (1983) 131

1983GU10 M. Guidetti, P.F. Nali and P. Quarati, Nuovo Cim. A75 (1983) 191

1983GU1A C. Guet, Nucl. Phys. A400 (1983) 191

1983GU1B Guinet et al., in Florence (1983) 531

1983HAYX G.M. Hale, D.C. Dodder and J.C. DeVeaux, in Antwerp 82 (1983) 326

1983HE17 P. Heusi, H.P. Isaak, H.S. Pruys, R. Engfer, E.A. Hermes, T. Kozlowski, U. Sennhauser and H.K. Walter, Nucl. Phys. A407 (1983) 429

1983IS10 M. Ishikawa, S. Seki, K. Furuno, Y. Tagishi, M. Sawada, T. Sugiyama, K. Matsuda, T. Murayama, N.X. Dai, J. Sanada et al., Phys. Rev. C28 (1983) 1884

1983JA13 B. Jakobsson, Phys. Scr. T5 (1983) 207

1983JE03 B. Jenny, W. Gruebler, V. Konig, P.A. Schmelzbach and C. Schweizer, Nucl. Phys. A397 (1983) 61

1983JO1A Johnson, Nishioka, Tostevin and Windham, in Florence (1983) 505

1983JU01 K. Junker, Nucl. Phys. A407 (1983) 460

1983KA1A S.G. Kadmenskii and Yu.L. Ratis, Yad. Fiz. 38 (1983) 1325; Sov. J. Nucl. Phys. 38 (1983) 805

1983KI10 U. Kirchner, R. Beckmann, U. Holm and H.-G. Korber, Nucl. Phys. A405 (1983) 159

1983KU06 V.I. Kukulin, V.N. Pomerantsev, V.G. Emelyanov and V.I. Klimov, Yad. Fiz. 37 (1983) 862; Sov. J. Nucl. Phys. 37 (1983) 514

1983KU17 N. Kumar, Nucl. Phys. A410 (1983) 50

1983KU1B A.A. Kuznetsov, Nucl. Phys. A400 (1983) 493

1983LE14 D.R. Lehman and W.C. Parke, Phys. Rev. C28 (1983) 364

1983LE26 Y. Le Bornec, F. Hibou, L. Bimbot, T. Hennino, J.C. Jourdain, F. Reide, B. Tatischeff, N. Willis, E. Aslanides, G. Bergdolt et al., Phys. Lett. B133 (1983) 149

1983LO10 G.J. Lolos, R.R. Johnson, P. Couvert, J. McKenna, R. Myers, I. Spadinger and P. Lorrain, Phys. Lett. B126 (1983) 20

1983LY04 E.B. Levshin, K.G. Sailer and A.D. Foursat, Yad. Fiz. 38 (1983) 633; Sov. J. Nucl. Phys. 38 (1983) 377

1983MA1F Majling, Zofka, Fetisov and Eramzhyan, in Orsay (1983) 19

1983MA53 J.F. Mateja, J. Garman and A.D. Frawley, Phys. Rev. C28 (1983) 1579

1983MI14 S.L. Mintz, Phys. Rev. C28 (1983) 1389

1983MO1C T. Motoba, H. Bando and K. Ikeda, Prog. Theor. Phys. 70 (1983) 189

1983MU08 M.J. Murphy and R.G. Stokstad, Phys. Rev. C28 (1983) 428

1983NA08 M.N. Namboodiri, R.K. Choudhury, J.B. Natowitz, K. Hagel, L. Adler, P.L. Gonthier, H. Simon, S. Kniffen, R. Patton, E. Tomasi et al., Phys. Rev. C28 (1983) 460

1983NO08 E. Norbeck, P.T. Wu, C.R. Chen and R.R. Carlson, Phys. Rev. C28 (1983) 1140

1983OL1A D.L. Olson, B.L. Berman, D.E. Greiner, H.H. Heckman, P.J. Lindstrom and H.J. Crawford, Phys. Rev. C28 (1983) 1602

1983OS03 A. Osman, Int. J. Theor. Phys. 22 (1983) 341

1983OT02 K. Otozai, T. Sekine, R. Arakawa, K. Hata, T. Saito and H. Baba, Z. Phys. A311 (1983) 303

1983PO1B Poppe et al., AIP Conf. Proc. 97 (1983) 226

1983PO1D Povh, in Florence (1983) 455

1983POZX C.H. Poppe, D. Rowley and F.S. Dietrich, Bull. Amer. Phys. Soc. 28 (1983) 969, AD8

1983PR09 J. Proriol and B. Jargeaix, Nuovo Cim. A77 (1983) 289

1983RE15 M.P. Rekalo, Izv. Akad. Nauk SSSR Ser. Fiz. 47 (1983) 2244; Bull. Acad. Sci. USSR Phys. Ser. 47 (1983) 152

1983RO12 R.G.H. Robertson and B.A. Brown, Phys. Rev. C28 (1983) 443

1983RU09 K. Rusek, Z. Moroz, R. Caplar, P. Egelhof, K.-H. Mobius, E. Steffens, I. Koenig, A. Weller and D. Fick, Nucl. Phys. A407 (1983) 208

1983SA1D G.R. Satchler, Nucl. Phys. A409 (1983) 3

1983SA39 Y. Sakuragi, M. Yahiro and M. Kamimura, Prog. Theor. Phys. (Kyoto) 70 (1983) 1047

1983SH1E Shi and Zhuang, Phys. Energ. Fortis Phys. Nucl. 7 (1983) 605

1983SH1J K. Shibata and S. Shirato, J. Phys. Soc. Jpn. 52 (1983) 3748

1983SH24 C.S. Shastry and Y.K. Gambhir, Phys. Rev. C28 (1983) 1109

1983SH38 Y.-J. Shi, Phys. Rev. C28 (1983) 2452

1983SM04 Yu.F. Smirnov and Yu.M. Tchuvilsky, Czech. J. Phys. B33 (1983) 1215

1983ST1A H. Stocker, G. Buchwald, G. Graebner, P. Subramanian, J.A. Maruhn, W. Greiner, B.V. Jacak and G.D. Westfall, Nucl. Phys. A400 (1983) 63

1983SU1B Y. Suzuki, Nucl. Phys. A405 (1983) 40

1983VA31 A.G.M. van Hees and P.W.M. Glaudemans, Z. Phys. A314 (1983) 323

1983VI03 M.F. Vineyard, J. Cook and K.W. Kemper, Nucl. Phys. A405 (1983) 429

1983VO1C Vogel, in Dronten (1983) 203

1984ABZY B.M. Abramov, I.A. Dukhovskoi, V.V. Kishkurno, L.A. Kondratyuk, A.P. Krutenkova, V.V. Kulikov, M.A. Matsyuk, P.A. Murat, I.A. Radkevich, E.N. Turdakina et al., in Alma Ata (1984) 311

1984AJ01 F. Ajzenberg-Selove, Nucl. Phys. A413 (1984) 1

1984AK01 A.I. Akhiezer and M.P. Rekalo, Dokl. Akad. Nauk SSSR 274 (1984) 1079; Sov. Phys. Dokl. 24 (1984) 121

1984AL08 D.V. Aleksandrov, E.A. Ganza, Yu.A. Glukhov, B.G. Novatsky, A.A. Ogloblin and D.N. Stepanov, Yad. Fiz. 39 (1984) 513; Sov. J. Nucl. Phys. 39 (1984) 323

1984AR17 N. Arena, S. Cavallaro, A.S. Figuera, P. D'Agostino, G. Fazio, G. Giardina and F. Mezzanares, Lett. Nuovo Cim. 41 (1984) 59

1984AS07 Y.I. Assafiri and I. Morrison, Nucl. Phys. A427 (1984) 460

1984BA19 I.Ya. Barit, L.S. Dulkova, E.V. Kuznetsova and N.M. Sobolevsky, Izv. Akad. Nauk SSSR Ser. Fiz. 48 (1984) 380; Bull. Acad. Sci. USSR Phys. Ser. 48 (1984) 159

1984BA1H I. Bang and Yu.V. Gaponov, Izv. Akad. Nauk SSSR Ser. Fiz. 48 (1984) 129; Bull. Acad. Sci. USSR Phys. Ser. 51 (1984) 130

1984BA1U Bayukov et al., in Panic (1984) I25

1984BA53 J. Bang, F.A. Gareev, S.A. Goncharov and G.S. Kazacha, Nucl. Phys. A429 (1984) 330

1984BE1E Benenson, Bull. Amer. Phys. Soc. 29 (1984) 1046

1984BE37 R. Beck, F. Dickmann and A.T. Kruppa, Phys. Rev. C30 (1984) 1044

1984BL21 L.D. Blokhintsev, A.M. Mukjamedzhanov and A.N. Safronov, Fiz. Elem. Chastits At. Yad. 15 (1984) 1296; Sov. J. Part. Nucl 15 (1984) 580

1984BO03 A.I. Boothroyd, J. Markey and P. Vogel, Phys. Rev. C29 (1984) 603

1984BO1C Boyd, Turner, Rybarcyk and Joseph, Private Communication (1984)

1984BO1D A.R. Bodmer, Q.N. Usmani and J. Carlson, Nucl. Phys. A422 (1984) 510

1984BO1G A.R. Bodmer, AIP Conf. Proc. 123 (1984) 806

1984BO1H L.N. Bogdanova and V.E. Markushin, Fiz. Elem. Chastits At. Yadra 15 (1984) 808; Sov. J. Part. Nucl. 15 (1984) 361

1984BO49 O.V. Bochkarev, A.A. Korsheninnikov, E.A. Kuzmin, I.G. Mukha, A.A. Ogloblin, L.V. Chulkov and G.B. Yankov, Pisma Zh. Eksp. Teor. Fiz. 40 (1984) 204; JETP Lett. (USSR) 40 (1984) 969

1984BR03 F.P. Brady, G.A. Needham, J.L. Ullmann, C.M. Castaneda, T.D. Ford, N.S.P. King, J.L. Romero, M.L. Webb, V.R. Brown and C.H. Poppe, J. Phys. G10 (1984) 363

1984BR04 J. Brzychczyk, L. Freindl, K. Grotowski, Z. Majka, S. Micek, R. Planeta, M. Albinska, J. Buschmann, H. Klewe-Nebenius, H.J. Gils et al., Nucl. Phys. A417 (1984) 174

1984BR08 I.M. Brancus, A. Constantinescu, I. Lazar, I. Mihai, M. Petrascu, A.S. Demianova, A.A. Ogloblin and S.B. Sakuta, Rev. Roum. Phys. 29 (1984) 77

1984BR1B Bragin and Tompson, in Alma Ata (1984) 460

1984BR22 T. Bressani, E. Chiavassa, S. Costa, G. Dellacasa, N. De Marco, M. Gallio, A. Musso, E. Aslanides, G. Bergdolt, P. Fassnacht et al., Phys. Rev. C30 (1984) 1745

1984BR25 B.A. Brown, C.R. Bronk and P.E. Hodgson, J. Phys. G10 (1984) 1683

1984BR28 V.N. Bragin, Izv. Akad. Nauk SSSR Ser. Fiz. 48 (1984) 182; Bull. Acad. Sci. USSR Phys. Ser. 48 (1984) 184

1984BU01 V.V. Burov, V.M. Dubovik, S.G. Kadmensky, Yu.M. Tchuvilsky and L.A. Tosunyan, J. Phys. G10 (1984) L21

1984BU1C Burkova, Glozman and Zhusupov, in Alma Ata (1984) 368

1984BY1A V.M. Bystritsky, V.P. Dzhelepov, A. Gula, V.A. Stolupin and J. Wozniak, Acta Phys. Pol. B15 (1984) 699

1984BY1B V.M. Bystritsky, V.P. Dzhelepov, A. Gula, J. Wozniak and V.G. Zinov, Acta Phys. Pol. B15 (1984) 689

1984CH16 E. Chiavassa, S. Costa, G. Dellacasa, N. De Marco, M. Gallio, A. Musso, E. Aslanides, P. Fassnacht, F. Hibou, T. Bressani et al., Nucl. Phys. A422 (1984) 621

1984CH1E B. Chen, B. Sa and X. Zhang, Chin. J. Nucl. Phys. 6 (1984) 129

1984CH1G H. Chen, F. Zhuang, X. Shi and X. Jin, Chin. J. Nucl. Phys. 6 (1984) 303

1984CH20 I.-T. Cheon, S.J. Choi and M.T. Jeong, Phys. Lett. B144 (1984) 312

1984CO08 J. Cook, Nucl. Phys. A417 (1984) 477

1984DA1H Davis, AIP Conf. Proc. 123 (1984) 1037

1984DE52 F.W.N. de Boer, R. van Dantzig, M. Daum, J. Jansen, P.J.S. Watson, L. Felawka, C. Grab, A. van der Schaaf, T. Kozlowski, J. Martino and A.I. Smirnov, Phys. Rev. Lett. 53 (1984) 423

1984DE53 P. De Bievre, M. Gallet, N.E. Holden and I.L. Barnes, J. Phys. Chem. Ref. Data 13 (1984) 809

1984DO20 T.W. Donnelly and I. Sick, Rev. Mod. Phys. 56 (1984) 461

1984DU17 S.B. Dubovichenko and M.A. Zhusupov, Izv. Akad. Nauk SSSR Ser. Fiz. 48 (1984) 935; Bull. Acad. Sci. USSR Phys. Ser. 48 (1984) 95

1984DY01 N. Dytlewski, S.A. Siddiqui and H.H. Thies, Nucl. Phys. A430 (1984) 214

1984DZ1A R.I. Dzhibuti and Sh.M. Tsiklauri, Yad. Fiz. 39 (1984) 1115; Sov. J. Nucl. Phys. 39 (1984) 704

1984EC01 J.S. Eck, K.W. Kemper and T.R. Ophel, Nucl. Phys. A425 (1984) 141

1984EF03 V.P. Efrosinin and D.A. Zaikin, Yad. Fiz. 39 (1984) 1135; Sov. J. Nucl. Phys. 39 (1984) 717

1984EV1A Evlanov, Polozov and Sokolov, in Alma Ata (1984) 431

1984FE1A Ferch et al., INDC (CCP)-221/L (1984) 18

1984FI14 G.F. Filippov, V.S. Vasilevsky and S.P. Kruchinin, Yad. Fiz. 40 (1984) 357; Sov. J. Nucl. Phys. 40 (1984) 229

1984FI1F V.V. Filchenkov, L.N. Somov and V.G. Zinov, Nucl. Instrum. Meth. Phys. Res. A228 (1984) 174

1984FIZW G.F. Filippov, V.S. Vasilevsky and A.V. Nesterov, in Alma Ata (1984) 209

1984FR13 H. Friedrich, Phys. Lett. B146 (1984) 135

1984GE05 J.-F. Germond and C. Wilkin, J. Phys. G10 (1984) 745

1984GE1B Germond, in Panic (1984) F26

1984GL02 L.Ya. Glozman, V.I. Kukulin and V.G. Neudatchin, Phys. Lett. B136 (1984) 315

1984GL06 Yu.A. Glukhov, A.S. Demyanova, A.A. Ogloblin, S.B. Sakuta and V.V. Sukharevsky, Yad. Fiz. 40 (1984) 62; Sov. J. Nucl. Phys. 40 (1984) 41

1984GL09 L.Ya. Glozman, V.I. Kukulin and V.G. Neudatchin, Nucl. Phys. A430 (1984) 589

1984GO03 A. Gokmen, H. Breuer, A.C. Mignerey, B.G. Glagola, K. Kwiatkowski and V.E. Viola, Jr., Phys. Rev. C29 (1984) 1595

1984GR05 G. Grawert and D. Mukhopadhyay, Nucl. Phys. A415 (1984) 304

1984GR08 R.E.L. Green, R.G. Korteling and K.P. Jackson, Phys. Rev. C29 (1984) 1806

1984GR20 K. Grotowski, Z. Majka, R. Planeta, M. Szczodrak, Y. Chan, G. Guarino, L.G. Moretto, D.J. Morrissey, L.G. Sobotka, R.G. Stokstad, I. Tserruya et al., Phys. Rev. C30 (1984) 1214

1984GU06 R. Guigas, P. Blum, H. Koch, M. Meyer, H. Poth, U. Raich, B. Richter, G. Backenstoss, P. Pavlopoulos, L. Tauscher et al., Phys. Lett. B137 (1984) 323

1984GU09 S.K. Gupta and S. Kailas, Z. Phys. A317 (1984) 75

1984GU14 P.C. Gugelot, Phys. Rev. C30 (1984) 654

1984HA1D D. Halderson, Phys. Rev. C30 (1984) 941

1984HA1M Haxton, AIP Conf. Proc. 123 (1984) 1026

1984HA25 M. Hanck, Y.C. Tang and D. Baye, Nucl. Phys. A419 (1984) 308

1984HA53 Q. Haider and F.B. Malik, At. Data Nucl. Data Tables 31 (1984) 185

1984HI1A A.S. Hirsch, A. Bujak, J.E. Finn, L.J. Gutay, R.W. Minich, N.T. Porile, R.P. Scharenberg and B.C. Stringfellow, Phys. Rev. C29 (1984) 508

1984IR1A Irgaziev, Yarmukhamedov and Avakov, in Panic (1984) A33

1984JI03 R.I. Jibuti and R.Ya. Kezerashvili, Nucl. Phys. A430 (1984) 573

1984JO1A Johnson, Proc. 4th Int. Conf. Clustering Aspects of Nucl. Struct., Chester, England, 1984 (1985) 155

1984KA1E H. Kanada, T. Kaneko, M. Nomoto and Y.C. Tang, Prog.Theor. Phys. 72 (1984) 369

1984KE1C B.O. Kerbikov, Yad. Fiz. 39 (1984) 816; Sov. J. Nucl. Phys. 39 (1984) 516

1984KH05 S.A.F. Khallaf, Fizika (Zagreb) 16 (1984) 285

1984KI08 B.T. Kim, T. Udagawa and T. Tamura, Phys. Rev. C30 (1984) 1087

1984KI16 R.R. Kiziah, M.D. Brown, C.J. Harvey, D.S. Oakley, D.P. Saunders, P.A. Seidl, C.F. Moore, W.B. Cottingame, R.W. Garnett, S.J. Greene et al., Phys. Rev. C30 (1984) 1643

1984KO16 K. Kobayashi and T. Kohmura, Prog. Theor. Phys. (Kyoto) 71 (1984) 327

1984KO1A Koenig et al., Bull. Amer. Phys. Soc. 29 (1984) 672

1984KO1E Komarov, Muller and Tesch, in Panic (1984) 120

1984KO1H D.P. Kostomarov, V.I. Kukulin and P.B. Sazonov, Moscow Univ. Comput. Math. Cybern. (USA) 1 (1984) 1; Vestn. Mosk. Univ. 15, Vychisl. Mat. Kibern. (USSR) 1 (1984) 3

1984KO25 I. Koenig, D. Fick, S. Kossionides, P. Egelhof, K.-H. Mobius and E. Steffens, Z. Phys. A318 (1984) 135

1984KR10 V.M. Krasnopolskii, V.I. Kukulin and V.G. Neudachin, Izv. Akad. Nauk SSSR Ser. Fiz. 48 (1984) 84; Bull. Acad. Sci. USSR Phys. Ser. 48 (1984) 82

1984KR1B A.V. Kravtsov, N.P. Popov and G.E. Solvakin, Pisma Zh. Eksp. Teor. Fiz. 40 (9184) 124; JETP Lett. (USSR) 40 (1984) 875

1984KU03 V.I. Kukulin, V.M. Krasnopolsky, V.T. Voronchev and P.B. Sazonov, Nucl. Phys. A417 (1984) 128

1984KU06 V.I. Kukulin and V.V. Peresypkin, Yad. Fiz. 39 (1984) 412; Sov. J. Nucl. Phys. 39 (1984) 259

1984KU13 A.E. Kudrjavtsev, V.D. Mur and V.S. Popov, Phys. Lett. B143 (1984) 41

1984KU15 V.I. Kukulin, M. Kamal, V.T. Voronchev and V.M. Krasnopolsky, J. Phys. G10 (1984) L213

1984LA19 M. Lattuada, F. Riggi, C. Spitaleri, D. Vinciguerra, G. Vourvopoulos, X. Aslanoglou and D. Miljanic, Phys. Rev. C30 (1984) 531

1984LA27 M. Langevin, C. Detraz, M. Epherre, D. Guillemaud-Mueller, B. Jonson, C. Thibault and the ISOLDE Collaboration, Phys. Lett. B146 (1984) 176

1984LA33 M. Lattuada, F. Riggi, C. Spitaleri and D. Vinciguerra, Nuovo Cim. A83 (1984) 151

1984LO1C Lovas, Proc. 4th Int. Conf. Clustering Aspects of Nucl. Struct., Chester, England, 1984 (1985) 231

1984MA1G Majling, Sotona, Zofka and Fetisov, in Panic (1984) M20

1984MI1A Mikhelamvili, in Alma Ata (1984) 216

1984MI1E D.J. Millener, AIP Conf. Proc. 123 (1984) 850

1984MI1F Mihailovic, Proc. 4th Int. Conf. Clustering Aspects of Nucl. Struct., Chester, England, 1984 (1985) 85

1984MIZM I.A. Mitropolsky and E.F. Hefter, in Alma Ata (1984) 241

1984MO09 T. Motoba, H. Bando and K. Ikeda, Prog. Theor. Phys. 71 (1984) 222

1984MO1H T. Motoba, H. Bando and K. Ikeda, Proc. Int. Summer School, Changchun, China, 1983 (1984) 702

1984MO29 D.J. Morrissey, W. Benenson, E. Kashy, B. Sherrill, A.D. Panagiotou, R.A. Blue, R.M. Ronningen, J. van der Plicht and H. Utsunomiya, Phys. Lett. B148 (1984) 423

1984MU01 B.A. Mughrabi, Z. El Itaoui, P.J. Ellis and Y.C. Tang, Phys. Rev. C29 (1984) 29

1984MU1D D. Mukhopadhyay and G. Grawert, J. Phys. (Paris) 45 (1984) C6-435

1984NA17 V.S. Nadezhdin, N.I. Petrov, V.I. Satarov and A.M. Rozanova, Yad. Fiz. 40 (1984) 27; Sov. J. Nucl. Phys. 40 (1984) 17

1984NA19 S. Nakaichi-Maeda and E.W. Schmid, Z. Phys. A318 (1984) 171

1984NA1D S. Nagamiya, J. Randrup and T.J.M. Symons, Ann. Rev. Nucl. Part. Sci. 34 (1984) 155

1984NE1A Nemets, Rudchik and Chuvilski, in Alma Ata (1984) 334

1984NI01 H. Nishioka, J.A. Tostevin, R.C. Johnson and K.-I. Kubo, Nucl. Phys. A415 (1984) 230

1984OH01 H. Ohnishi, M. Tanifuji, M. Kamimura, Y. Sakuragi and M. Yahiro, Nucl. Phys. A415 (1984) 271

1984PA08 W.C. Parke and D.R. Lehman, Phys. Rev. C29 (1984) 2319; Erratum Phys. Rev. C34 (1986) 1496

1984PA1B Pasechnik et al., in Alma Ata 84 (1984) 288

1984PL1A G.-R. Plattner, Nucl. Phys. A416 (1984) 565

1984PU1A Pugach et al., in Alma Ata (1984) 386

1984RA1E N.C. Rana, Nuovo Cim. B84 (1984) 53

1984RE14 S.M. Read and V.E. Viola, Jr., At. Data Nucl. Data Tables 31 (1984) 359

1984RE1C M.P. Rekalo, Dopov. Akad. Nauk UKRSR Ser. A7 (1984) 62

1984REZZ D.S. Resler, H.D. Knox, R.O. Lane and S.M. Grimes, Bull. Amer. Phys. Soc. 29 (1984) 629, AG3

1984RO04 R.G.H. Robertson, P. Dyer, R.C. Melin, T.J. Bowles, A.B. McDonald, G.C. Ball, W.G. Davies and E.D. Earle, Phys. Rev. C29 (1984) 755

1984RO1B Romanov and Grechukhin, in Alma Ata (1984) 280, 281

1984SA1B Saupe, Shirokova and Shitikova, in Alma Ata (1984) 474

1984SA39 L. Satta, J. Duflo, F. Plouin, P. Picozza, L. Goldzahl, J. Banaigs, R. Frascaria, F.L. Fabbri, A. Codino, J. Berge et al., Phys. Lett. B139 (1984) 263

1984SC1A E.W. Schmid, Nucl. Phys. A416 (1984) 347

1984SHZJ A.A. Shvedov, V.N. Dobrikov and O.F. Nemets, in Alma-Ata (1984) 332

1984SM04 G.R. Smith, J.R. Shepard, R.L. Boudrie, R.J. Peterson, G.S. Adams, T.S. Bauer, G.J. Igo, G. Pauletta, C.A. Whitten, Jr., A. Wriekat et al., Phys. Rev. C30 (1984) 593

1984ST1B R.G. Stokstad, Comments on Nucl. Part. Phys. 13 (1984) 231

1984SU09 D. Sundholm, P. Pyykko, L. Laaksonen and A. Sadlej, Chem. Phys. Lett. 112 (1984) 1

1984TA07 T.N. Taddeucci, T.A. Carey, C. Gaarde, J. Larsen, C.D. Goodman, D.J. Horen, T. Masterson, J. Rapaport, T.P. Welch and E. Sugarbaker, Phys. Rev. Lett. 52 (1984) 1960

1984TAZS T.N. Taddeucci, Bull. Amer. Phys. Soc. 29 (1984) 1032, BA4

1984TR1B V.A. Tryasuchev, Yad. Fiz. 39 (1984) 602; Sov. J. Nucl. Phys. 39 (1984) 380

1984TR1C J.W. Truran, Ann. Rev. Nucl. Part. Sci. 34 (1984) 53

1984TS03 M.B. Tsang, D.R. Klesch, C.B. Chitwood, D.J. Fields, C.K. Gelbke, W.G. Lynch, H. Utsunomiya, K. Kwiatkowski, V.E. Viola, Jr. and M. Fatyga, Phys. Lett. B134 (1984) 169

1984TU02 M. Turk and B. Antolkovic, Nucl. Phys. A431 (1984) 381

1984UD1A M.A. Uddin and M.S. Ali, Bangladesh Acad. Sci. 8 (1984) 19

1984UM04 K. Umeda, T. Yamaya, T. Suehiro, K. Takimoto, R. Wada, E. Takada, S. Shimoura, A. Sakaguchi, S. Murakami, M. Fukada et al., Nucl. Phys. A429 (1984) 88

1984VA06 A.G.M. van Hees and P.W.M. Glaudemans, Z. Phys. A315 (1984) 223

1984VA1B Vasilevsky, Chopovski and Fillipov, in Alma Ata (1984) 197

1984VI01 M.F. Vineyard, K.W. Kemper and J. Cook, Phys. Lett. B142 (1984) 249

1984VI02 M.F. Vineyard, J. Cook, K.W. Kemper and M.N. Stephens, Phys. Rev. C30 (1984) 916

1984WA02 H. Walliser and Y.C. Tang, Phys. Lett. B135 (1984) 344

1984WA09 R.E. Warner, R.S. Wakeland, J.-Q. Yang, D.L. Friesel, P. Schwandt, G. Caskey, A. Galonsky, B. Remington and A. Nadasen, Nucl. Phys. A422 (1984) 205

1984WA18 M.W. Wade, M.K. Brussel, L.J. Koester, Jr. and J.H. Smith, Phys. Rev. Lett. 53 (1984) 2540

1984WA1H L.-H. Wang, F.-A. Zeng and X. Zhao, Phys. Energ. Fortis Phys. Nucl. 8 (1984) 328

1984WA1J J.D. Walecka, AIP Conf. Proc. 123 (1984) 1

1984WE03 G.D. Westfall, Z.M. Koenig, B.V. Jacak, L.H. Harwood, G.M. Crawley, M.W. Curtin, C.K. Gelbke, B. Hasselquist, W.G. Lynch, A.D. Panagiotou et al., Phys. Rev. C29 (1984) 861

1984WI08 G. Windham, H. Nishioka, J.A. Tostevin and R.C. Johnson, Phys. Lett. B138 (1984) 253

1984YP01 K. Ypsilantis and M.E. Grypeos, Nuovo Cim. A82 (1984) 93

1984ZA1A M. Zamani, K. Zioutas and S. Charalambous, Nucl. Tracks Radiat. Meas. 8 (1984) 555

1984ZH1A Zhusupov, Shaksibekova and Ibraeva, in Alma Ata (1984) 411

1984ZH1B F. Zhuang, H.-Z. Chen and X.-N. Jin, Phys. Energ. Fortis Phys. Nucl. 8 (1984) 215

1984ZW1A Zwarts, Unpublished Ph.D. Thesis, Utrecht (1984)

1985AJ01 F. Ajzenberg-Selove, Nucl. Phys. A433 (1985) 1; Erratum Nucl. Phys. A449 (1986) 155

1985AK1B I. Akhiezer and M.P. Rekalo, Dokl. Akad. Nauk SSSR 280 (1985) 83; Sov. Phys. Dokl. (USA) 30 (1985) 45

1985AL12 Y. Alhassid, G. Maddison, K. Langanke, K. Chow and S.E. Koonin, Z. Phys. A321 (1985) 677

1985AL16 G.D. Alkhazov, S.L. Belostotsky, A.A. Vorobyov, O.A. Domchenkov, Yu.V. Dotsenko, N.P. Kuropatkin and V.N. Nikulin, Yad. Fiz. 42 (1985) 8; Sov. J. Nucl. Phys. 42 (1985) 4

1985AL1G Aleksandrov et al., in Questions in At. Phys. and in Tech., USSR (1985) 3

1985AN28 M.S. Antony, J. Britz, J.B. Bueb and A. Pape, At. Data Nucl. Data Tables 33 (1985) 447

1985BA1C B.F. Bayman, S. Fricke and Y.C. Tang, Phys. Rev. C31 (1985) 679

1985BA1E H. Bando, Prog. Theor. Phys. Suppl. 81 (1985) 1

1985BA68 F.C. Barker and C.L. Woods, Aust. J. Phys. 38 (1985) 563

1985BAYZ I.Ya. Barit, Yu.G. Balashko, L.S. Dulkova and S.V. Zuev, in Leningrad (1985) 307

1985BE1C Berdnikov et al., in Lengingrad (1985) 302

1985BE30 S.L. Belostotsky, S.S. Volkov, A.A. Vorobyev, Yu.V. Dotsenko, L.G. Kudin, N.P. Kuropatkin, O.V. Miklukho, V.N. Nikulin and O.E. Prokofyev, Yad. Fiz. 41 (1985) 1425; Sov. J. Nucl. Phys. 41 (1985) 903

1985BE60 R. Beck, F. Dickmann and R.G. Lovas, Nucl. Phys. A446 (1985) 703

1985BL18 J. Blocki, K. Grotowski, R. Planeta and W.J. Swiatecki, Nucl. Phys. A445 (1985) 367

1985BO05 M. Bouten, M.C. Bouten and T. Cornelissens, J. Phys. G11 (1985) 231

1985BO11 O.V. Bochkarev, A.A. Korsheninnikov, E.A. Kuzmin, I.G. Mukha, L.V. Chulkov and G.B. Yankov, Yad. Fiz. 41 (1985) 31; Sov. J. Nucl. Phys. 41 (1985) 19

1985BO1E R.N. Boyd, R.E. Turner, B. Sur, L. Rybarcyk and C. Joseph, AIP Conf. Proc. 126 (1985) 145

1985BO1J A.S. Botvina, A.S. Il'inov and I.N. Mishustin, Yad. Fiz. 42 (1985) 1127; Sov. J. Nucl. Phys. 42 (1985) 712

1985BO1K Boesgaard and Steigman, Ann. Rev. Astron. Astrophys. 23 (1985) 319

1985BO55 O.V. Bochkarev, A.A. Korsheninnikov, E.A. Kuzmin, I.G. Mukha, A.A. Ogloblin, L.V. Chulkov and G.B. Yankov, Pisma Zh. Eksp. Teor. Fiz. 42 (1985) 303; JETP Lett. (USSR) 42 (1985) 374

1985BO56 O.V. Bochkarev, A.A. Korsheninnikov, E.A. Kuzmin, I.G. Mukha, A.A. Ogloblin, L.V. Chulkov and G.B. Yankov, Pisma Zh. Eksp. Teor. Fiz. 42 (1985) 305; JETP Lett. (USSR) 42 (1985) 377

1985BR14 V.N. Bragin and I.J. Thompson, Yad. Fiz. 41 (1985) 314; Sov. J. Nucl. Phys. 41 (1985) 199

1985BU1B M. Bubak, V.M. Bystritsky and A. Gula, Acta Phys. Pol. B16 (1985) 575

1985CA1B J.M. Cameron, Nucl. Phys. A434 (1985) 261

1985CA41 G.R. Caughlan, W. A. Fowler, M.J. Harris and B.A. Zimmerman, At. Data Nucl. Data Tables 32 (1985) 197

1985CH01 C.T. Christou, C.J. Seftor, W.J. Briscoe, W.C. Parke and D.R. Lehman, Phys. Rev. C31 (1985) 250

1985CH37 S. Chiba, M. Baba, H. Nakashima, M. Ono, N. Yabuta, S. Yukinori and N. Hirakawa, J. Nucl. Sci. Tech. (Tokyo) 22 (1985) 771

1985CL1A F.E. Close, Nucl. Phys. A446 (1985) 273

1985CO09 J. Cook and K.W. Kemper, Phys. Rev. C31 (1985) 1745

1985CO21 J. Cook, Nucl. Phys. A445 (1985) 350

1985CU04 A. Cunsolo, A. Foti, G. Imme, G. Pappalardo, G. Raciti, F. Rizzo and N. Saunier, Nuovo Cim. A85 (1985) 343

1985DA29 V. D'Amico, G. Fazio, S. Femino, G. Giardina, A. Italiano and F. Mezzanares, Can. J. Phys. 63 (1985) 1438

1985DE05 G. D'Erasmo, V. Variale and A. Pantaleo, Phys. Rev. C31 (1985) 656

1985DE17 E. Descroix, M. Bedjidian, J.Y. Grossiord, A. Guichard, M. Gusakow, M. Jacquin, J.R. Pizzi and G. Bagieu, Nucl. Phys. A438 (1985) 112

1985DO03 P. Doleschall, Gy. Bencze, M. Bruno, F. Cannata and M. D'Agostino, Phys. Lett. B152 (1985) 1

1985DO16 Yu.V. Dotsenko and V.E. Starodubsky, Yad. Fiz. 42 (1985) 107; Sov. J. Nucl. Phys. 42 (1985) 66

1985DO19 M. Dorr, W. Fetscher, D. Gotta, J. Reich, H. Ullrich, G. Backenstoss, W. Kowald and H.-J. Weyer, Nucl. Phys. A445 (1985) 557; Erratum Nucl. Phys. A457 (1986) 742

1985DU05 O. Dumbrajs, Phys. Scr. 31 (1985) 485

1985EM01 V.G. Emelyanov, V.I. Klimov and V.N. Pomerantsev, Phys. Lett. B157 (1985) 105

1985ER06 R.A. Eramzhyan, T.D. Kaipov and S.S. Kamalov, Z. Phys. A322 (1985) 321

1985FA02 H. Faissner, B.R. Kim and H. Reithler, Phys. Rev. Lett. 54 (1985) 1902

1985FI01 G.F. Filippov, V.S. Vasilevskii and A.V. Nesterov, Izv. Akad. Nauk SSSR Ser. Fiz. 49 (1985) 173; Bull. Acad. Sci. USSR Phys. Ser. 49 (1985) 182

1985FI1E G.F. Filippov, V.S. Vasilevskii and L.L. Chopovskii, Fiz. Elem. Chastits At. Yadra 16 (1985) 349; Sov. J. Part. Nucl. 16 (1985) 153

1985FR01 R. Franke, K. Kochskamper, B. Steinheuer, K. Wingender, W. Von Witsch and H. Machner, Nucl. Phys. A433 (1985) 351

1985FR1F V. Franco and Y. Yin, Phys. Rev. Lett. 55 (1985) 1059

1985GL06 Yu.A. Glukhov, A.S. Demyanova, A.A. Ogloblin, S.B. Sakuta, I. Berceanu and I. Mihai, Yad. Fiz. 42 (1985) 561; Sov. J. Nucl. Phys. 42 (1985) 355

1985GO07 P. Goldhammer, Phys. Rev. C31 (1985) 1533

1985GO1F Goodman, AIP Conf. Proc. 124 (1985) 375

1985GO1G Gorionov et al., in Leningrad (1985) 310

1985GO20 J. Gomez-Camacho, M. Lozano and M.A. Nagarajan, Phys. Lett. B161 (1985) 39

1985GO23 J. Gomez-Camacho and M.A. Nagarajan, J. Phys. G11 (1985) L239

1985GR1A L. Grenacs, Ann. Rev. Nucl. Part. Sci. 35 (1985) 455

1985GU11 S.K. Gupta, S. Kailas, N. Lingappa and A. Shridhar, Phys. Rev. C31 (1985) 1965

1985GU1G A. Gula, Acta Phys. Pol. B16 (1985) 589

1985GU1J K.K. Gudima and V.D. Toneev, Yad. Fiz. 42 (1985) 645; Sov. J. Nucl. Phys. 42 (1985) 409

1985HA04 K. Hahn, E.W. Schmid and P. Doleschall, Phys. Rev. C31 (1985) 325

1985HA14 M. Hanck, Nucl. Phys. A439 (1985) 1

1985HA18 S.S. Hanna and J.W. Hugg, Hyperfine Interactions 21 (1985) 59

1985HO1A L.M. Hobbs, Astrophys. J. 290 (1985) 284

1985HO1E Hofmann, NEANDC-222 U; Specialists' Meeting on the Use of the Optical Model for the Calculation of Neutron Cross Sections Below 20 MeV, Paris, 1985 (OECD/OCDE 1986) 75

1985IK1A K. Ikeda, H. Bando and T. Motoba, Prog. Theor. Phys. Suppl. 81 (1985) 147

1985JA16 N. Jarmie and R.E. Brown, Nucl. Instrum. Meth. Phys. Res. B10-11 (1985) 405

1985JA18 B.V. Jacak, D. Fox and G.D. Westfall, Phys. Rev. C31 (1985) 704

1985JE04 B. Jenny, W. Gruebler, V. Konig and P.A. Schmelzbach, Nucl. Phys. A444 (1985) 93

1985KA1D Kadkin, in Leningrad (1985) 297

1985KA1M M. Kaschiev, A.V. Matveenko and J. Revai, Phys. Lett. B162 (1985) 18

1985KA20 H. Kanada, T. Kaneko, S. Saito and Y.C. Tang, Nucl. Phys. A444 (1985) 209

1985KH07 A.E. Khalil, Phys. Rev. C32 (1985) 1631

1985KO22 E.A. Kotikov and E.D. Makhnovsky, Yad. Fiz. 41 (1985) 289; Sov. J. Nucl. Phys. 41 (1985) 183

1985KO29 Yu.E. Kozyr, V.I. Medvedev, Yu.N. Pavlenko and V.M. Pugach, Izv. Akad. Nauk SSSR, Ser. Fiz. 49 (1985) 1026; Bull. Acad. Sci. USSR Phys. Ser. 49 (1985) 179

1985KR13 J.J. Kraushaar, P.D. Kunz, J.H. Mitchell, J.M. Cameron, D.A. Hutcheon, R.P. Liljestrand, W.J. McDonald, C.A. Miller, W.C. Olsen, J.R. Tinsley et al., Phys. Rev. C32 (1985) 1083

1985KW02 E. Kwasniewicz and L. Jarczyk, Nucl. Phys. A441 (1985) 77

1985KW03 E. Kwasniewicz, J. Kisiel and L. Jarczyk, Acta Phys. Pol. B16 (1985) 947

1985LA20 I.A. Lantsev, V.I. Ostroumov, Yu.R. Gismatulin, V.N. Zbarag and A.A. Melentev, Izv. Akad. Nauk SSSR Ser. Fiz. 49 (1985) 143; Bull. Acad. Sci. USSR Phys. Ser. 49 (1985) 149

1985LE08 D.R. Lehman and W.C. Parke, Phys. Rev. C31 (1985) 1920; Erratum Phys. Rev. C37 (1988) 2266

1985LE1B Lemaire, Int. Symp. Medium Energy Nucleon and Anti-Nucleon Scattering (1985)

1985LI1C Y.-G. Ling, X. Zhao and F.-A. Zeng, Phys. Energ. Fortis Phys. Nucl. 9 (1985) 236

1985LI1F Y.-G. Ling and X. Zhao, Chin. Phys. 5 (1985) 77

1985LO02 M.A.K. Lodhi and K.E. Wald, J. Phys. (London) G11 (1985) 365

1985LO1A M.A. Lodhi and R.B. Hamilton, Phys. Rev. Lett. 54 (1985) 646

1985LU08 R.C. Luhn, S. Sen, N.O. Gaiser, S.E. Darden and Y. Koike, Phys. Rev. C32 (1985) 11

1985MA02 H. Machner, D. Protic, G. Riepe, H.G. Bohlen and H. Fuchs, Phys. Rev. C31 (1985) 443

1985MA13 M.T. Magda, A. Pop and A. Sandulescu, J. Phys. G11 (1985) L75

1985MA1G J.L. Matthews, AIP Conf. Proc. 133 (1985) 296

1985MAZG B.S. Mazitov and E.N. Rasulov, in Leningrad (1985) 298

1985MC05 B.J. McParland, E.G. Auld, P. Couvert, G.L. Giles, G. Jones, W. Ziegler, X. Aslanoglou, G.M. Huber, G.J. Lolos, S.I.H. Naqvi et al., Phys. Lett. B156 (1985) 47

1985ME02 A.C. Merchant and N. Rowley, Phys. Lett. B150 (1985) 35

1985MI05 S. Micek, Z. Majka, H. Rebel, H.J. Gils and H. Klewe-Nebenius, Nucl. Phys. A435 (1985) 621

1985MI10 R.E. Mischke, Nucl. Phys. A434 (1985) 505c

1985MI1E G. Michaud, AIP Conf. Proc. 126 (1985) 75

1985MI1F K. Miyagawa, Y. Koike, T. Ueda, T. Sawada and S. Takagi, Prog. Theor. Phys. 74 (1985) 1264

1985MO17 D.J. Morrissey, W. Benenson, E. Kashy, C. Bloch, M. Lowe, R.A. Blue, R.M. Ronningen, B. Sherrill, H. Utsunomiya and I. Kelson, Phys. Rev. C32 (1985) 877

1985MO1F T. Motoba, H. Bando, K. Ikeda and T. Yamada, Suppl. Prog. Theor. Phys. 81 (1985) 42

1985MO24 D.J. Morrissey, W. Benenson, E. Kashy, C. Bloch, M. Lowe, B. Sherrill, R.A. Blue, R.M. Ronningen and H. Utsunomiya, Nucl. Phys. A447 (1986) 603c

1985MOZZ A. Mondragon and E. Hernandez, Bull. Amer. Phys. Soc. 30 (1985) 700, AE4

1985NI01 K. Nisimura, H. Shimizu, K. Imai, T. Ichihara, N. Matsuoka, K. Hatanaka, H. Sakai, T. Saito, K. Hosono, M. Kondo et al., Nucl. Phys. A432 (1985) 378

1985NO1A Norbeck and Lin, Bull. Amer. Phys. Soc. 30 (1985) 1248

1985OS02 H. Oswald, M. Buballa, J. Helten, M. Karus, B. Laumann, R. Melzer, P. Niessen, G. Rauprich, J. Schulte-Uebbing, H. Paetz gen. Schieck and Y. Koike, Nucl. Phys. A435 (1985) 77

1985OS03 A. Osman and M.Y.H. Farag, Acta Phys. Pol. B16 (1985) 59

1985PA03 M.V. Pasechnik, L.S. Saltykov, E.P. Kadkin, I.I. Loshchakov and A.I. Vdovin, Izv. Akad. Nauk SSSR Ser. Fiz. 49 (1985) 53; Bull. Acad. Sci. USSR Phys. Ser. 49 (1985) 55

1985PA04 M.V. Pasechnik, L.S. Saltykov, E.P. Kadkin, I.I. Loshchakov and A.I. Vdovin, Izv. Akad. Nauk SSSR, Ser. Fiz. 49 (1985) 58; Bull. Acad. Sci. USSR Phys. Ser. 49 (1985) 61

1985PA1B Pasechnik, in Leningrad (1985) 265

1985PAZL M.V. Pasechnik, L.S. Saltykov, E.P. Kadkin, I.I. Loshchakov and A.I. Vdovin, in Leningrad (1985) 296

1985PO09 J. Pochodzalla, W.A. Friedman, C.K. Gelbke, W.G. Lynch, M. Maier, D. Ardouin, H. Delagrange, H. Doubre, C. Gregoire, A. Kyanowski et al., Phys. Rev. Lett. 55 (1985) 177

1985PO10 N.A.F.M. Poppelier, L.D. Wood and P.W.M. Glaudemans, Phys. Lett. B157 (1985) 120

1985PU1B Pugach et al., in Leningrad (1985) 354

1985RE1A Repenko et al., in Leningrad (1985) 342

1985RE1B M.P. Rekalo, Sov. Phys. J. 28 (1985) 588

1985RO17 F. Roig and J. Navarro, Nucl. Phys. A440 (1985) 659

1985SA13 Y. Sakuragi, M. Kamimura, M. Yahiro and M. Tanifuji, Phys. Lett. B153 (1985) 372

1985SA1B Safronov, in Leningrad (1985) 407

1985SA1D Y. Sakuragi, M. Kamimura, M. Yahiro and Y. Fukushima, J. Phys. Soc. Jpn. 54 (1985) 88

1985SA32 H. Sato and Y. Okuhara, Phys. Lett. B162 (1985) 217

1985SA36 Y. Sakuragi, M. Kamimura, S. Micek, H. Rebel and H.J. Gils, Z. Phys. A322 (1985) 627

1985SC1A E. Schatzman, AIP Conf. Proc. 126 (1985) 69

1985SC1C Schramm, Nature 317 (1985) 386

1985SE17 M.R. Sene, I. Anthony, D. Branford, A.G. Flowers, A.C. Shotter and C.H. Zimmerman, Nucl. Phys. A442 (1985) 215

1985SH1A K.V. Shitikova, Fiz. Elem. Chastits At. Yadra 16 (1985) 824; Sov. J. Part. Nucl. 16 (1985) 364

1985SH1C J.R. Shepard, AIP Conf. Proc. 124 (1985) 107

1985SI12 B.K. Sinha, A.M. Nachabe, P. Bricault, J. Pouliot, L. Potvin, R. Roy and R.J. Slobodrian, Z. Phys. A321 (1985) 381

1985ST1A Stibunov, in Leningrad (1985) 341

1985ST1B R.G. Stokstad, Treatise on Heavy-Ion Sci. 3 (1985) 83

1985TA13 I. Tanihata, H. Hamagaki, O. Hashimoto, S. Nagamiya, Y. Shida, N. Yoshikawa, O. Yamakawa, K. Sugimoto, T. Kobayashi, D.E. Greiner et al., Phys. Lett. B160 (1985) 380

1985TA18 I. Tanihata, H. Hamagaki, O. Hashimoto, Y. Shida, N. Yoshikawa, K. Sugimoto, O. Yamakawa, T. Kobayashi and N. Takahashi, Phys. Rev. Lett. 55 (1985) 2676

1985TA1D I. Tanihata, Hyperfine Interactions 21 (1985) 251

1985VA1B C.D. Van Siclen, J. Phys. G11 (1985) 267

1985VA1C Varlamov et al., in Leningrad (1985) 339

1985VI03 M.F. Vineyard, J. Cook and K.W. Kemper, Phys. Rev. C31 (1985) 879

1985WA1K T.P. Walker, G.J. Mathews and V.E. Viola, Astrophys. J. 299 (1985) 745

1985WA25 R.E. Warner, J.-Q. Yang, D.L. Friesel, P. Schwandt, G. Caskey, A. Galonsky, B. Remington, A. Nadasen, N.S. Chant, F. Khazaie et al., Nucl. Phys. A443 (1985) 64

1985WI1A Wieman et al., Bull. Amer. Phys. Soc. 30 (1985) 767

1985WO11 L.W. Woo, K. Kwiatkowski, S.H. Zhou and V.E. Viola, Phys. Rev. C32 (1985) 706

1985ZH1A X. Zhao, R.-C. Hou and F.-A. Zeng, Phys. Energ. Fortis Phys. Nucl. 9 (1985) 742

1985ZI05 W. Zickendraht, Ann. Phys. 42 (1985) 113

1985ZI1C V.G. Zinov, L.N. Somov and V.V. Fil'chenkov, Sov. At. Energy 58 (1985) 226

1986AH03 M.H. Ahsan and H.H. Thies, Nucl. Instrum. Meth. Phys. Res. A243 (1986) 523

1986AJ04 F. Ajzenberg-Selove, Nucl. Phys. A460 (1986) 1

1986AK1A A.I. Akhiezer and M.P. Rekalo, Dokl. Akad. Nauk SSSR 286 (1986) 613; Sov. Phys. Dokl. 31 (1986) 59

1986AK1B Akhiezer and Rekalo, Dopov. Akad. Nauk Ukr RSR A-FIZ. 12 (1986) 25

1986AK1C A.I. Akhiezer and M.P. Rekalo, Dokl. Akad. Nauk SSSR 287 (1986) 1365; Sov. Phys. Dokl. 31 (1986) 332

1986ALZJ W.P. Alford, AIP Conf. Proc. 150 (1986) 710

1986AN04 L.E. Antonuk, D. Bovet, E. Bovet, Y. De Coulon, J.-P. Egger, F. Goetz, P. Gretillat, C. Lunke, E. Schwarz, G.S. Adams et al., Nucl. Phys. A451 (1986) 741

1986AN26 B. Antolkovic, G. Paic and K. Kadija, Few-Body Syst. 1 (1986) 159

1986AS1A D. Ashery and J.P. Schiffer, Ann. Rev. Nucl. Part. Sci. 36 (1986) 207

1986AU1A V.E. Aushev, N.I. Zaika, Yu.V. Kibkalo, A.V. Mokhnach, G.G. Zaikin, A.A. Kluchnikov, A.A. Kozur, A.L. Taradanov, Yu.A. Chvanov and V.N. Scherbin, J. Phys. Soc. Jpn. Suppl. 55 (1986) 1074

1986AU1D N. Auerbach, AIP Conf. Proc. 150 (1986) 520

1986AV01 G.V. Avakov, L.D. Blokhintsev, A.M. Mukhamedzhanov and R. Yarmukhamedov, Yad. Fiz. 43 (1986) 824; Sov. J. Nucl. Phys. 43 (1986) 524

1986AV06 G.V. Avakov, B.F. Irgaziev and R. Yarmukhamedov, Yad. Fiz. 44 (1986) 942; Sov. J. Nucl. Phys. 44 (1986) 607

1986AV08 G.V. Avakov, L.D. Blokhintsev, T.D. Blokhintseva, V.P. Kurochkin and Zh.P. Pustylnik, Yad. Fiz. 44 (1986) 1471; Sov. J. Nucl. Phys. 44 (1986) 958

1986AV1B Avdeichikov, in Dubna (1986) 122

1986AZ01 I.G. Aznauryan and I.A. Troshenkova, Yad. Fiz. 43 (1986) 342; Sov. J. Nucl. Phys. 43 (1986) 219

1986BA1R G. Baur, C.A. Bertulani and H. Rebel, in Heidelberg (1986) 980

1986BA1W H. Bando, Nucl. Phys. A450 (1986) 217c

1986BA2G Barlamov, Ishkanov, Chernyaev and Eramzhian, in Kharkov (1986) 345

1986BA73 A.G. Baryshnikov, L.D. Blokhintsev, R. Kapote and D.A. Savin, Izv. Akad. Nauk SSSR Ser. Fiz. 50 (1986) 1962; Bull. Acad. Sci. USSR Phys. Ser. 50 (1986) 90

1986BA85 D.S. Bagdasaryan, E.M. Boyakhchyan, G.B. Kazaryan, M.D. Karibyan, E.R. Markaryan, G.G. Mkrtchyan and I.A. Troshenkova, Izv. Akad. Nauk Arm. SSR Fiz. 21 (1986) 284; Sov. J. Contemp. Phys. 21 (1986) 58

1986BE1L Bekbaev, Kim, Mazitov and Eramzhian, in Kharkov (1986) 436

1986BE35 A.V. Belozyorov, C. Borcea, Z. Dlouhy, A.M. Kalinin, R. Kalpakchieva, Nguyen Hoai Chau, Yu.Ts. Oganessian and Yu.E. Penionzhkevich, Nucl. Phys. A460 (1986) 352

1986BE44 A.V. Belozerov, K. Borcha, Z. Dlouty, A.M. Kalinin, Nguen Khoai Tyau and Yu.E. Penionzhkevich, Izv. Akad. Nauk SSSR Ser. Fiz. 50 (1986) 1936; Bull. Acad. Sci USSR Phys. Ser. 50 (1986) 64

1986BE45 Yu.A. Berezhnoi, A.V. Kuznichenko, G.M. Onishchenko and V.V. Pilipenko, Izv. Akad. Nauk SSSR Ser. Fiz. 50 (1986) 2050; Bull. Acad. Sci. USSR Phys. Ser. 50 (1986) 177

1986BO01 D.H. Boal and J.C. Shillcock, Phys. Rev. C33 (1986) 549

1986BO1E A.R. Bodmer and Q.N. Usmani, Nucl. Phys. A450 (1986) 257c

1986BR1N M. Bruno, F. Cannata, M.D. D'Agostino, M. Frisoni, H. Herman, B. Vuaridel, V. Konig, W. Gruebler, K. Elsener, P.A. Schemlzbach et al., Few-Body Syst. Suppl. 1 (1986) 211

1986BR20 R.E. Brown and N. Jarmie, Radiat. Eff. 92 (1986) 45

1986BR31 V.N. Bragin, N.T. Burtebaev, A.D. Dujsebaev, G.N. Ivanov, S.B. Sakuta, V.I. Chuev and L.V. Chulkov, Yad. Fiz. 44 (1986) 312; Sov. J. Nucl. Phys. 44 (1986) 198

1986BU07 V.V. Burov, V.M. Dubovik, S.G. Kadmensky, Yu.M. Tchuvilsky and L.A. Tosunyan, J. Phys. G12 (1986) 509

1986BY1A V.M. Bystritsky and J. Wozniak, Acta Phys. Pol. B17 (1986) 309

1986CE04 C. Cernigoi, N. Grion, G. Pauli, R. Rui and R. Cherubini, Nucl. Phys. A456 (1986) 599

1986CH10 C.B. Chitwood, C.K. Gelbke, J. Pochodzalla, Z. Chen, D.J. Fields, W.G. Lynch, R. Morse, M.B. Tsang, D.H. Boal and J.C. Shillcock, Phys. Lett. B172 (1986) 27

1986CH1I R.E. Chrien, AIP Conf. Proc. 150 (1986) 325

1986CH1J N.S. Chant, AIP Conf. Proc. 142 (1986) 246

1986CH1Q P. Chaumette, J. Deregel, G. Durand, J. Fabre, J. Movchet, L. van Rossum, J. Ball, V. Bouffard, G. Fournier and Y. Roinel, Helv. Phys. Acta 59 (1986) 767

1986CHZX C.T. Christou, D.R. Lehman and W.C. Parke, Bull. Amer. Phys. Soc. 31 (1986) 816, EI9

1986CL1B N.M. Clarke, P.J. Simmons, K.I. Pearce, S. Roman, A. Farooq and G. Rai, J. Phys. Soc. Jpn. Suppl. 55 (1986) 756

1986CL1C Clegg, J. Phys. Soc. Jpn. Suppl. 55 (1986) 535

1986CS1A L.P. Csernai and J.I. Kapusta, Phys. Rept. 131 (1986) 223

1986DA1B D.H. Davis and J. Pniewski, Contemp. Phys. 27 (1986) 91

1986DO11 T.W. Donnelly and A.S. Raskin, Ann. Phys. 169 (1986) 247

1986DO1K P. Doleschall, C. Chandler, M. Bruno, F. Cannata, M. D'Agostino and M.L. Fiandri, Few-Body Syst. Suppl. 1 (1986) 206

1986DU10 O. Dumbrajs, H. Heiselberg, A.S. Jensen, A. Miranda, G.C. Oades and J.M. Richard, Nucl. Phys. A457 (1986) 491

1986EL1A P.J. Ellis and Y.C. Tang, Phys. Rev. Lett. 56 (1986) 1309

1986EM02 V.G. Emelyanov, V.I. Klimov and V.N. Pomerantsev, Izv. Akad. Nauk SSSR Ser. Fiz. 50 (1986) 902; Bull. Acad. Sci. USSR Phys. Ser. 50 (1986) 70

1986EN05 R. Ent, H.P. Blok, J.F.A. van Hienen, G. van der Steenhoven, J.F.J. van den Brand, J.W.A. den Herder, E. Jans, P.H.M. Keizer, L. Lapikas, E.N.M. Quint et al., Phys. Rev. Lett. 57 (1986) 2367

1986EN1A Engelmann and Bardy, Rept. CEA-R-5340 (1986)

1986EN1B Engelage et al., Bull. Amer. Phys. Soc. 31 (1986) 889

1986ER1A R.A. Eramzhyan, B.S. Ishkhanov, I.M. Kapitonov and V.G. Neudatchin, Phys. Rept. 136 (1986) 229

1986ESZY A. Eskandarian, D.R. Lehman and W.C. Parke, Bull. Amer. Phys. Soc. 31 (1986) 816, E18

1986EV1A Evseev, Buki, Likhachev and Shevchenko, in Kharkov (1986) 350

1986FI07 G.F. Filippov, V.S. Vasilevsky, S.P. Kruchinin and L.L. Chopovsky, Yad. Fiz. 43 (1986) 843; Sov. J. Nucl. Phys. 43 (1986) 536

1986FI15 B.W. Filippone, Ann. Rev. Nucl. Part. Sci. 36 (1986) 717

1986FI1A V.A. Filimonov, Czech. J. Phys. 36 (1986) 431

1986FI1D D. Fick, J. Phys. Soc. Jpn. Suppl. 55 (1986) 423

1986FL1A Flerov, in Harrogate (1986) Suppl. 1

1986FO04 D. Fox, D.A. Cebra, Z.M. Koenig, P. Ugorowski and G.D. Westfall, Phys. Rev. C33 (1986) 1540

1986FR12 V. Franco and Y. Yin, Phys. Rev. C34 (1986) 608

1986GA1F M. Gazdzicki, K. Iovchev, E. Kladnitskaya, E. Okonov and E.Z. Skrzypczak, Z. Phys. C31 (1986) 549

1986GE05 J.-F. Germond, J. Phys. (London) G12 (1986) 609

1986GL07 I.V. Glavanakov, V.N. Eponeshnikov, Yu.F. Krechetov, G.M. Radutsky and V.A. Tryasuchev, Phys. Lett. B178 (1986) 155

1986GL1A Glaudemans, AIP Conf. Proc. 142 (1986) 316

1986GLZU Yu.A. Glukhov, E.I. Koshchy, N.S. Lutsay, Yu.G. Mashkarov, E.Yu. Nikolsky, A.T. Rudchik, S.B. Sakuta and K.F. Ustimenkov, in Kharkov (1986) 371

1986GO1M B.I. Goryachev, Sov. J. Nucl. Phys. 44 (1986) 252

1986GO23 S.A. Goncharov, Yu.I. Denisov, A.M. Mukhamedzhanov, E.A. Romanovsky, G.E. Valiev, I.R. Gulamov, T. Iskhakov, G. Ni, N.K. Timofeyuk, R. Yarmukhamedov et al., Yad. Fiz. 44 (1986) 303; Sov. J. Nucl. Phys. 44 (1986) 191

1986GOZL J. Golden, Bull. Amer. Phys. Soc. 31 (1986) 890, KJ9

1986GR1A C. Gregoire and B. Tamain, Ann. Phys. (France) 11 (1986) 323

1986GR1D W. Gruebler, V. Konig, P.A. Schmelzbach, R.E. White, B. Vuaridel, C. Forstner, D. Singy, M. Bittcher and J. Ulbricht, J. Phys. Soc. Jpn. Suppl. 55 (1986) 884

1986GR1G Gridnev, Subbotin and Fadeev, in Dubna (1986) 114

1986HA1B B.G. Harvey, J. Phys. Colloq. (Paris) 47 (1986) C4-29

1986HA1L H. Hasan and B.K. Jain, Phys. Rev. C33 (1986) 1020

1986HA27 H.J. Hauser, M. Walz, F. Weng, G. Staudt and P.K. Rath, Nucl. Phys. A456 (1986) 253

1986HAZR L.F. Hansen, J. Rapaport, X. Wang and F.A. Barrios, Bull. Amer. Phys. Soc. 31 (1986) 1237, ED3

1986HU1B E.V. Hungerford, Nucl. Phys. A450 (1986) 157c

1986HU1D C.A. Hughes, S.D. Bloom and G.J. Mathews, Astrophys. J. 311 (1986) 485

1986IM01 O. Imambekov, Yu.N. Uzikov and L.V. Shevchenko, Yad. Fiz. 44 (1986) 1459; Sov. J. Nucl. Phys. 44 (1986) 950

1986IM1A Imambekov and Uzikov, in Kharkov (1986) 410

1986IO01 A.A. Ioannides and R.S. Mackintosh, Phys. Lett. B169 (1986) 113

1986JA02 L. Jarczyk, B. Kamys, Z. Rudy, A. Strzalkowski, B. Styczen, G.P.A. Berg, A. Magiera, J. Meissburger, W. Oelert, P. Von Rossen et al., Nucl. Phys. A448 (1986) 1

1986JA14 L. Jarczyk, B. Kamys, Z. Rudy, A. Strzalkowski, B. Styczen, G.P.A. Berg, A. Magiera, J. Meissburger, W. Oelert, P. von Rossen et al., Nucl. Phys. A459 (1986) 52

1986JA1E Jarime, Preprint LA-UR-86-3705 (1986)

1986JO1A R.C. Johnson, J. Phys. Soc. Jpn. Suppl. 55 (1986) 7

1986KA1B M. Kamimura, M. Yahiro, Y. Iseri, Y. Sakuragi, H. Kameyama and M. Kawai, Prog. Theor. Phys. Suppl. 89 (1986) 1

1986KA1C M. Kamimura, Y. Sakuragi, M. Yahiro and M. Tanifuji, J. Phys. Soc. Jpn. Suppl. 55 (1986) 205

1986KA1R Kailas and Gupta, in Santa Fe (1986) 1163

1986KA22 S. Kailas and S.K. Gupta, Phys. Rev. C34 (1986) 357

1986KA26 K. Kadija and G. Paic, Phys. Rev. C34 (1986) 380

1986KE1F Kerimov, Buras and El Gavkhari, in Kharkov (1986) 472

1986KI12 N.S.P. King, P.W. Lisowski, G.L. Morgan, P.N. Craig, R.G. Jeppesen, D.A. Lind, J.R. Shepard, J.L. Ullmann, C.D. Zafiratos, C.D. Goodman et al., Phys. Lett. B175 (1986) 279

1986KO1E H. Koch, AIP Conf. Proc. 150 (1986) 490

1986KO1J Y. Koike, J. Phys. Soc. Jpn. Suppl. 55 (1986) 272

1986KO1K H.-G. Korber, R. Beckmann, U. Holm and A. Lindner, J. Phys. Soc. Jpn. Suppl. 55 (1986) 632

1986KO1M V. Konig, P.A. Schmelzbach, W. Gruebler, Ch. Forstner, M. Bittcher, J. Ulbricht, B. Vuaridel and D. Singy, J. Phys. Soc. Jpn. Suppl. 55 (1986) 886

1986KO1N Korcheninnikov and Chulkov, in Kharkov (1986) 319

1986KO1U Kostin and Trubnikov, in Kharkov (1986) 422, 423

1986KR12 A.T. Kruppa, R.G. Lovas, R. Beck and F. Dickmann, Phys. Lett. B179 (1986) 317

1986KR1E A.T. Kruppa, in Heidelberg (1986) 57

1986KU08 V.I. Kukulin, V.M. Krasnopolsky, V.T. Voronchev and P.B. Sazonov, Nucl. Phys. A453 (1986) 365

1986KU1F Kukulin and Eramzhian, in Kharkov (1986) 146

1986LA22 K. Langanke, Nucl. Phys. A457 (1986) 351

1986LA27 K. Langanke and C. Rolfs, Z. Phys. A325 (1986) 193

1986LE21 D.R. Lehman and W.C. Parke, Few-Body Syst. 1 (1986) 193

1986LI1F Likhachev et al., in Kharkov (1986) 349

1986LIZP P.J. Lindstrom, M.E. Baumgartner, E. Beleal, F. Bieser, M. Bronson, D.E. Greiner, C.P. McParland, D.L. Olson, H.J. Crawford, J. Engelage et al., Bull. Amer. Phys. Soc. 31 (1986) 888, KI5

1986MA19 J.F. Mateja, A.D. Frawley, L.C. Dennis and K. Sartor, Phys. Rev. C33 (1986) 1649

1986MA1C L. Majling, J. Zofka, V.N. Fetisov and R.A. Eramzhyan, Nucl. Phys. A450 (1986) 189c

1986MA1S G.S. Masson, T. Wise, P.A. Quin and W. Haeberli, Nucl. Instrum. Meth. Phys. Res. A242 (1986) 196

1986MA1V Magda, Pop and Sandulescu, in Harrogate (1986) C208

1986MA1X Mackintosh and Ioannides, in Harrogate (1986) A4, A5

1986MC11 B.J. McParland, E.G. Auld, P. Couvert, G.L. Giles, G. Jones, W. Ziegler, X. Aslanoglou, G.M. Huber, G.J. Lolos, S.I.H. Naqvi et al., Nucl. Phys. A456 (1986) 629

1986MCZZ M. McMaster, A. Judd, S. Villanueva, A. Nadasen, F.D. Becchetti, J. Janecke, P. Schwandt, J. Winfield, J. van der Plicht and R.E. Warner, Bull. Amer. Phys. Soc. 31 (1986) 839, GJ2

1986ME06 M.C. Mermaz, T. Suomijarvi, R. Lucas, B. Berthier, J. Matuszek, J.P. Coffin, G. Guillaume, B. Heusch, F. Jundt and F. Rami, Nucl. Phys. A456 (1986) 186

1986ME13 T. Mertelmeier and H.M. Hofmann, Nucl. Phys. A459 (1986) 387

1986MI1D K. Miyagawa, T. Ueda, T. Sawada and S. Takagi, J. Phys. Soc. Jpn. Suppl. 55 (1986) 686

1986MI1E K. Miyagawa, Y. Koike, T. Ueda, T. Sawada and S. Takagi, J. Phys. Soc. Jpn. Suppl. 55 (1986) 890

1986MI24 K. Mikulas, K.A. Gridnev, E.F. Hefter, V.M. Semjonov and V.B. Subbotin, Nuovo Cim. A93 (1986) 135

1986MO1E Z. Moroz, J. Phys. Soc. Jpn. Suppl. 55 (1986) 221

1986MOZQ A. Mondragon and E. Hernandez, in Harrogate (1986) B10, 36

1986OS07 A. Osman, Radiat. Eff. 95 (1986) 145

1986OS08 V.I. Ostroumov, I.I. Loshchakov and A.I. Vdovin, Izv. Akad. Nauk SSSR Ser. Fiz. 50, (1986) 916; Bull. Acad. Sci. USSR Phys. Ser. 50 (1986) 83

1986OS1D A. Osman, J. Phys. Soc. Jpn. Suppl. 55 (1986) 744

1986PE05 J.P. Perroud, A. Perrenoud, J.C. Alder, B. Gabioud, C. Joseph, J.F. Loude, N. Morel, M.T. Tran, E. Winkelmann, H. Von Fellenberg et al., Nucl. Phys. A453 (1986) 542

1986PF1A H.G. Pfutzner, A.L. Li, K. Murphy, C.R. Howell, M.L. Roberts, I. Slaus, R.L. Walter, M. Herman and H.M. Hofmann, J. Phys. Soc. Jpn. Suppl. 55 (1986) 556

1986PL01 R. Planeta, H. Klewe-Nebenius, J. Buschmann, H.J. Gils, H. Rebel, S. Zagromski, T. Kozik, L. Freindl and K. Grotowski, Nucl. Phys. A448 (1986) 110

1986PO1G O. Portilho, P.S.C. Alencar and S.A. Coon, Nucl. Phys. A450 (1986) 237c

1986PO1H B. Povh, Nucl. Phys. A450 (1986) 573c

1986POZX D. Pocanic, K. Wang, C.J. Martoff, S.S. Hanna, R.C. Byrd, C.C. Foster, D.L. Friesel, J. Rapaport and D. Wang, Bull. Amer. Phys. Soc. 31 (1986) 1216, BC15

1986RA02 J. Rama Rao, J. Ernst and H. Machner, Nucl. Phys. A448 (1986) 365

1986RA1C C. Rai, C. Blyth and A. Farooq, J. Phys. Soc. Jpn. Suppl. 55 (1986) 1010

1986RA1J G.M. Radutskii, Izv. Vyssh. Uch. Zav. Fiz. SSSR 29 (1986) 45; Sov. Phys. J. (USA) 29 (1986) 903

1986RE1C R. Rebolo, L. Crivellari, F. Castelli, B. Foing and J.E. Beckman, Astron. Astrophys. 166 (1986) 195

1986RE1D M.P. Rekalo, Ukr. Fiz. Zh. 31 (1986) 491

1986RI01 R. Rieder, P.D. Barnes, B. Bassalleck, R.A. Eisenstein, G. Franklin, R. Grace, C. Maher, P. Pile, J. Szymanski, W.R. Wharton et al., Phys. Rev. C33 (1986) 614

1986RO03 R. Rockmore and B. Saghai, Phys. Rev. C33 (1986) 576

1986RO27 M.S. Rowland and J.C. Robertson, Radiat. Eff. 96 (1986) 21

1986ROZK A. Roy, R.K. Bhowmik, C.V.K. Baba, M.G. Betigeri, R. Mythili and A.K. Jain, in Harrogate (1986) C225, 412

1986SA15 Y. Sakuragi, M. Kamimura, M. Yahiro and M. Tanifuji, Phys. Lett. B175 (1986) 105

1986SA1D Y. Sakuragi, M. Yahiro and M. Kamimura, Prog. Theor. Phys. Suppl. 89 (1986) 136

1986SA1K Y. Sakuragi, M. Kamimura, M. Yahiro and M. Tanifuji, J. Phys. Soc. Jpn. Suppl. 55 (1986) 770

1986SA1M J.A. Sawicki, J. Nucl. Mater. A141-143 (1986) 327

1986SA1N Y. Sakuragi, Rept. Joint Seminar on Heavy-Ion Nucl. Phys. Nucl. Chem. in the Energy Region of Tandem Accelerators (II), Apr. 1986, Tokai, Ibaraki, Japan (1986) 70

1986SA1Q H. Sakai, N. Matsuoka, T. Saito and A. Shimizu, J. Phys. Soc. Jpn. Suppl. 55 (1986) 1112

1986SA30 H. Sato and Y. Okuhara, Phys. Rev. C34 (1986) 2171

1986SAZJ Y. Sakuragi, in Harrogate (1986) 275

1986SAZK Y. Sakuragi, in Harrogate (1986) 274

1986SAZL Y. Sakuragi, in Harrogate (1986) 273

1986SAZS D.P. Sanderson and K.W. Kemper, Bull. Amer. Phys. Soc. 31 (1986) 1204, AB2

1986SC28 C.J.S. Scholz, L. Ricken and E. Kuhlmann, Z. Phys. A325 (1986) 203

1986SH14 K. Shoda, M. Torikoshi, O. Sasaki, S. Toyama, T. Kobayashi, A. Kagaya and H. Tsubota, Phys. Rev. C33 (1986) 2179

1986SHZP T. Shimoda, N. Ikeda, A. Nakamura, S. Shimoura, K. Katori, T. Fukuda and H. Ogata, in Harrogate (1986) C159, 346

1986SIZS P.J. Simmonds, N.M. Clarke, K.I. Pearce, R.J. Griffiths, C.A. Ogilvie and M. Mannion, in Harrogate (1986) C128, 315

1986SR02 D.K. Srivastava and H. Rebel, J. Phys. (London) G12 (1986) 717

1986ST1E E. Steffens, J. Phys. Soc. Jpn. Suppl. 55 (1986) 459

1986SU1K C.-S. Su, Nucl. Tracks Radiat. Meas. 12 (1986) 325

1986SY1A T.J.M. Symons, Nucl. Phys. A447 (1986) 157c

1986SZ1A J.J. Szymanski, AIP Conf. Proc. 150 (1986) 934

1986TA06 H. Taneichi, H. Ueno, K. Shoda, Y. Kawazoe and T. Tsukamoto, Nucl. Phys. A448 (1986) 315

1986TA1E T.N. Taddeucci, J. Phys. Soc. Jpn. Suppl. 55 (1986) 156

1986TA1G M. Tanifuji, M. Kamimura and Y. Sakuragi, J. Phys. Soc. Jpn. Suppl. 55 (1986) 198

1986TA1M B. Tamain, Proc. Int. Nucl. Phys. Conf., Harrogate, U.K., No. 68, Vol. 2 (1986) 247

1986VA13 V.S. Vasilevsky, G.F. Fillipov, L.L. Chopovsky and S.P. Kruchinin, Izv. Akad. Nauk SSSR Ser. Fiz. 50 (1986) 151; Bull. Acad. Sci. USSR Phys. Ser. 50 (1986) 148

1986VL1A Vladimirov and Gaponov, in Kharkov (1986) 196

1986VO09 V.T. Voronchev, V.I. Kukulin, V.M. Krasnopolsky and P.B. Sazonov, Yad. Fiz. 43 (1986) 1149; Sov. J. Nucl. Phys. 43 (1986) 735

1986VU1B B. Vuaridel, V. Konig, W. Gruebler, K. Elsener, P.A. Schmelzbach, J. Ulbricht, C. Forstner, M. Bittcher, D. Singy, M. Bruno et al., J. Phys. Soc. Jpn. Suppl. 55 (1986) 874

1986VUZZ B. Vuaridel, W. Gruebler, V. Konig, P.A. Schmelzbach, K. Elsener, J. Ulbricht, D. Singy, Ch. Forstner, M. Bittcher, M. Bruno et al., in Harrogate (1986) 258, C71

1986WA11 R.E. Warner, B.A. Vaughan, D.L. Friesel, P. Schwandt, J.-Q. Yang, G. Caskey, A. Galonsky, B. Remington and A. Nadasen, Nucl. Phys. A453 (1986) 605

1986WA1J X.-C. Wang, H. Takaki and H. Bando, Prog. Theor. Phys. 76 (1986) 865

1986WE1C G.D. Westfall, Nucl. Phys. A447 (1986) 591c

1986WH01 W.R. Wharton, P.D. Barnes, B. Bassalleck, R.A. Eisenstein, G. Franklin, R. Grace, C. Maher, P. Pile, R. Rieder, J. Szymanski et al., Phys. Rev. C33 (1986) 1435

1986WI04 D.H. Wilkinson, Nucl. Phys. A452 (1986) 296

1986WI1A Wilmerding, Maglich, Nering and Powell, Bull. Amer. Phys. Soc. 31 (1986) 890

1986XU1B H.M. Xu and W.G. Lynch, Int. Conf. on Nucl. Radiochem, 1-5 Sept. 1986, Beijing, China (1986) 54

1986YA12 T. Yamaya, J.I. Hirota, K. Takimoto, S. Shimoura, A. Sakaguchi, S. Kubono, M. Sugitani, S. Kato, T. Suehiro and M. Fukada, Phys. Rev. C34 (1986) 2369

1986YA1L Yamagata et al., in Harrogate (1986) B63

1986YO06 H. Yokota, K. Nakayama, K. Ichimaru, T. Katsumi, T. Mori, S. Igarashi, K. Hama, R. Chiba, K. Nakai, J. Chiba et al., Phys. Rev. Lett. 57 (1986) 807

1986ZA1C Zaritskii et al., in Kharkov (1986) 401

1986ZE01 N.S. Zelenskaya and A.K. Morzabaev, Yad. Fiz. 43 (1986) 879; Sov. J. Nucl. Phys. 43 (1986) 559

1986ZH03 M.A. Zhusupov, O. Imambekov and Yu.N. Uzikov, Izv. Akad. Nauk SSSR Ser. Fiz. 50 (1986) 178; Bull. Acad. Sci. USSR Phys. Ser. 50 (1986) 172

1986ZH1B F. Zhuang and H.Z. Chen, Chin. J. Nucl. Phys. 8 (1986) 325

1986ZO1A J. Zofka, Nucl. Phys. A450 (1986) 165c

1987AB09 S.N. Abramovich, L.A. Morkin, V.I. Serov and Yu.V. Strelnikov, Izv. Akad. Nauk SSSR Ser. Fiz. 51 (1987) 930; Bull. Acad. Sci. USSR Phys. Ser. 51 (1987) 92

1987AJ02 F. Ajzenberg-Selove, Nucl. Phys. A475 (1987) 1

1987AJ1A F. Ajzenberg-Selove, in Dubna (1987) 341

1987AL1C C. Alcock, G.M. Fuller and G.J. Mathews, Astrophys. J. 320 (1987) 439

1987AL23 D.V. Aleksandrov, Yu.A. Glukhov, B.G. Novatsky, E.Yu. Nikolsky, S.B. Sakuta and D.N. Stepanov, Yad. Fiz. 46 (1987) 385; Sov. J. Nucl. Phys. 46 (1987) 197

1987AR13 A.E. Aravantinos and A.C. Xenoulis, Phys. Rev. C35 (1987) 1746

1987AR19 S.E. Arnell, S. Mattsson, H.A. Roth, M. Rydehell, O. Skeppstedt, A. Johnson, J. Nyberg, A. Kerek and A. Nilsson, Phys. Scr. 36 (1987) 214

1987AR1C Arnould, Phil. Trans. Roy. Soc. (London) 323 (1987) 251

1987AR1J K. Arai, M. Hasimoto and T. Fukui, Astron. Astrophys. 179 (1987) 17

1987AS05 H.J. Assenbaum, K. Langanke and C. Rolfs, Z. Phys. A327 (1987) 461

1987AS06 E. Aslanides, D.M. Drake, J.C. Peng, D. Garreta, P. Birien, G. Bruge, H. Catz, A. Chaumeaux, S. Janouin, D. Legrand et al., Nucl. Phys. A470 (1987) 445

1987AU1A J. Audouze, J. Astrophys. Astron. 8 (1987) 147

1987AU1C Auchev et al., in Yurmala (1987) 395

1987BA13 J. Banaigs, J. Berger, P. Berthet, G. Bizard, M. Boivin, M. De Sanctis, J. Duflo, F.L. Fabbri, R. Frascaria, L. Goldzahl et al., Phys. Rev. C35 (1987) 1416

1987BA1I B.F. Bayman and Y.C. Tang, Phys. Rept. 147 (1987) 155

1987BA2C Barlanov, Surgutanov and Chernyaev, in Yurmala (1987) 371

1987BA38 G.J. Balster, P.C.N. Crouzen, P.B. Goldhoorn, R.H. Siemssen and H.W. Wilschut, Nucl. Phys. A468 (1987) 93

1987BA39 G.J. Balster, H.W. Wilschut, R.H. Siemssen, P.C.N. Crouzen, P.B. Goldhoorn and Z. Sujkowski, Nucl. Phys. A468 (1987) 131

1987BE2A A.S. Belousov, Ya.A. Vazdik, E.I. Malinovskii, S.V. Rusakov, P.A. Smirnov, Yu.V. Solov'ev, A.P. Usik, A.R. Terkulov and A.M. Fomenko, Sov. Phys. Lebedev Inst. Rept. 2 (1987) 13

1987BE45 J.J. Bevelacqua, Indian J. Phys. A61 (1987) 111

1987BEYI A.V. Belozyorov, C. Borcea, Z. Dlouhy, A.M. Kalinin, Nguyen Hoai Chau and Yu.E. Penionzhkevich, JINR-E15-87-733 (1987)

1987BL13 C. Bloch, W. Bensenson, A.I. Galonsky, E. Kashy, J. Heltsley, L. Heilbronn, M. Lowe, B. Remington, D.J. Morrissey and J. Kasagi, Phys. Rev. C36 (1987) 203

1987BL18 R. Blumel and K. Dietrich, Nucl. Phys. A471 (1987) 453

1987BL1K L.D. Blokhintsev, Kh.D. Razikov, M.K. Ubaidullaeva and R. Yarmukhamedov, Izv. Akad. Nauk. SSSR Ser. Fiz. 51 (1987) 189; Bull. Acad. Sci. USSR Phys. Ser. 51 (1987) 173

1987BO1L A.R. Bodmer and Q.N. Usmani, Nucl. Phys. A463 (1987) 221c

1987BO1O A.R. Bodmer and Q.N. Usmani, Nucl. Phys. A468 (1987) 653

1987BO1P E.T. Boschitz, W. Gyles, K. Junker, W. List, C.R. Ottermann and R. Tacik, SIN Newsl. (Switzerland) 19 (1987) 42

1987BO39 O.V. Bochkarev, A.A. Korsheninnikov, E.A. Kuzmin, I.G. Mukha, A.A. Ogloblin, L.V. Chulkov and G.B. Yankov, Yad. Fiz. 46 (1987) 12; Sov. J. Nucl. Phys. 46 (1987) 7

1987BO40 C. Borcea, A.V. Belozyorov, Z. Dlouhy, A.M. Kalinin, Nguyen Hoai Chau and Yu.E. Penionzhkevich, Rev. Roum. Phys. 32 (1987) 497

1987BR02 R.E. Brown, F.D. Correll, P.M. Hegland, J.A. Koepke and C.H. Poppe, Phys. Rev. C35 (1987) 383

1987BR07 M. Bruno, F. Cannata, M. D'Agostino, M.L. Fiandri, M. Frisoni, H. Oswald, P. Niessen, J. Schulte-Uebbing, H. Paetz gen. Schieck, P. Doleschall et al., Phys. Rev. C35 (1987) 1563

1987BR1V W.H. Breunlich, M. Cargnelli, P. Kammel, J. Marton, N. Naegele, J. Werner, J. Zmeskal, C. Petitjean, J. Bistirlich, K. Crowe et al., Muon Catal. Fusion (Switzerland) 1 (1987) 121

1987BR32 F.P. Brady, Can. J. Phys. 65 (1987) 578

1987BU04 N.A. Burkova and M.A. Zhusupov, Izv. Akad. Nauk SSSR Ser. Fiz. 51 (1987) 182; Bull. Acad. Sci. USSR Phys. Ser. 51 (1987) 167

1987BU20 N.A. Burgov, A.E. Buklei, M.K. Vlasov, L.S. Vorobev, S.A. Gerzon, Yu.T. Kiselev, G.A. Leksin, A.N. Martemyanov, V.L. Novikov, N.A. Pivnyuk et al., Yad. Fiz. 45 (1987) 743; Sov. J. Nucl. Phys. 45 (1987) 463

1987BU27 N.T. Burtebaev, A.D. Duisebaev, V.S. Sadkovskii and G.A. Feofilov, Izv. Akad. Nauk SSSR Ser. Fiz. 51 (1987) 615; Bull. Acad. Sci. USSR Phys. Ser. 51 (1987) 191

1987CH08 Z. Chen, C.K. Gelbke, J. Pochodzalla, C.B. Chitwood, D.J. Fields, W.G. Lynch and M.B. Tsang, Phys. Lett. B186 (1987) 280

1987CH10 R.E. Chrien, E.V. Hungerford and T. Kishimoto, Phys. Rev. C35 (1987) 1589

1987CH26 Z. Chen, C.K. Gelbke, J. Pochodzalla, C.B. Chitwood, D.J. Fields, W.G. Gong, W.G. Lynch and M.B. Tsang, Nucl. Phys. A473 (1987) 564

1987CH32 Z. Chen, C.K. Gelbke, W.G. Gong, Y.D. Kim, W.G. Lynch, M.R. Maier, J. Pochodzalla, M.B. Tsang, F. Saint-Laurent, D. Ardouin et al., Phys. Lett. B199 (1987) 171

1987CH33 Z. Chen, C.K. Gelbke, W.G. Gong, Y.D. Kim, W.G. Lynch, M.R. Maier, J. Pochodzalla, M.B. Tsang, F. Saint-Laurent, D. Ardouin et al., Phys. Rev. C36 (1987) 2297

1987CO1S Coon, Bull. Amer. Phys. Soc. 32 (1987) 1549

1987DA1G Danilin et al., in Yurmala (1987) 200

1987DA1H Danilin et al., in Yurmala (1987) 467

1987DA31 B.V. Danilin, M.V. Zhukov, A.A. Korsheninnikov, L.V. Chulkov and V.D. Efros, Yad. Fiz. 46 (1987) 427; Sov. J. Nucl. Phys. 46 (1987) 225

1987DE02 A.C. Demiyanova, V.N. Bragin, A.A. Ogloblin, A.L. Lebedev, J.M. Bang, S.A. Goncharov, S.N. Ershov, F.A. Gareev and P.P. Korovin, Phys. Lett. B184 (1987) 129

1987DE37 F. Deak, A. Kiss, Z. Seres, G. Caskey, A. Galonsky and B. Remington, Nucl. Instrum. Meth. Phys. Res. A258 (1987) 67

1987DE43 H. De Vries, C.W. De Jager and C. De Vries, At. Data Nucl. Data Tables 36 (1987) 495

1987DO07 G. Domogala, H. Freiesleben and B. Hippert, Nucl. Instrum. Meth. Phys. Res. A257 (1987) 7

1987DO13 K.G.R. Doss, H.-A. Gustafsson, H. Gutbrod, J.W. Harris, B.V. Jacak, K.-H. Kampert, B. Kolb, A.M. Poskanzer, H.-G. Ritter, H.R. Schmidt et al., Phys. Rev. Lett. 59 (1987) 2720

1987DU07 J. Duflo, Phys. Rev. C36 (1987) 1425

1987DU09 E.I. Dubovoi and G.I. Chitanava, Yad. Fiz. 45 (1987) 677; Sov. J. Nucl. Phys. 45 (1987) 423

1987DZ1B R.I. Dzhibuti, T.Ya. Mikhelashvili and K.V. Shitikova, Yad. Fiz. 45 (1986) 670; Sov. J. Nucl. Phys. 45 (1987) 419

1987EY01 W. Eyrich, A. Hofmann, A. Lehmann, B. Muhldorfer, H. Schlosser, H. Wirth, H.J. Gils, H. Rebel and S. Zagromski, Phys. Rev. C36 (1987) 416

1987FA01 M. Fatyga, H.J. Karwowski, K. Kwiatkowski, L. Nowicki, V.E. Viola and K. Hicks, Phys. Rev. C35 (1987) 568

1987FA02 A. Fahli, J.P. Coffin, G. Guillaume, B. Heusch, F. Jundt, F. Rami, P. Wagner, P. Fintz, A.J. Cole, S. Kox et al., Z. Phys. A326 (1987) 169

1987FA1H G. Faldt, C. Lazard and R.J. Lombard, Phys. Rev. C36 (1987) 1037

1987FE1A E.-P. Feng, Q. Wang, Y.-T. Zhu, X. Yin, H.-B. Miao, S.-M. Sun, S.-L. Li, Z.-L. Wu, G.-Y. Fan, Y.-X. Xie et al., Chin. Phys. 7 (1987) 121

1987FI1D D. Fick, Phys. Bl. (West Germany) 43 (1987) 446

1987FO08 D. Fox, D.A. Cebra, J. Karn, C. Parks, G.D. Westfall and W.K. Wilson, Phys. Rev. C36 (1987) 640

1987FR1G W.A. Friedman, Nucl. Phys. A471 (1987) 327c

1987GA20 A.K. Ganguly, B. Chaudhuri and B.B. Baliga, Nuovo Cim. A97 (1987) 639

1987GA22 V.B. Ganenko, V.A. Gushchin, Yu.V. Zhebrovsky, L.Ya. Kolesnikov, A.L. Rubashkin and P.V. Sorokin, Pisma Zh. Eksp. Teor. Fiz. 46 (1987) 216; JETP Lett. (USSR) 46 (1987) 272

1987GAZM S.A. Gaidaenko, E.P. Kadkin, M.V. Pasechnik, L.S. Saltykov and A.D. Fursa, in Yurmala (1987) 299

1987GAZZ N.O. Gaiser, S.E. Darden, R.C. Luhn, H. Paetz gen. Schieck and S. Sen, Bull. Amer. Phys. Soc. 32 (1987) 1059, EE14

1987GE1B C.-K. Gelbke and D.H. Boal, Prog. Part. Nucl. Phys. 19 (1987) 33

1987GL01 I.V. Glavanakov, A.L. Deynezhenko, V.N. Eponeshnikov, Yu.F. Krechetov, G.A. Pleshkov, G.M. Radutsky, G.A. Saruev, A.A. Sidorov, V.A. Tryasuchev and E.N. Shuvalov, Yad. Fiz. 45 (1987) 3; Sov. J. Nucl. Phys. 45 (1987) 1; Erratum Sov. J. Nucl. Phys. 46 (1987) 384

1987GL05 Yu.A. Glukhov, A.S. Demyanova, A.A. Ogloblin and S.B. Sakuta, Yad. Fiz. 45 (1987) 1236; Sov. J. Nucl. Phys. 45 (1987) 767

1987GLZW Yu.A. Glukhov, S.B. Sakuta and D.N. Stepanov, in Yurmala (1987) 383

1987GM02 M. Gmitro, S.S. Kamalov and R. Mach, Phys. Rev. C36 (1987) 1105

1987GM04 M. Gmitro, S. Kamalov and R. Mach, Prog. Theor. Phys. (Kyoto) Suppl. 91 (1987) 60

1987GO1S Goryunov et al., in Yurmala (1987) 474

1987GO27 S.A. Goncharov, A.M. Mukhamedzhanov, E.A. Romanovsky, G.E. Valiev, I.R. Gulamov, T. Iskhakov, G. Nie, N.K. Tomopheyuk, R. Yarmukhamedov, V. Kroha et al., Czech. J. Phys. B37 (1987) 168

1987GOZN M.G. Gornov, P.V. Morokhov, V.A. Pechkurov, F.M. Sergeev, A.A. Khomutov and R.R. Shafigullin, in Yurmala (1987) 269

1987GR08 W. Gruebler, Nucl. Phys. A463 (1987) 193c

1987GR11 R.E.L. Green, R.G. Korteling, J.M. D’Auria, K.P. Jackson and R.L. Helmer, Phys. Rev. C35 (1987) 1341

1987GR1I A.M. Green and J.A. Niskanen, Prog. Part. Nucl. Phys. 18 (1987) 93

1987GR1N Gridnev, Subbotin and Fadeev, in Yurmala (1987) 426

1987GU1L Gusev and Seliverstov, in Dubna (1987) 217

1987GUZZ I.R. Gulamov, T. Iskhakov, A.M. Mukhamedzhanov, Sh. Kayumov, A.A. Karakhodzhaev, G.K. Ni, E.A. Romanovsky and G.S. Valiev, in Yurmala (1987) 344

1987HA01 Y. Haneishi and T. Fujita, Phys. Rev. C35 (1987) 70

1987HA30 P.G. Hansen and B. Jonson, Europhys. Lett. 4 (1987) 409

1987HA34 K. Hahn, Phys. Rev. C36 (1987) 1692

1987HA40 R. Hausmann, P.B. Siegel, W. Weise and M. Kohno, Phys. Lett. B199 (1987) 17

1987HA45 D. Hahn and H. Stocker, Phys. Rev. C35 (1987) 1311

1987HE22 R. Helmer, Can. J. Phys. 65 (1987) 588

1987HO1M L.M. Hobbs and D.K. Duncan, Astrophys. J. 317 (1987) 796

1987HU02 J.R. Hurd, J.S. Boswell, R.C. Minehart, L.B. Rees, Y. Tzeng, H.J. Ziock and K.O.H. Ziock, Nucl. Phys. A462 (1987) 605

1987HU13 J.R. Hurd, J.S. Boswell, R.C. Minehart, Y. Tzeng, H.J. Ziock, K.O.H. Ziock, L.C. Liu and E.R. Siciliano, Nucl. Phys. A475 (1987) 743

1987IM04 O. Imambekov and Yu.N. Uzikov, Izv. Akad. Nauk SSSR Ser. Fiz. 51 (1987) 947; Bull. Acad. Sci. USSR Phys. Ser. 51 (1987) 107

1987IM1F Imambekov, Uzikov and Zhusupov, in Panic (1987) 276

1987JA06 B.V. Jacak, G.D. Westfall, G.M. Crawley, D. Fox, C.K. Gelbke, L.H. Harwood, B.E. Hasselquist, W.G. Lynch, D.K. Scott, H. Stocker et al., Phys. Rev. C35 (1987) 1751

1987JA1C B.K. Jain and S.K. Gupta, Z. Phys. A326 (1987) 191

1987JE03 H. Jelitto, H.J. Gils, H. Rebel and S. Zagromski, Rev. Roum. Phys. 32 (1987) 629

1987JI1A G.-Y. Jiang and X.-N, Jin, Phys. Energ. Fortis Phys. Nucl. 11 (1987) 226

1987KA1I M. Kamimura, Y. Sakuragi, Y. Iseri, M. Yahiro, H. Kameyama, M. Kawai and M. Tanifuji, INS-REP.-606 (1987)

1987KA1L Kadmenskii et al., in Yurmala (1987) 473

1987KA1M Karmanov et al., in Yurmala (1987) 509

1987KI1C H.R. Kissener, I. Rotter and N.G. Goncharova, Fortschr. Phys. 35 (1987) 277

1987KO15 T. Kozik, J. Buschmann, K. Grotowski, H.J. Gils, N. Heide, J. Kiener, H. Klewe-Nebenius, H. Rebel, S. Zagromski, A.J. Cole et al., Z. Phys. A326 (1987) 421

1987KO1L Kozmyr and Sokolov, in Yurmala (1987) 331

1987KO1Z Kobayashi et al., in Panic (1987) 478

1987KO39 A.A. Korsheninnikov and L.V. Chulkov, Izv. Akad. Nauk SSSR Ser. Fiz. 51 (1987) 124; Bull. Acad. Sci. USSR Phys. Ser. 51 (1987) 116

1987KR07 A.T. Kruppa, R. Beck and F. Dickmann, Phys. Rev. C36 (1987) 327

1987KR09 A. Krauss, H.W. Becker, H.P. Trautvetter and C. Rolfs, Nucl. Phys. A467 (1987) 273

1987KU1G Kuznetzova, Krasnopolskii and Kukulin, in Yurmala (1987) 500

1987KU23 Y. Kuno, K. Nagamine and T. Yamazaki, Nucl. Phys. A475 (1987) 615

1987KUZI V.I. Kukulin, in Yurmala (1987) 151

1987KW01 E. Kwasniewicz and J. Kisiel, J. Phys. G13 (1987) 121

1987KW03 E. Kwasniewicz and J. Kisiel, Rev. Roum. Phys. 32 (1987) 607

1987LA1J A. Lamberty, E. Michels and P. De Bievre, Int. J. Mass Spectrom. Ion Proc. 79 (1987) 311

1987LA25 M. Lattuada, F. Riggi, D. Vinciguerra, C. Spitaleri and D. Miljanic, Z. Phys. A328 (1987) 497

1987LE1B F. Lenz, Prog. Theor. Phys. Suppl. 91 (1987) 27

1987LE1C Lehman, Bull. Amer. Phys. Soc. 32 (1987) 1025

1987LE1E Leisi et al., Helv. Phys. Acta. 60 (1987) 316

1987LE33 F.S. Levin, Nucl. Phys. A463 (1987) 487c

1987LI32 V.P. Likhachev, I.G. Evseev, A.Yu. Buki, Yu.V. Vladimirov, S.A. Pashchuk, G.A. Savitsky, V.M. Khvastunov, V.A. Fartushny, V.B. Shostak and V.A. Stepanenko, Ukr. Fiz. Zh. 32 (1987) 1293

1987LO16 R.G. Lovas, A.T. Kruppa, R. Beck and F. Dickmann, Nucl. Phys. A474 (1987) 451

1987LU1B Lubovoi and Chitanava, in Yurmala (1987) 512

1987LY04 W.G. Lynch, Nucl. Phys. A471 (1987) 309c

1987LY1D W.G. Lynch, Ann. Rev. Nucl. Part. Sci. 37 (1987) 493

1987MA1I Matthews et al., in Panic (1987) 360

1987MA2C Malaney and Fowler, OAP-680, To be published in Origin and Distribution of the Elements (1987)

1987MI06 K. Miyagawa, T. Ueda, T. Sawada and S. Takagi, Nucl. Phys. A463 (1987) 411c

1987MO1I A. Mondragon and E. Hernandez, 6th Int. Symp. on Capture Gamma-ray Spectroscopy, 31 Aug.-4 Sept. 1987, Leuven, Belgium (1988) 794

1987NA01 M.N. Namboodiri, R.K. Choudhury, L. Adler, J.D. Bronson, D. Fabris, U. Garg, P.L. Gonthier, K. Hagel, D.R. Haenni, Y.W. Lui et al., Phys. Rev. C35 (1987) 149

1987NA04 J. Navarro and F. Roig, Nucl. Phys. A465 (1987) 628

1987NA1I Naumenko et al., in Yurmala (1987) 370

1987NI04 W. Nitsche, G.J. Wagner, K.T. Knopfle, P. Grabmayr and Y. Kawazoe, Z. Phys. A326 (1987) 435

1987PA12 S.J. Padalino, K. Sartor, L.C. Dennis and K.W. Kemper, Phys. Rev. C35 (1987) 1692

1987PA1F R. Pallavicini, M. Cerruti-Sola and D.K. Duncan, Astron. Astrophys. 174 (1987) 116

1987PE1C Penionshkevich, in Dubna (1987) 364

1987PI06 I.M. Piskarev, Yad. Fiz. 45 (1987) 1222; Sov. J. Nucl. Phys. 45 (1987) 758

1987PO03 J. Pochodzalla, C.K. Gelbke, W.G. Lynch, M. Maier, D. Ardouin, H. Delagrange, H. Doubre, C. Gregoire, A. Kyanowski, W. Mittig et al., Phys. Rev. C35 (1987) 1695

1987PO05 H. Poth, H. Barth, G. Buche, A.D. Hancock, H. Koch, Th. Kohler, A. Kreissl, U. Raich, D. Rohmann, A. Wolf et al., Nucl. Phys. A466 (1987) 667

1987PO18 D. Pocanic, K. Wang, C.J. Martoff, S.S. Hanna, R.C. Byrd, C.C. Foster, D.L. Friesel and J. Rapaport, Can. J. Phys. 65 (1987) 687

1987PO1H B. Povh, Prog. Part. Nucl. Phys. 18 (1987) 183

1987PO1M L.I. Ponomarev and G. Fiorentini, Muon Catalyzed Fusion 1 (1987) 3

1987PO23 J. Pochodzalla, Nucl. Phys. A471 (1987) 289c

1987PR08 S. Pratt and M.B. Tsang, Phys. Rev. C36 (1987) 2390

1987RA1I Ransome et al., Bull. Amer. Phys. Soc. 32 (1987) 1560

1987RA32 J. Rapaport, Can. J. Phys. 65 (1987) 574

1987RO10 G. Royer, Y. Raffray, A. Oubahadou and B. Remaud, Nucl. Phys. A466 (1987) 139

1987RO25 C. Rolfs, H.P. Trautvetter and W.S. Rodney, Rep. Prog. Phys. 50 (1987) 233

1987SA15 H. Sagawa and H. Toki, J. Phys. G13 (1987) 453

1987SA1C Sakuragi, Yahiro and Kamimura, INS-REP.-600 (1986)

1987SA21 Y. Sakuragi, Phys. Rev. C35 (1987) 2161

1987SA46 H. Sakai, N. Matsuoka, T. Noro, T. Saito, A. Shimizu, M. Tosaki, M. Ieiri, K. Imai, A. Sakaguchi, Y. Takeuchi et al., Nucl. Instrum. Meth. Phys. Res. A257 (1987) 279

1987SC08 D. Schmidt, D. Seeliger, G.N. Lovchikova and A.M. Trufanov, Nucl. Sci. Eng. 96 (1987) 159

1987SE1C Seth, Parker and Soundranayagam, in Panic (1987) 528

1987SU06 T. Suzuki, D.F. Measday and J.P. Roalsvig, Phys. Rev. C35 (1987) 2212

1987SU1K D.P. Sural, Indian J. Phys. B61 (1987) 201

1987SV1A V.A. Sviciulis and R.K. Kalinauskas, Sov. Phys.-Collect. 27 (1987) 10

1987TA06 Y.C. Tang, Nucl. Phys. A463 (1987) 377c

1987TA07 Y. Tagishi, Y. Aoki, M. Kurokawa, T. Murayama, T. Sakai, M. Takei, M. Tomizawa and K. Yagi, Phys. Rev. C35 (1987) 1153

1987TA21 M. Tanaka, T. Yamagata, S. Nakayama, M. Inoue, Y. Sakuragi, M. Kamimura, K. Goto, K. Katori, M. Yanagi and H. Ogata, Phys. Rev. C36 (1987) 2146

1987TAZU I. Tanihata, H. Hamagaki, O. Hashimoto, Y. Shida, O. Yamakawa, T. Kobayashi, K. Sugimoto and N. Takahashi, in Panic (1987) 474; LBL-22820 (1987) 82

1987TO06 M. Tosaki, M. Fujiwara, K. Hosono, T. Noro, H. Ito, T. Yamazaki and H. Ikegami, Nucl. Phys. A463 (1987) 429c

1987TR05 W. Trautmann, K.D. Hildenbrand, U. Lynen, W.F.J. Muller, H.J. Rabe, H. Sann, H. Stelzer, R. Trockel, R. Wada, N. Brummund et al., Nucl. Phys. A471 (1987) 191c

1987VA08 G. van der Steenhoven, A.M. van den Berg, H.P. Blok, S. Boffi, J.F.J. van den Brand, R. Ent, T. de Forest, Jr., C. Giusti, J.W.A. den Herder, E. Jans et al., Phys. Rev. Lett. 58 (1987) 1727

1987VA1N Van Der Steenhoven et al., in Panic (1987) 618

1987VA31 S.P. Van Verst, D.P. Sanderson, K.W. Kemper, D. Shapira, R.L. Varner and B. Shivakumar, Phys. Rev. C36 (1987) 1865

1987VAZY S.P. van Verst, D.P. Sanderson, K.W. Kemper, D.E. Trcka, G.A. Hall, V. Hnizdo, K.R. Chapman and B.G. Schmidt, Bull. Amer. Phys. Soc. 32 (1987) 1547, AE10

1987VD01 A.I. Vdovin and I.N. Loshchakov, Yad. Fiz. 45 (1987) 67; Sov. J. Nucl. Phys. 45 (1987) 42

1987VE1D Vetoshkin et al., in Yurmala (1987) 387

1987VU1A B. Vuaridel, W. Grüebler, V. König, P.A. Schmelzbach, K. Elsener, J. Ulbricht, D. Singy, Ch. Forstner, M. Bittcher, M. Bruno et al., Helv. Phys. Acta. 60 (1987) 326

1987WA09 R. Wada, K.D. Hildenbrand, U. Lynen, W.F.J. Muller, H.J. Rabe, H. Sann, H. Stelzer, W. Trautmann, R. Trockel, N. Brummund et al., Phys. Rev. Lett. 58 (1987) 1829

1987WA36 X.-C. Wang, H. Bando and H. Takaki, Z. Phys. A 327 (1987) 59

1987WE1A H.J. Weyer, Helv. Phys. Acta (Switzerland) 60 (1987) 667

1987WI09 J.S. Winfield, N. Anantaraman, S.M. Austin, Ziping Chen, A. Galonsky, J. van der Plicht, H.-L. Wu, C.C. Chang and G. Ciangaru, Phys. Rev. C35 (1987) 1734

1987WY1A D.R. Wyman, R.E. Stone and A.A. Harms, Nucl. Sci and Eng. 96 (1987) 46

1987YA16 Yu.P. Yakovlev, Yad. Fiz. 46 (1987) 459; Sov. J. Nucl. Phys. 46 (1987) 244

1987YA1M Y. Yamamoto, Phys. Rev. C36 (1987) 2166

1987YO01 H. Yokota, T. Mori, T. Katsumi, S. Igarashi, K. Hama, R. Chiba, K. Nakai, J. Chiba, H. Enyo, S. Sasaki et al., Phys. Rev. Lett. 58 (1987) 191

1987ZA07 M. Zadro, D. Miljanic, M. Lattuada, F. Riggi and C. Spitaleri, Nucl. Phys. A474 (1987) 373

1987ZH1D Zhusupov, Imambekov and Uzikov, in Yurmala (1987) 455

1987ZH1E Zhao et al., in Panic (1987) 710

1988AL1G Aleksandrov et al., in Baku (1988) 377

1988BA1F P.D. Barnes, Nucl. Phys. A478 (1988) 127c

1988BA1G P.D. Barnes, Nucl. Phys. A479 (1988) 89c

1988BA86 J.N. Bahcall and R.K. Ulrich, Rev. Mod. Phys. 60 (1988) 297

1988BE09 C.A. Bertulani and G. Baur, Nucl. Phys. A480 (1988) 615

1988BE1I Bekbaev et al., in Baku (1988) 442

1988BEYJ A.V. Belozerov, K. Borcha, I. Vintsour, Z. Dlougy, Nguen Khoai Tyau and Yu.Eh. Penionzhkevich, in Baku (1988) 380

1988BL09 C. Bloch, W. Benenson, A.I. Galonsky, E. Kashy, J. Heltsley, L. Heilbronn, M. Lowe, R.J. Radtke, B. Remington, J. Kassagi et al., Phys. Rev. C37 (1988) 2469

1988BO1J Bochkarev et al., in Baku (1988) 347

1988BR1E Brovkin et al., in Baku (1988) 430

1988BU1D Burkova et al., in Baku (1988) 315

1988BU1G Burkova et al., in Baku (1988) 426

1988BU1Q Buranov et al., in Baku (1988) 363

1988BUZH V.V. Buranov, N.I. Venikov, Yu.A. Glukhov, A.M. Dobychin, A.A. Ogloblin, S.B. Sakuta and V.N. Unezhev, in Baku (1988) 362

1988CA06 G. Caskey, L. Heilbronn, B. Remington, A. Galonsky, F. Deak, A. Kiss and Z. Seres, Phys. Rev. C37 (1988) 696

1988CA11 P.J. Carlos, Ph. Bourgeois, J. Fagot, J.L. Fallou, P. Garganne, J.M. Laget, A. Lepretre, A. de Miniac, A. Veyssiere, J. Jury et al., Phys. Lett. B203 (1988) 33

1988CEZZ D.A. Cebra, W. Benenson, Y. Chen, E. Kashy, D.J. Morrissey, A. Pradhan, A. Vandermolen, G.D. Westfall, W.K. Wilson, R.S. Tickle et al., Bull. Amer. Phys. Soc. 33 (1988) 963, DI12

1988CH05 C.T. Christou, D.R. Lehman and W.C. Parke, Phys. Rev. C37 (1988) 445

1988CH06 C.T. Christou, D.R. Lehman and W.C. Parke, Phys. Rev. C37 (1988) 458

1988CH1D C.T. Christou, D.R. Lehman and W.C. Parke, Phys. Rev. C37 (1988) 477

1988CO1B Cook, Bull. Amer. Phys. Soc. 33 (1988) 1022

1988DA1D Danilin et al., in Baku (1988) 163

1988DA1E Danilin et al., in Baku (1988) 398

1988DA1F Danilin et al., in Baku (1988) 399

1988DAZW B.V. Danilin, M.V. Zhukov, A.A. Korsheninnikov, L.V. Chulkov and V.D. Efros, in Baku, (1988) 142

1988DE1F Demyanova et al., in Baku (1988) 332

1988DEZU A.S. Demyanova, A.A. Ogloblin, F.A. Gareev, S.N. Ershov and S.A. Goncharov, in Baku (1988) 330

1988DI02 S.S. Dietrich and B.L. Berman, At. Data Nucl. Data Tables 38 (1988) 199

1988EL01 K. Elsener, W. Gruebler, F. Sperisen, K. Ghazi-Wakili, V. Konig, P.A. Schmelzbach, B. Vuaridel, M. Bittcher, D. Singy and J. Ulbricht, Nucl. Phys. A481 (1988) 227

1988FO1A W.A. Fowler, Interact. and Struct. in Nuclei, Proc. Conf. to Honor D. Wilkinson FRS, 7-9 Sept. 1987, Brighton, UK (1988) 119

1988FR1B W.A. Friedman, Phys. Rev. C37 (1988) 976

1988FR1E L. Frankfurt and M. Strikman, Phys. Rept. 160 (1988) 235

1988FR1F W.A. Friedman, Phys. Rev. Lett. 60 (1988) 2125

1988GA1A A. Gal, Nucl. Phys. A479 (1988) 97c

1988GI1B B.F. Gibson, Nucl. Phys. A479 (1988) 115c

1988GIZT Yu.R. Gismatullin, A.A. Melentev, V.I. Ostroumov, A.M. Petukhov and M.A. Stalevich, in Baku (1988) 294

1988GIZU Yu.R. Gismatullin, A.A. Melentev, V.I. Ostroumov, A.M. Petukhov and M.A. Stalevich, in Baku (1988) 293

1988GO1H Goryonov et al., in Baku (1988) 367

1988GUZW I.R. Gulamov, A.M. Mukhamedzhanov and G.K. Ni, in Baku (1988) 300

1988HA12 S.S. Hanna, J. Phys. (London) G14 (1988) S283

1988HA1K O. Hausser, AIP Conf. Proc. 164 (1988) 604

1988HA44 R. Hausmann, Nucl. Phys. A479 (1988) 247c

1988HE08 R. Henneck, C. Gysin, P. Haffter, M. Hammans, W. Lorenzon, M.A. Pickar, I. Sick and S. Burzynski, Phys. Rev. C37 (1988) 2224

1988JA01 K.P. Jackson, A. Celler, W.P. Alford, K. Raywood, R. Abegg, R.E. Azuma, C.K. Campbell, S. El-Kateb, D. Frekers, P.W. Green et al., Phys. Lett. B201 (1988) 25

1988JI1A G.-Y. Jiang and X.-N. Jin, Commun. Theor. Phys. 9 (1988) 33

1988JO1C B. Jonson, S. Mattsson, G. Nyman, O. Tengblad, M.J.G. Borge, P.G. Hansen and K. Riisager, AIP Conf. Proc. 164 (1988) 223

1988KA09 K. Katori, T. Shimoda, T. Fukuda, S. Shimoura, A. Sakaguchi, M. Tanaka, T. Yamagata, N. Takahashi, H. Ogata, M. Kamimura et al., Nucl. Phys. A480 (1988) 323

1988KA1J Kaganov et al., in Baku (1988) 161

1988KI05 J.M. Kidd, P.J. Lindstrom, H.J. Crawford and G. Woods, Phys. Rev. C37 (1988) 2613

1988KO1C Kozchy, Mashkarov and Rudchik, in Baku (1988) 350

1988KU1C Kukulin et al., in Baku (1988) 160

1988LA1C A. Lamberty and P. de Bievre, Int. J. Mass Spectrom. Ion Proc. 83 (1988) 135

1988LE06 M. LeMere and Y.C. Tang, Phys. Rev. C37 (1988) 1369

1988LI1A Liu et al., Bull. Amer. Phys. Soc. 33 (1988) 903

1988MCZY M. McMaster, A. Nadasen, M. Fingal, F.D. Becchetti, J. Janecke, J. Winfield, R.M. Ronningen, P. Schwandt and R.E. Warner, Bull. Amer. Phys. Soc. 33 (1988) 1102, KJ14

1988MIZX J. Mildenberger, O. Hausser, R. Abegg, W.P. Alford, A. Celler, D. Frekers, R. Helmer, R. Henderson, K. Hicks, K.P. Jackson, R. Jeppesen et al., Bull. Amer. Phys. Soc. 33 (1988) 1180, AG5

1988NA02 A. Nadasen, M. McMaster, G. Gunderson, A. Judd, S. Villanueva, P. Schwandt, J.S. Winfield, J. van der Plicht, R.E. Warner, F.D. Becchetti et al., Phys. Rev. C37 (1988) 132

1988NAZX A. Nadasen, A. McMaster, J. Tavormina, F.D. Becchetti, J.W. Janecke, P. Schwandt, J. Winfield and R.E. Warner, Bull. Amer. Phys. Soc. 33 (1988) 1101, KJ13

1988PO1H B. Povh, Prog. Part. Nucl. Phys. 20 (1988) 353

1988POZS N.A.F.M. Poppelier, J.H. de Vries, A.A. Wolters and P.W.M. Glaudemans, AIP Conf. Proc. 164 (1988) 334

1988PUZZ V. Punjabi, C.F. Perdrisat, C. Lyndon, P. Ulmer, J. Yonnet, R. Beurtey, M. Boivin, A. Boudard, F. Plouin, J.P. Didelez et al., Bull. Amer. Phys. Soc. 33 (1988) 962, DI7

1988RE1B R. Rebolo, P. Molaro, C. Abia and J.E. Beckman, Astron. Astrophys. 193 (1988) 193

1988ROZZ D. Rothenberger, B.G. Ritchie, J.R. Comfort, R.A. Giannelli, J. Tinsley, N.S. Chant, D. Mack, P.G. Roos, J.D. Silk, G.S. Kyle et al., Bull. Amer. Phys. Soc. 33 (1988) 903, AI12

1988RU01 V.A. Rubchenya and S.G. Yavshits, Z. Phys. A329 (1988) 217

1988RYZW I.Yu. Rybkin, V.S. Vasilevsky and O. Velaskes, in Baku (1988) 428

1988SA15 Y. Sakuragi, M. Kamimura and K. Katori, Phys. Lett. B205 (1988) 204

1988SA19 H. Sato, Phys. Rev. C37 (1988) 2902

1988SA2J Samsonenko, Adamu and Samgin, in Baku (1988) 263

1988SEZJ K.K. Seth, AIP Conf. Proc. 164 (1988) 324

1988SH1E Shvedov, Nemets and Rudchik, in Baku (1988) 351

1988ST06 J. Stevenson, B.A. Brown, Y. Chen, J. Clayton, E. Kashy, D. Mikolas, J. Nolen, M. Samuel, B. Sherrill, J.S. Winfield et al., Phys. Rev. C37 (1988) 2220

1988TA1A I. Tanihata, Nucl. Phys. A478 (1988) 795c

1988TA29 H. Tamura, W. Bruckner, H. Dobbeling, R.S. Hayano, T. Ishikawa, M. Iwasaki, T. Motoki, H. Outa, S. Paul, B. Povh et al., Nucl. Phys. A479 (1988) 161c

1988TRZY D.E. Trcka, S.P. Van Verst, A.D. Frawley, K.W. Kemper, J.D. Fox, V. Hnizdo and E.G. Myers, Bull. Amer. Phys. Soc. 33 (1988) 1101, KJ12

1988TS03 M.B. Tsang, W.G. Lynch, R.M. Ronningen, Z. Chen, C.K. Gelbke, T. Nayak, J. Pochodzalla, F. Zhu, M. Tohyama, W. Trautmann et al., Phys. Rev. Lett. 60 (1988) 1479

1988US1A Usmanov, Zhusupov and Ivkina, in Baku (1988) 168

1988VA03 A.G.M. van Hees, A.A. Wolters and P.W.M. Glaudemans, Nucl. Phys. A476 (1988) 61

1988VA18 K. Varga and R.G. Lovas, Phys. Rev. C37 (1988) 2906

1988VA1E Vagner et al., in Baku (1988) 383

1988VAZY S.P. Van Verst, K.W. Kemper, D.E. Trcka, G.A. Hall, V. Hnizdo, K.R. Chapman and B.G. Schmidt, Bull. Amer. Phys. Soc. 33 (1988) 1101, KJ11

1988VD1A Vdovin, Golikov, Zhukov and Lozchakov, in Baku (1988) 274

1988WA18 A.H. Wapstra, G. Audi and R. Hoekstra, At. Data Nucl. Data Tables 39 (1988) 281

1988WO04 A.A. Wolters, A.G.M. van Hees and P.W.M. Glaudemans, Europhys. Lett. 5 (1988) 7

1988WO10 C.L. Woods, F.C. Barker, W.N. Catford, L.K. Fifield and N.A. Orr, Aust. J. Phys. 41 (1988) 525

1990AJ01 F. Ajzenberg-Selove, Nucl. Phys. A506 (1990) 1