

Figure 1: Total cross section of the reaction $\pi^- p \rightarrow \eta n$. Data: the filled squares indicate experiments accepted by the GWU/SAID group [1]; open circles from Ref. [2].

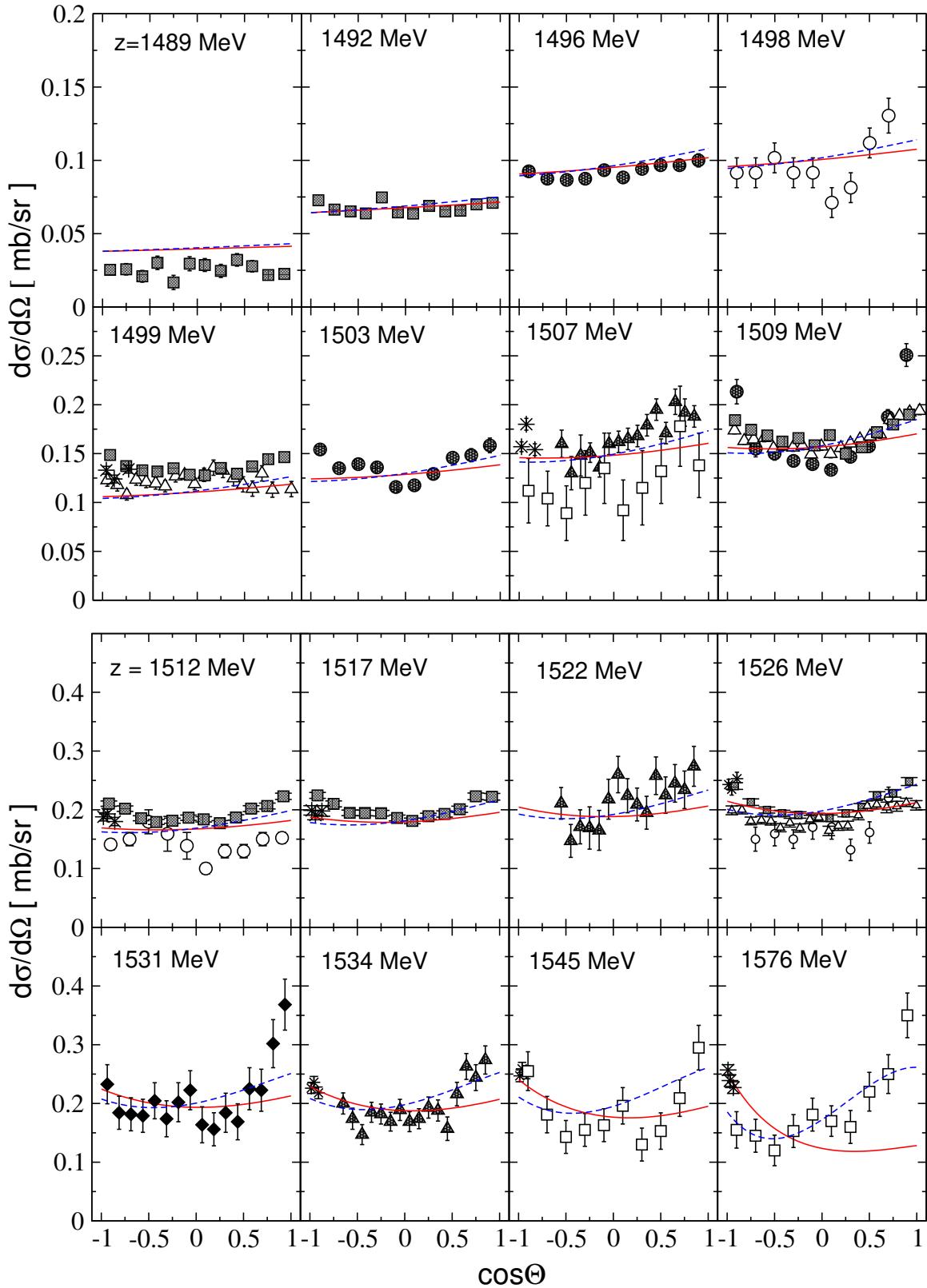
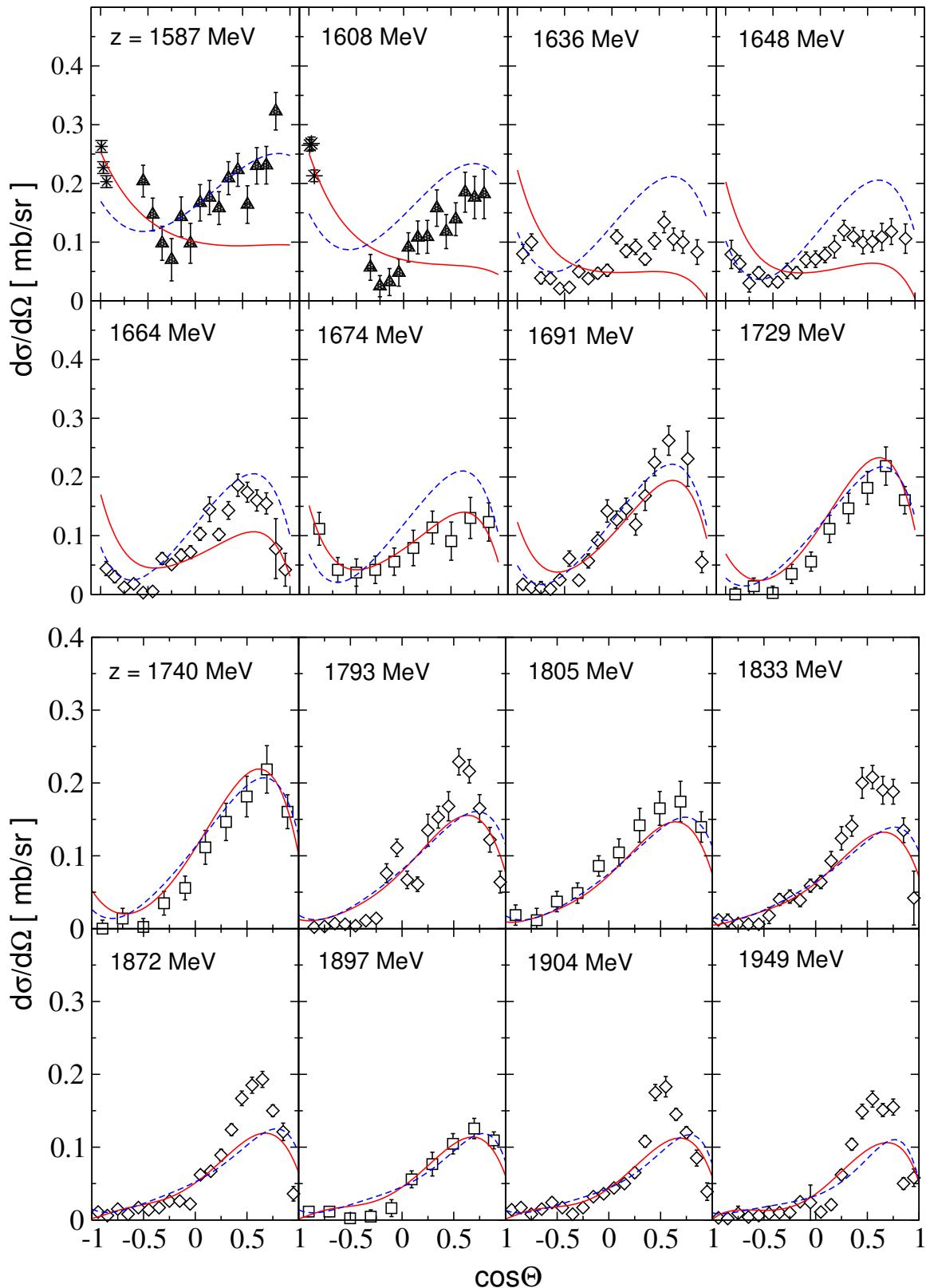
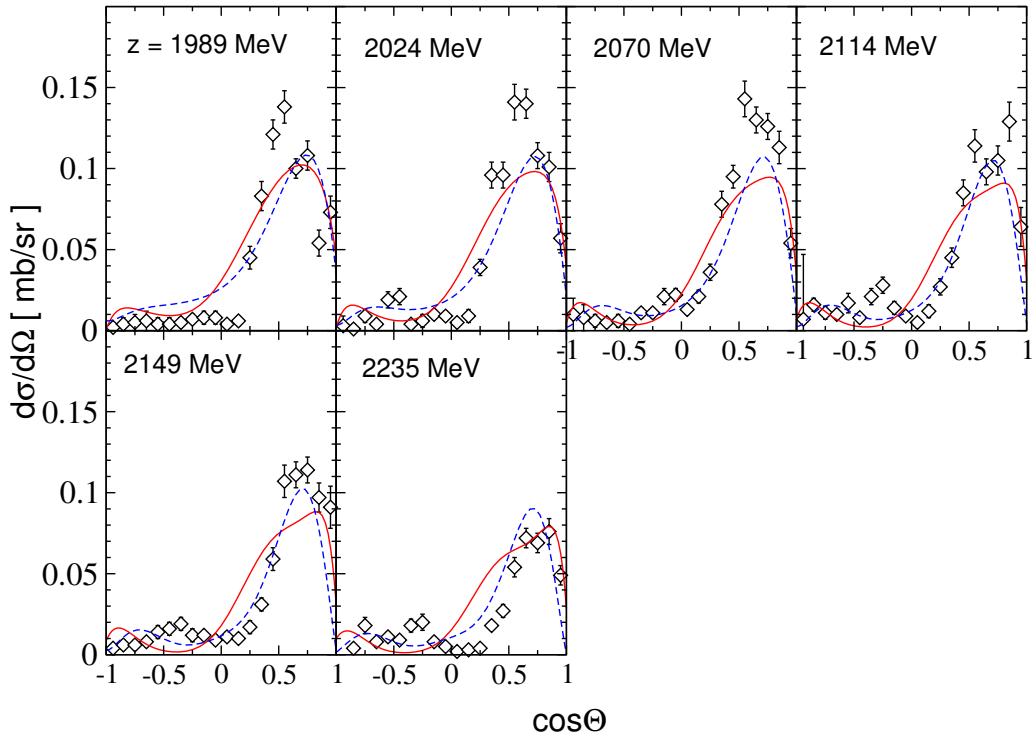
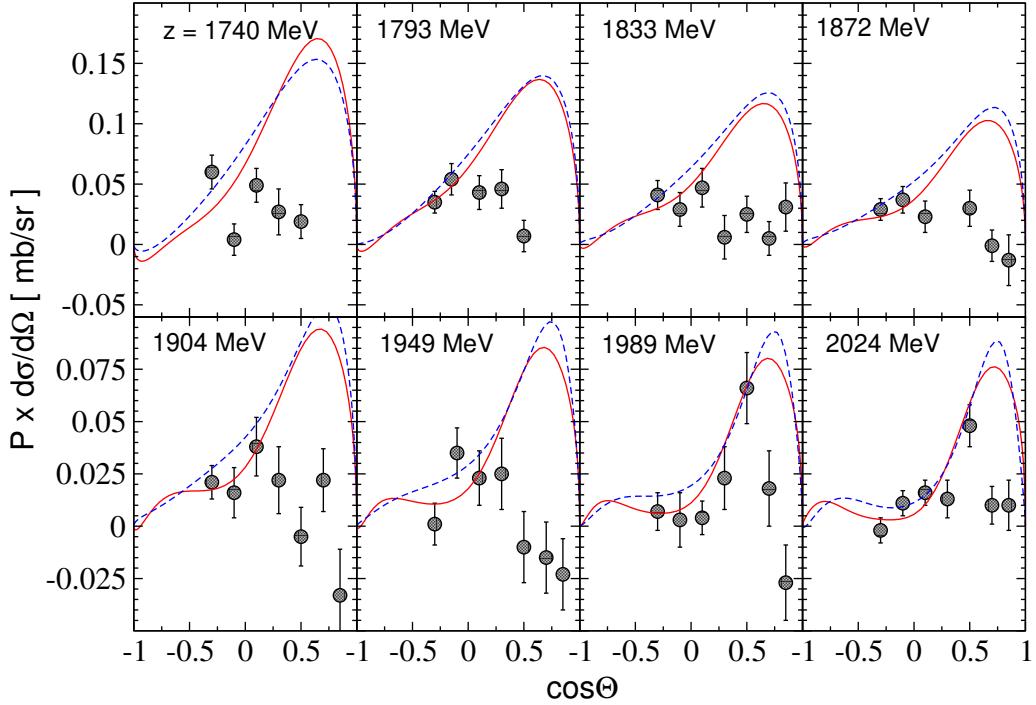
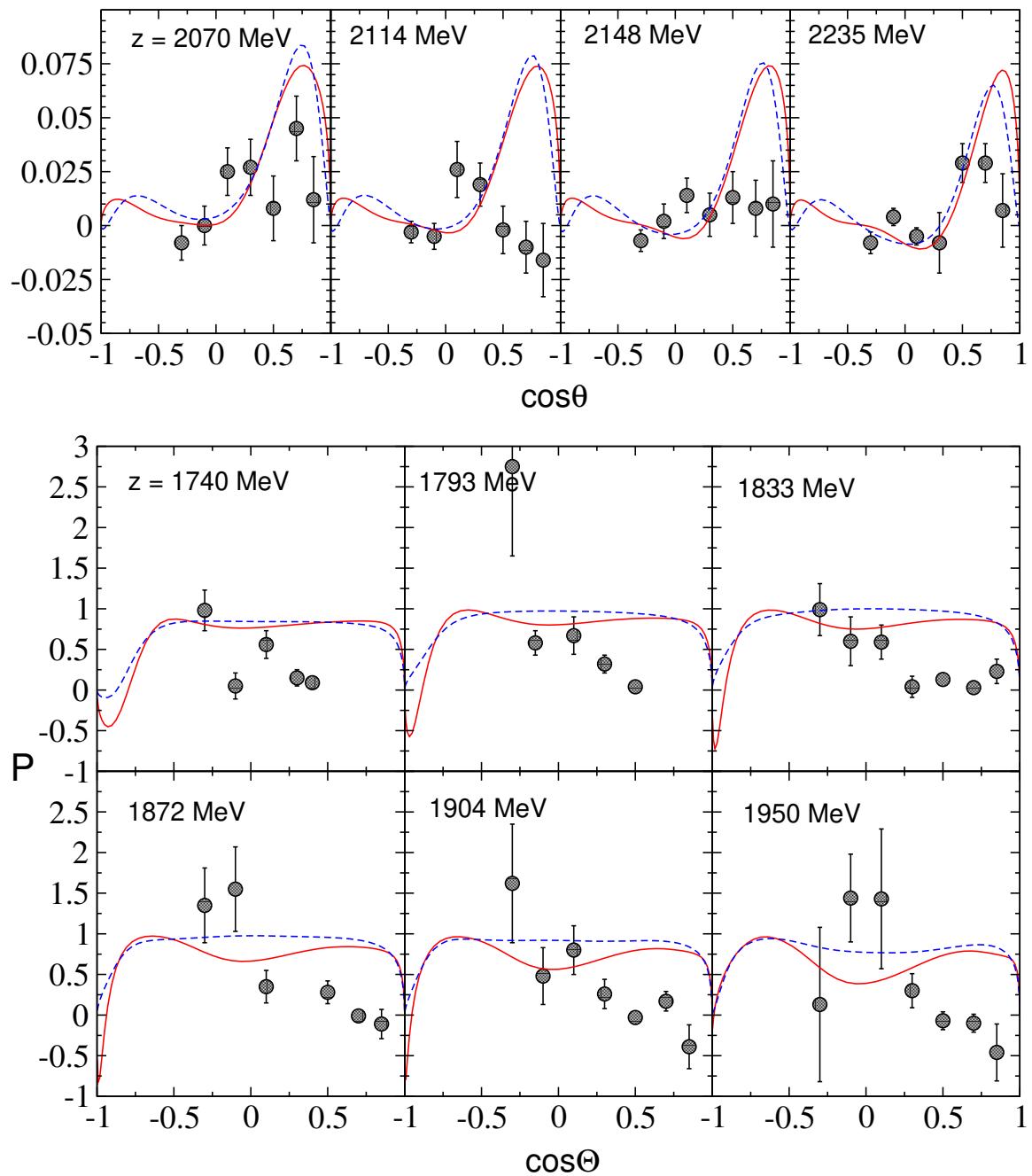


Figure 2: Differential cross section [1/3] of the reaction $\pi^- p \rightarrow \eta n$. Data: filled squares from Ref. [2]; filled circles from Ref. [3]; empty circles from Ref. [4]; empty triangles up from Ref. [5]; stars from Ref. [6]; filled triangles up from Ref. [7]; empty squares from Ref. [8]; filled diamonds from Ref. [9].

Figure 3: Differential cross section [2/3] of the reaction $\pi^- p \rightarrow \eta n$. Data: c.f. Fig. 2 and empty diamonds from Ref. [10].

Figure 4: Differential cross section [3/3] of the reaction $\pi^- p \rightarrow \eta n$. Data: c.f. Fig. 3.Figure 5: Polarization [1/2] of the reaction $\pi^- p \rightarrow \eta n$. Data: Ref. [11].

Figure 6: Polarization [2/2] of the reaction $\pi^- p \rightarrow \eta n$. Data: Ref. [11].

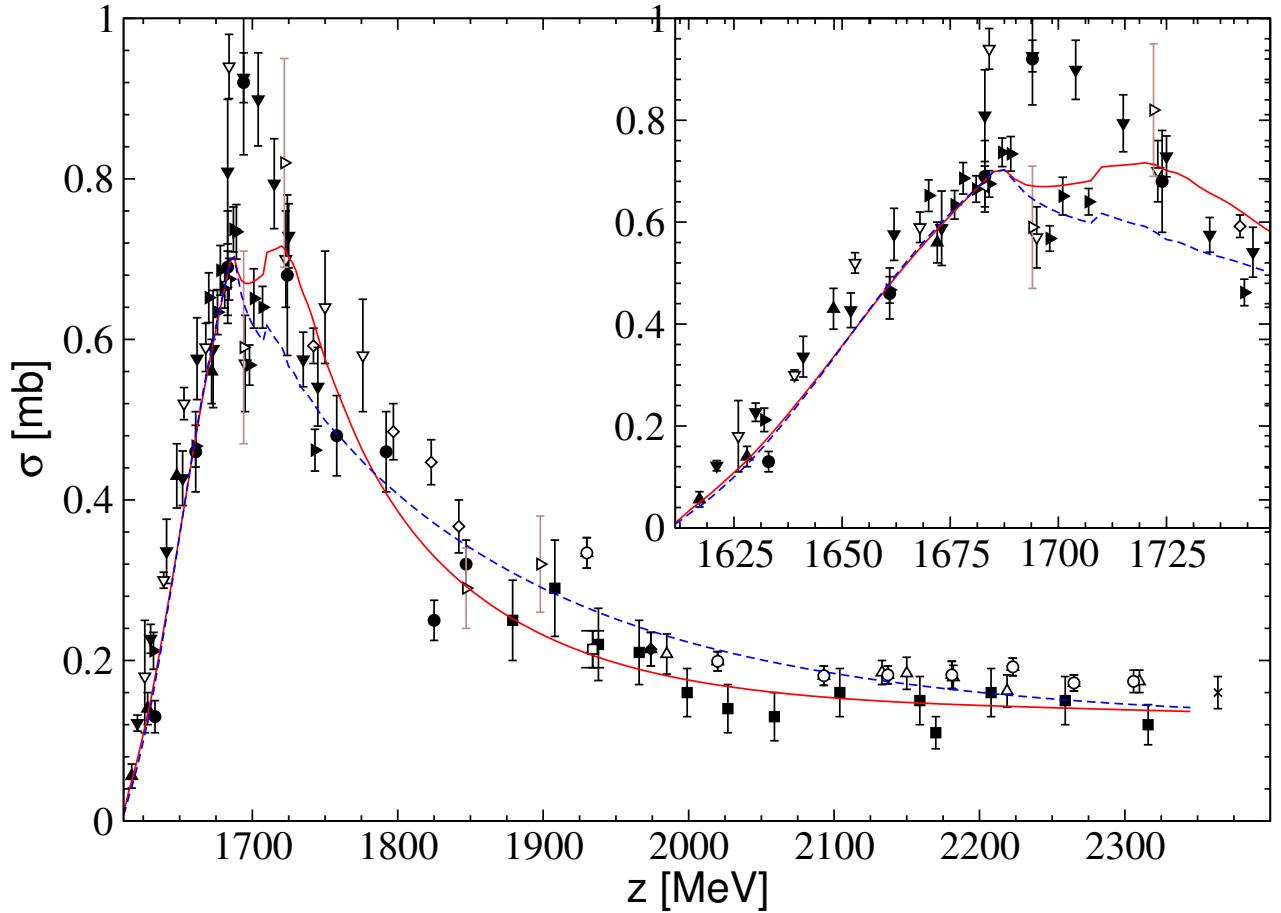


Figure 7: Total cross section of the reaction $\pi^- p \rightarrow K^0 \Lambda$. Data: filled circles from Ref. [12]; filled squares from Ref. [13]; empty diamonds from Ref. [14]; empty triangles up from Ref. [15]; filled triangles up from Ref. [16]; filled triangles down from Ref. [21]; empty triangles down from Ref. [22]; filled triangles right from Ref. [17]; empty triangles left from Ref. [23]; empty triangles right from Ref. [24]; empty squares from Ref. [18]; filled diamonds from Ref. [19]; stars from Ref. [25]; for empty circles and crosses see Ref. [26].

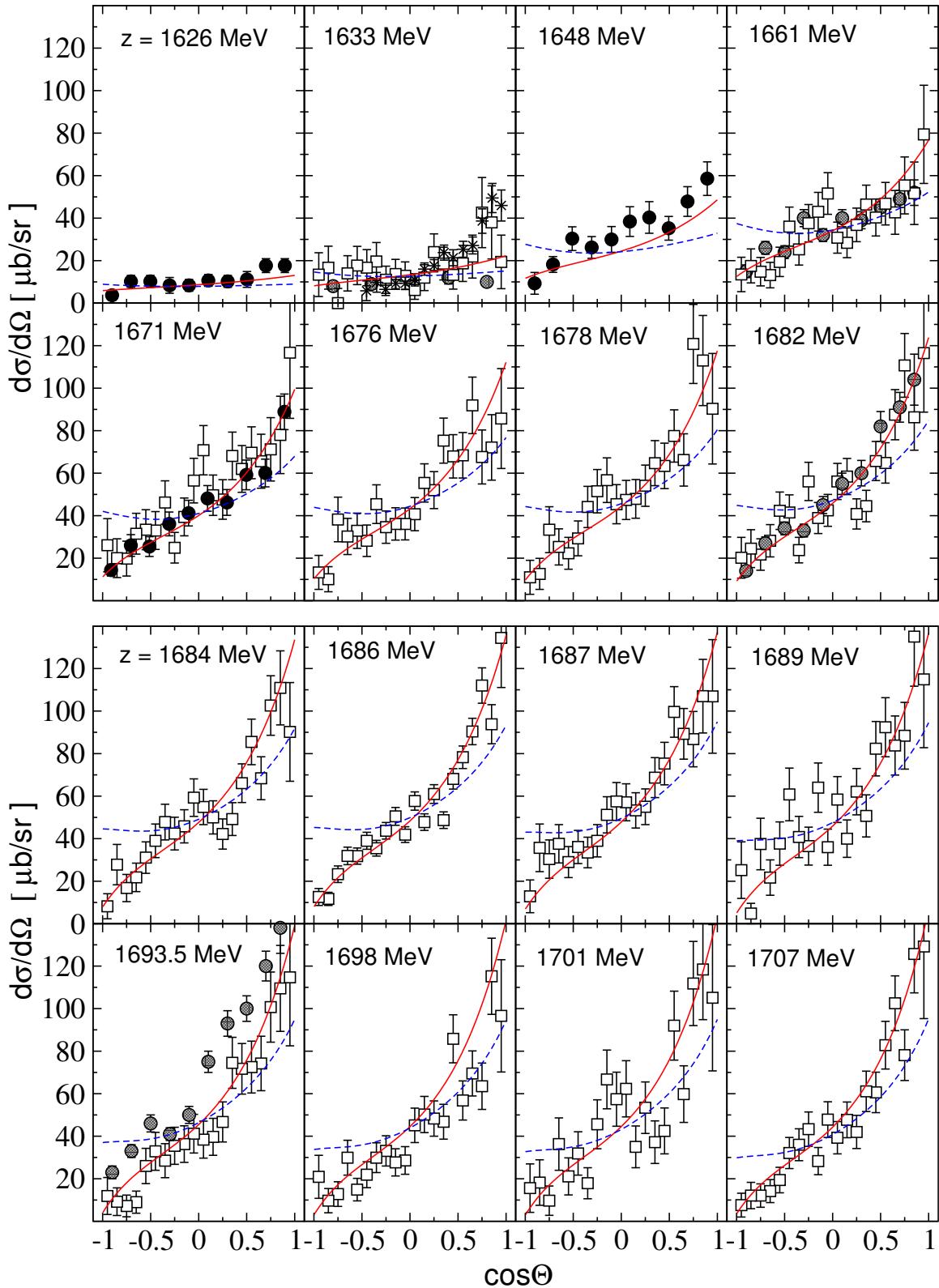
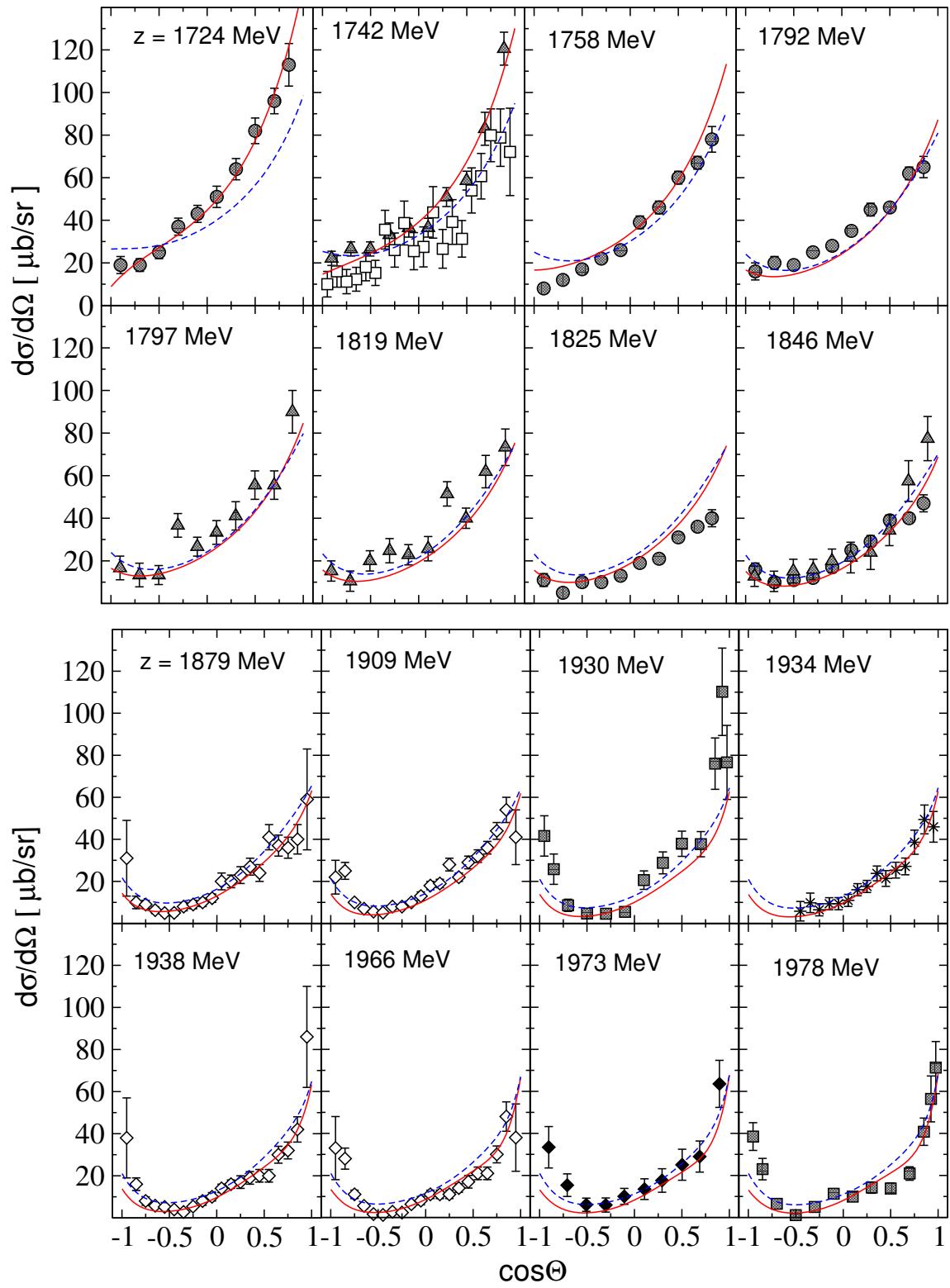
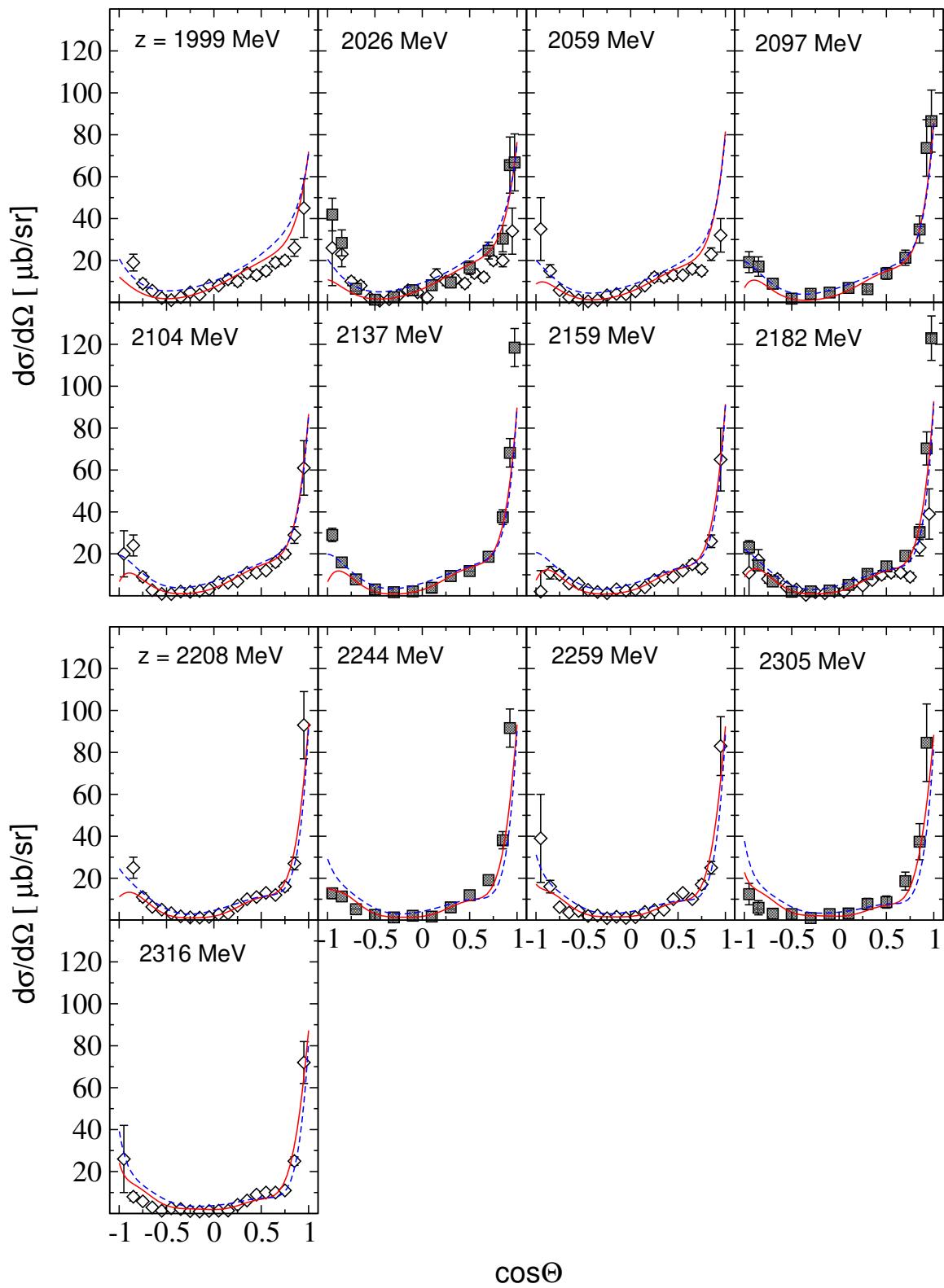


Figure 8: Differential cross section [1/3] of the reaction $\pi^- p \rightarrow K^0 \Lambda$. Data: filled circles from Ref. [16]; empty squares from Ref. [17]; partially filled circles from Ref. [12]; stars from Ref. [18]; triangles from Ref. [14]; empty diamonds from Ref. [13]; partially filled squares from Ref. [15]; filled diamonds from Ref. [19].

Figure 9: Differential cross section [2/3] of the reaction $\pi^- p \rightarrow K^0 \Lambda$. Data: c.f. Fig. 8.

Figure 10: Differential cross section [3/3] of the reaction $\pi^- p \rightarrow K^0 \Lambda$. Data: c.f. Fig. 8.

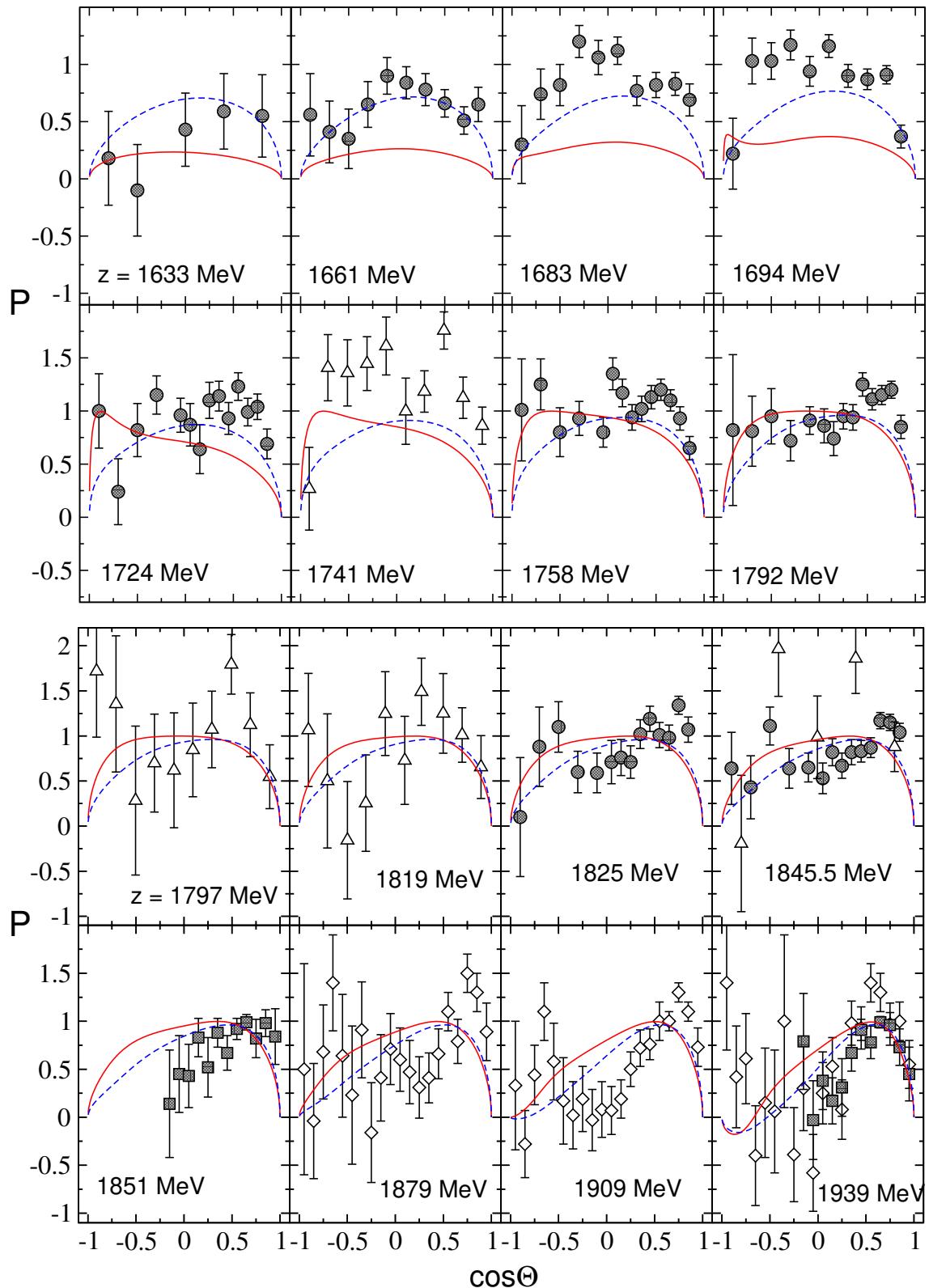
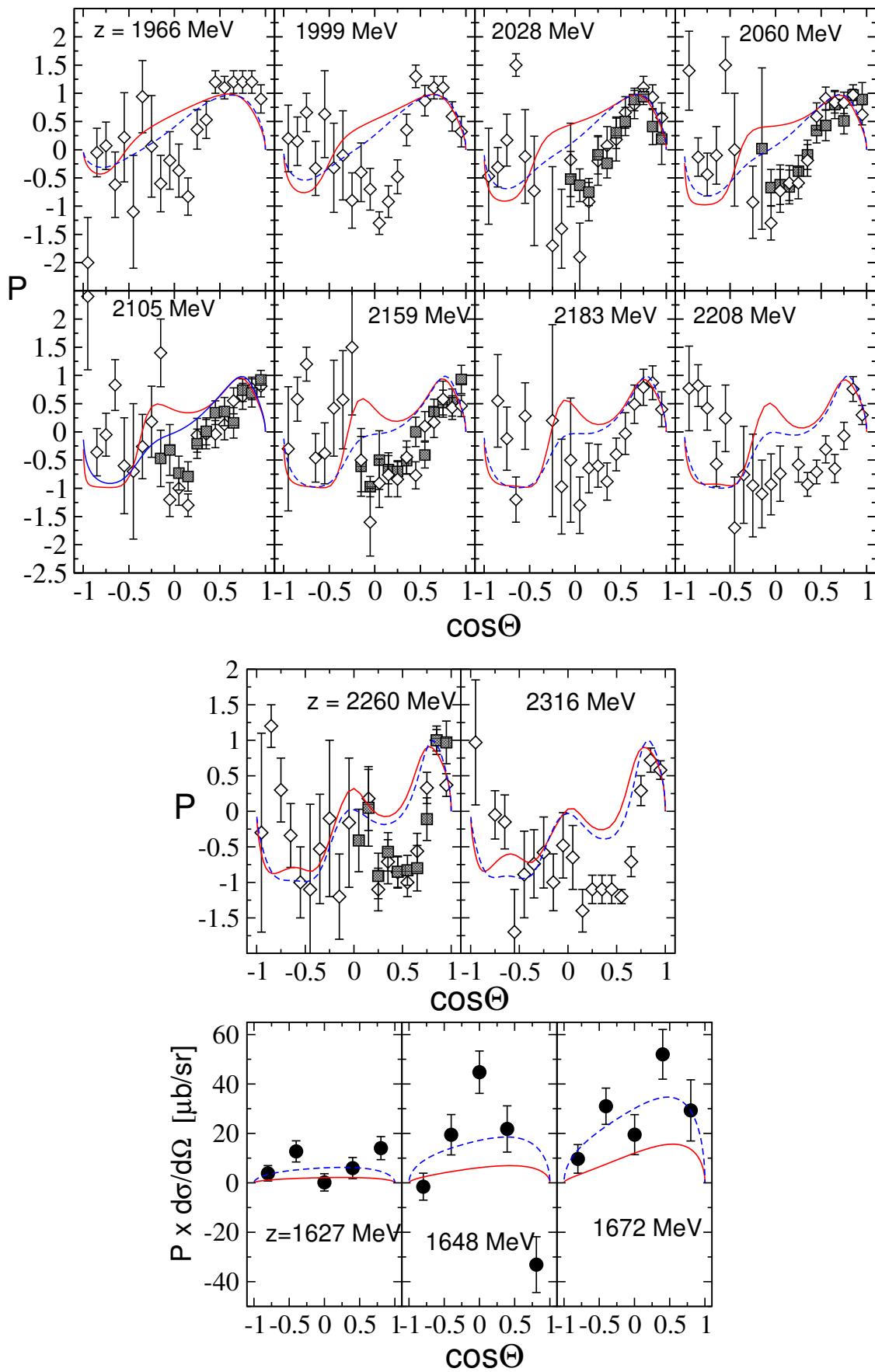
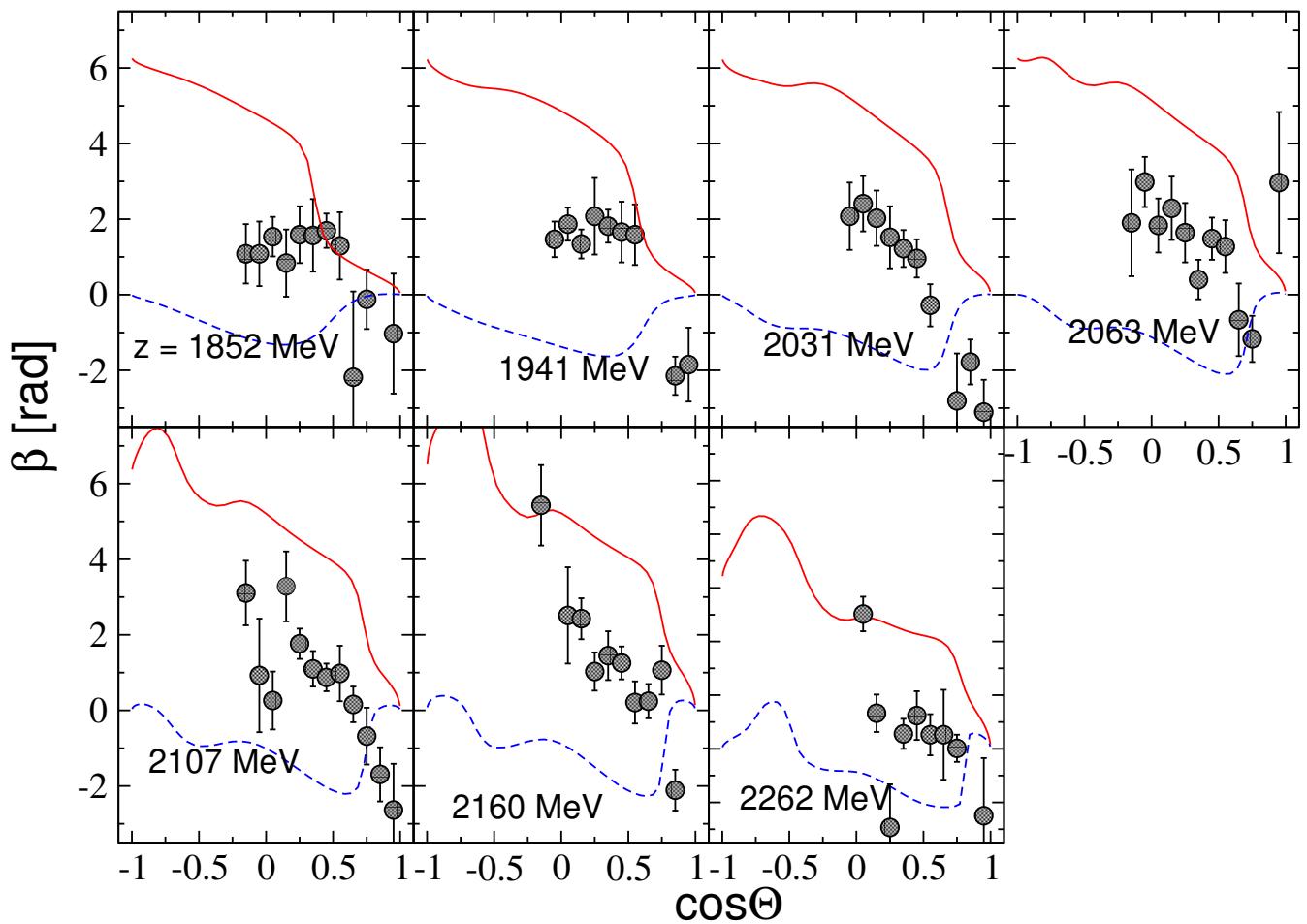


Figure 11: Polarization [1/2] of the reaction $\pi^- p \rightarrow K^0\Lambda$. Data: filled circles from Ref. [12]; empty triangles up from Ref. [14]; filled squares from Ref. [20]; empty diamonds from Ref. [13].

Figure 12: Polarization [2/2] of the reaction $\pi^- p \rightarrow K^0\Lambda$. Data: c.f Fig. 11.

Figure 13: Spin-rotation parameter β of the reaction $\pi^- p \rightarrow K^0 \Lambda$. Data: Ref. [20].

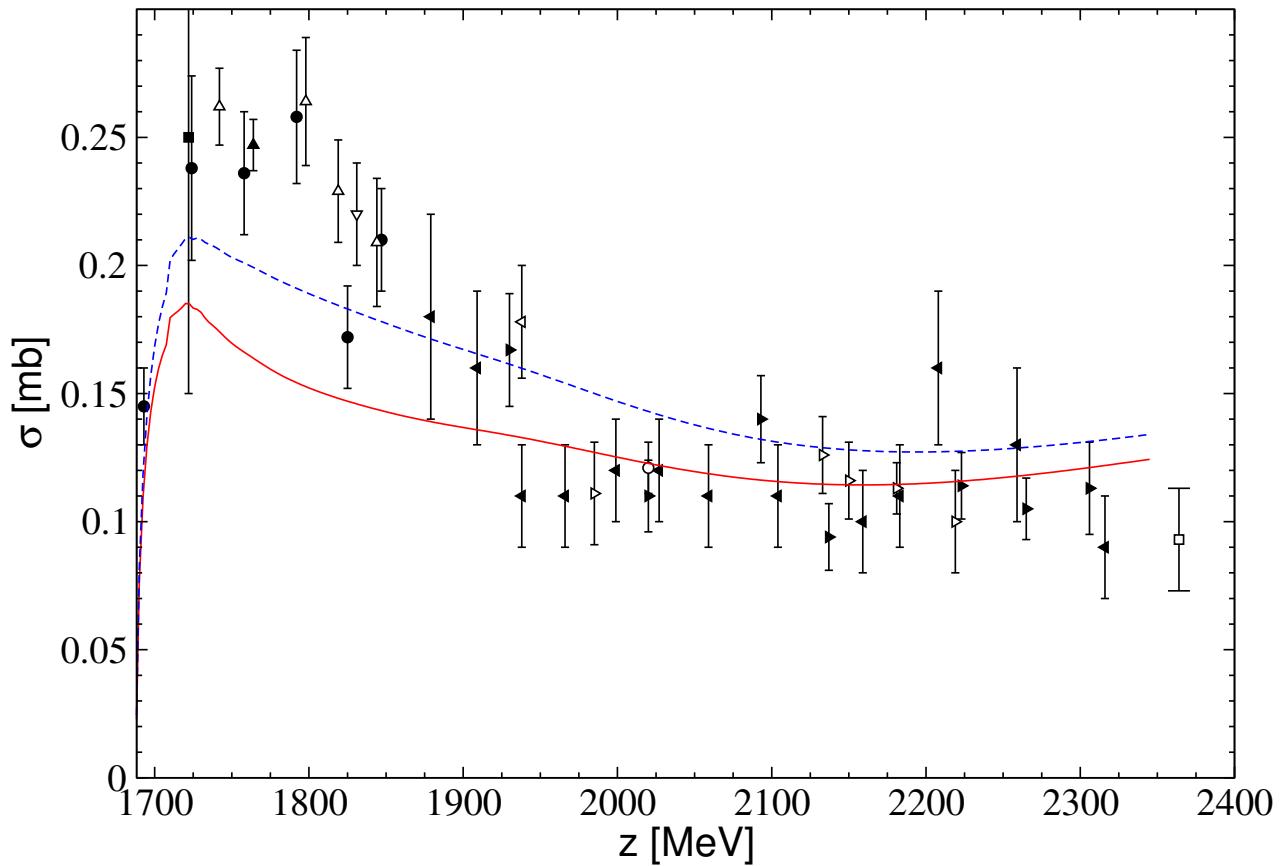


Figure 14: Total cross section of the reaction $\pi^- p \rightarrow K^0 \Sigma^0$. Data: empty triangles up: Ref. [14]; empty triangles right: Ref. [15]; filled squares: Ref. [24]; empty triangles left: Ref. [19]; filled triangles up: Ref. [29] filled circles: Ref. [27]; empty circles: Ref. [30]; filled triangles left: Ref. [28]. For empty triangles down, filled triangles right, and empty squares see [26].

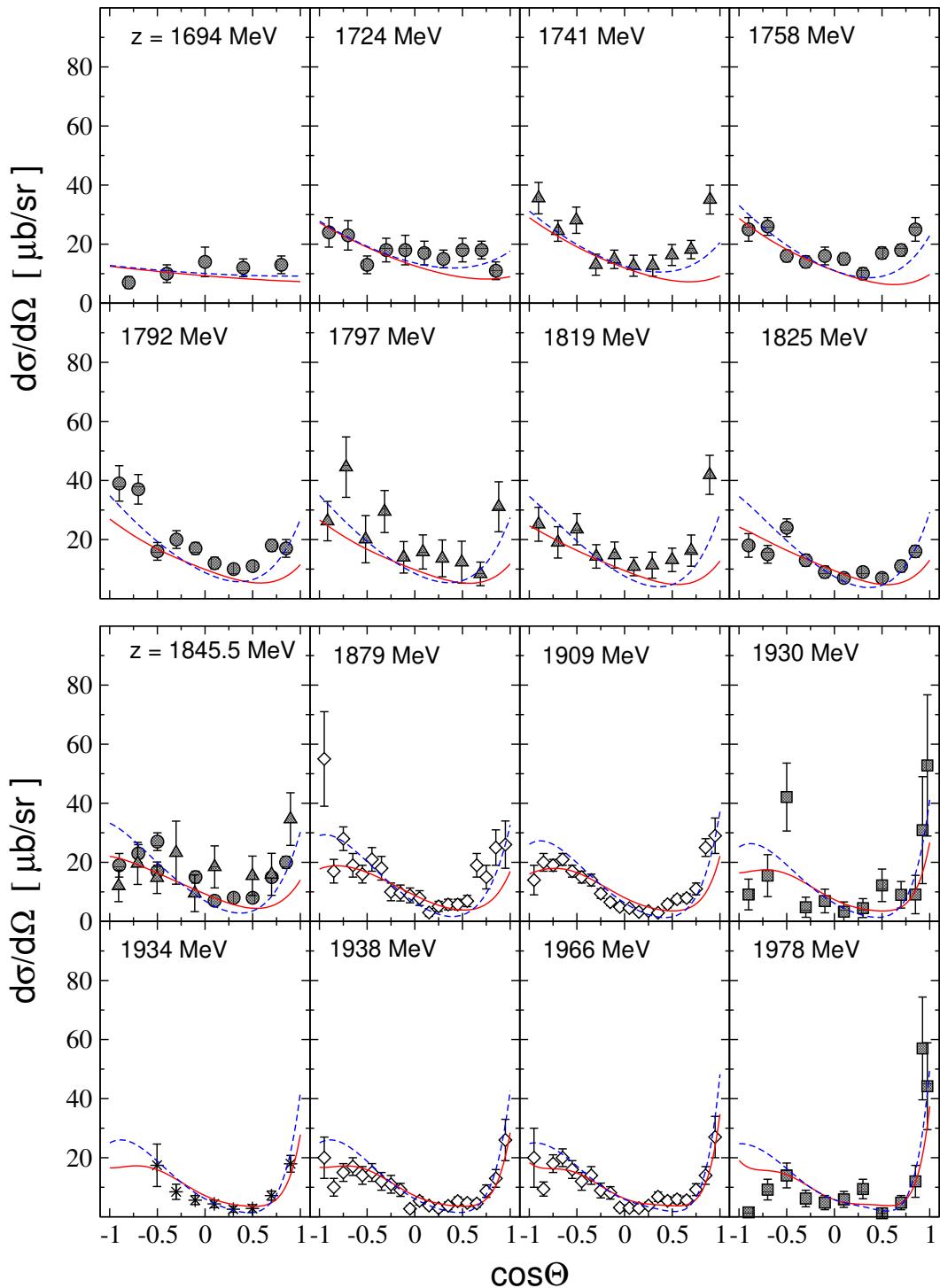
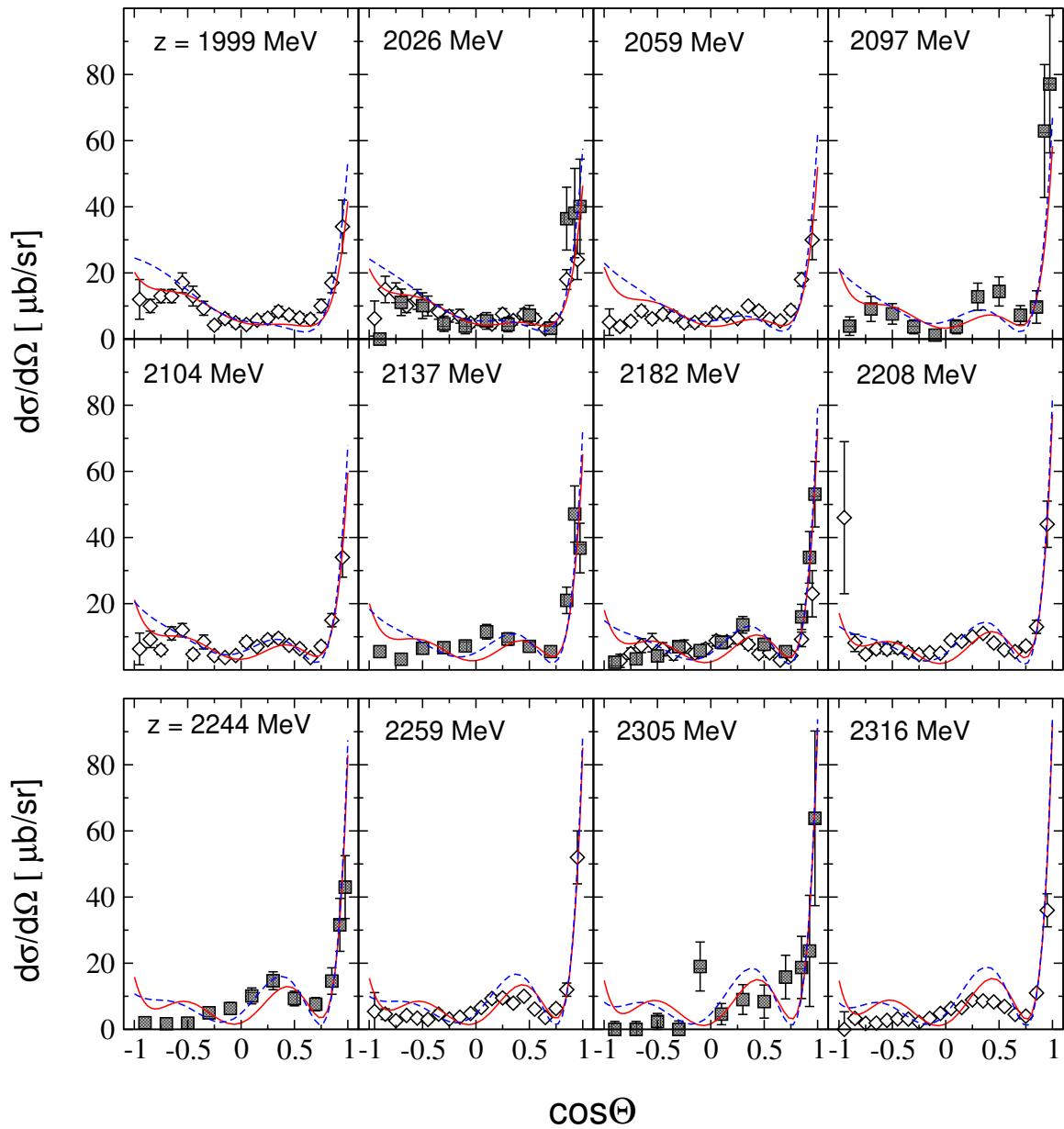
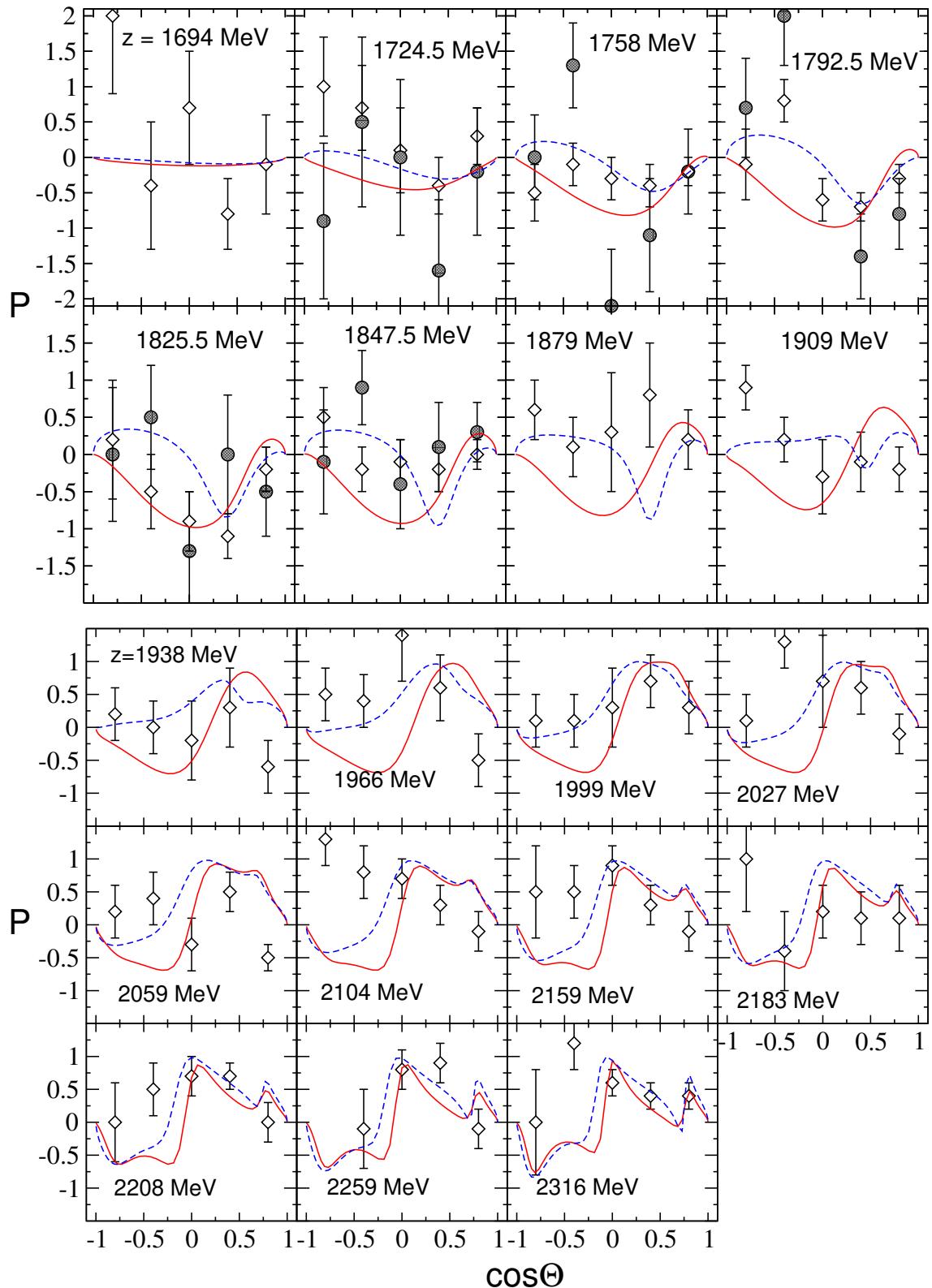


Figure 15: Differential cross section [1/2] of the reaction $\pi^- p \rightarrow K^0 \Sigma^0$. Data: circles from Ref. [27]; up triangles from Ref. [14]; squares from Ref. [15]; diamonds from Ref. [28]; stars from Ref. [18].

Figure 16: Differential cross section [2/2] of the reaction $\pi^- p \rightarrow K^0 \Sigma^0$. Data: c.f. Fig. 15.

Figure 17: Polarization of the reaction $\pi^- p \rightarrow K^0 \Sigma^0$. Data: circles from Ref. [27]; diamonds from Ref. [28].

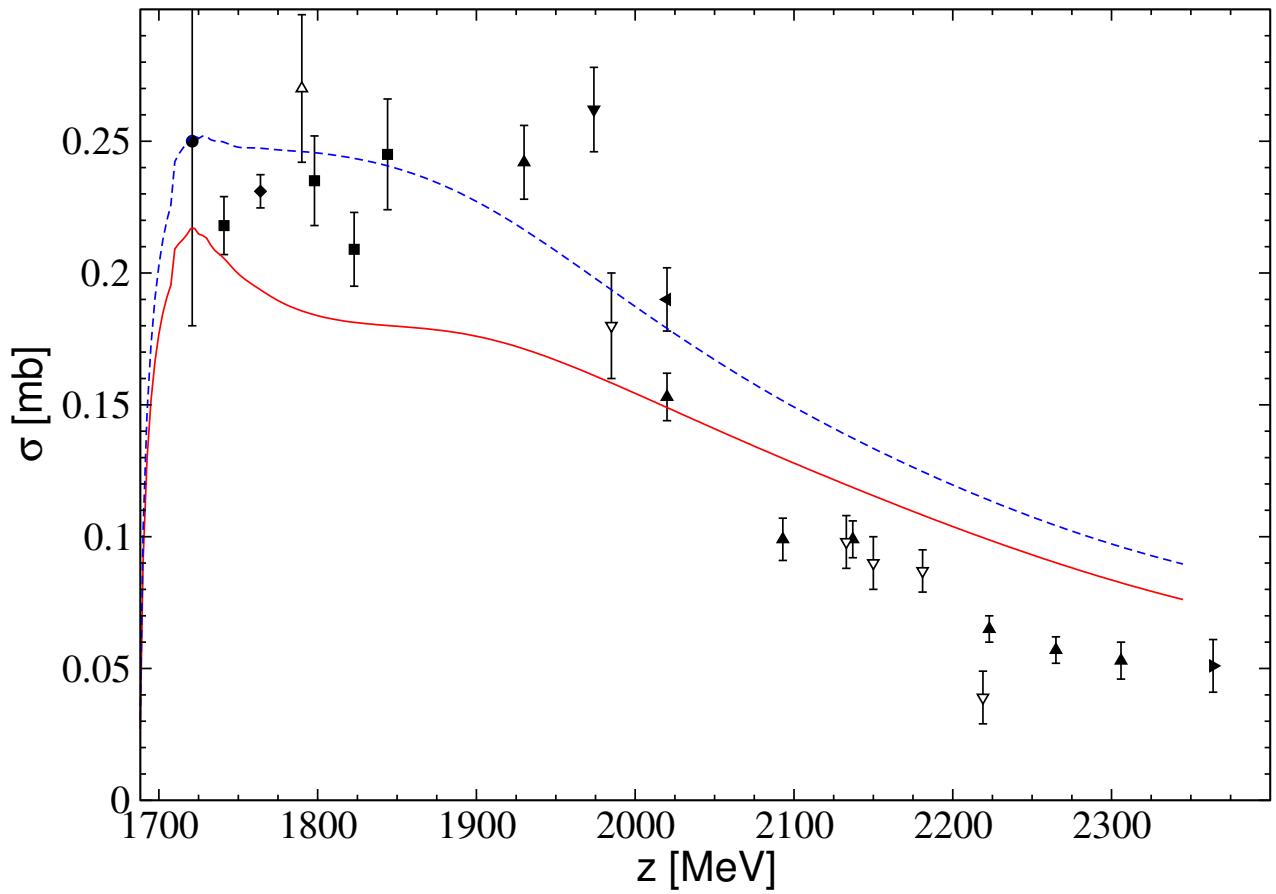


Figure 18: Total cross section of the reaction $\pi^- p \rightarrow K^+ \Sigma^-$. Data: empty triangles down: Ref. [15]; filled circles: Ref. [24]; filled triangles down: Ref. [19]; filled triangles left: Ref. [30]; empty triangles up: Ref. [34]; filled squares: Ref. [32]; filled diamonds: Ref. [33]. For filled triangles up and filled triangles right see Ref. [26].

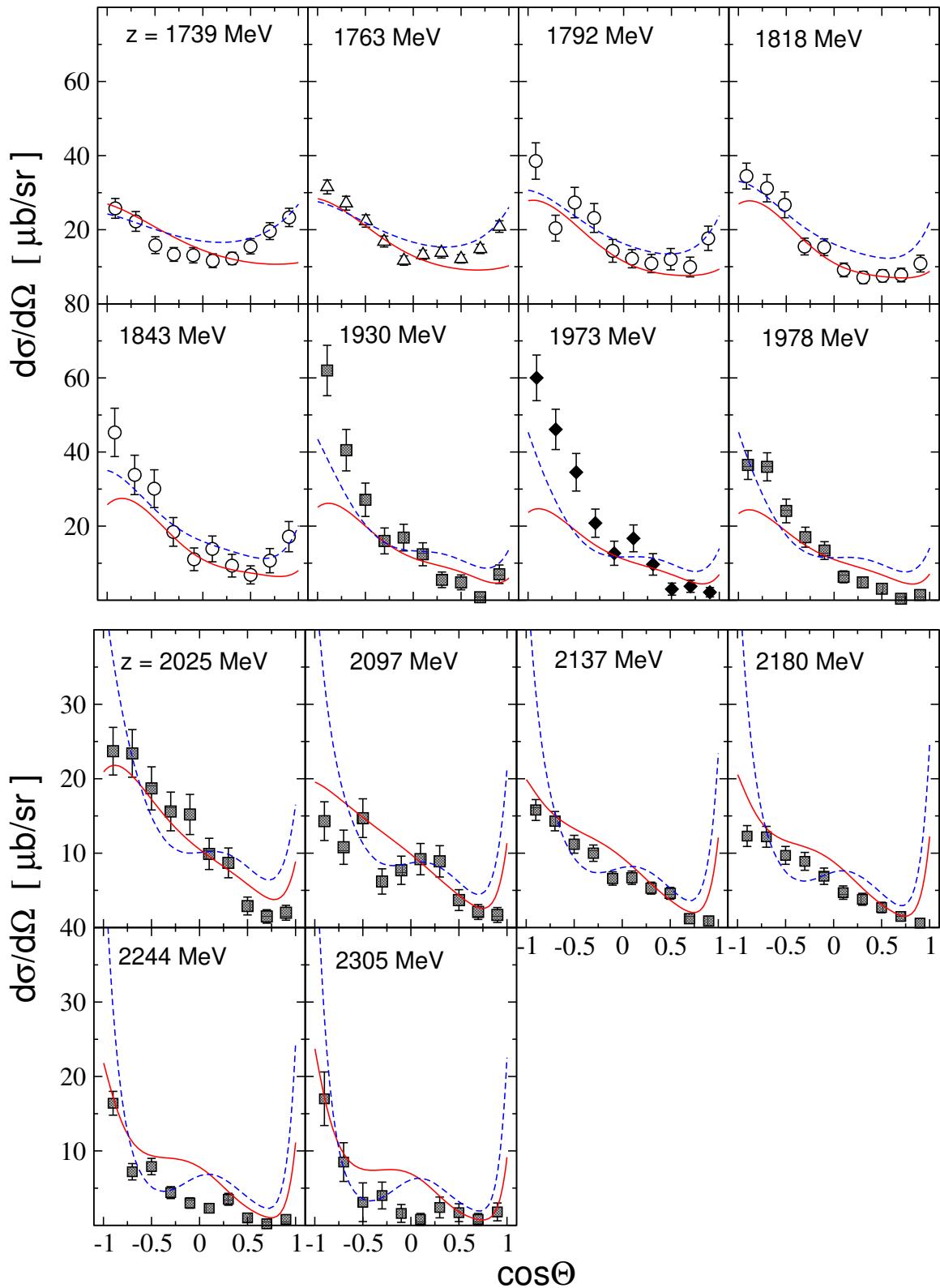


Figure 19: Differential cross section of the reaction $\pi^- p \rightarrow K^+ \Sigma^-$. Data: circles from Ref. [32]; up triangles from Ref. [33]; squares from Ref. [15]; diamonds from Ref. [19].

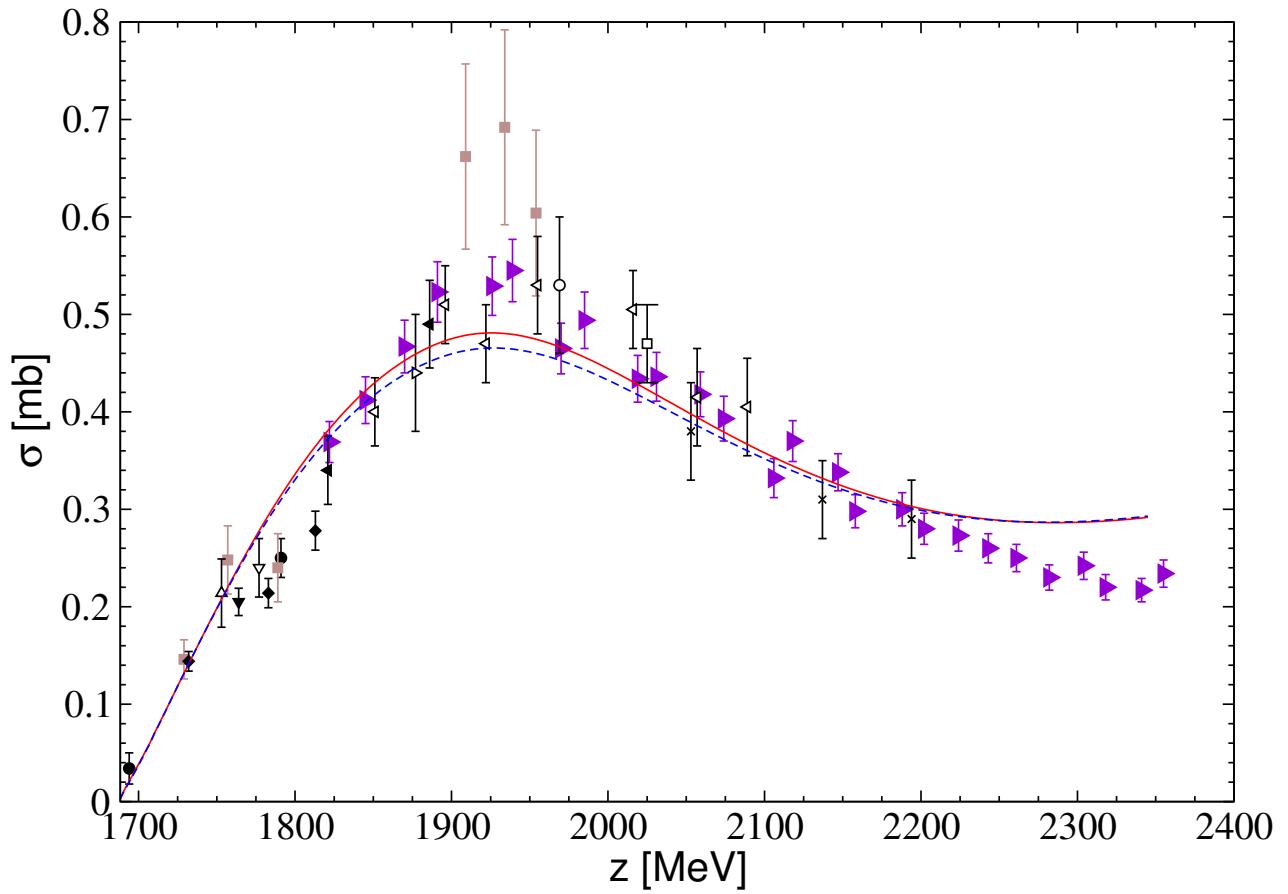


Figure 20: Total cross section of the reaction $\pi^+ p \rightarrow K^+ \Sigma^+$. Data: filled triangles right: Ref. [35]; filled squares: Ref. [40]; filled diamonds: Ref. [41]; empty triangles up: Ref. [47]; filled triangles down: Ref. [43]; empty triangles down: Ref. [48]; empty triangles left: Ref. [49]; empty circles: Ref. [50]; empty squares: Ref. [51]; crosses: Ref. [52]. For filled circles, filled triangles left and empty triangles right see Ref. [26].

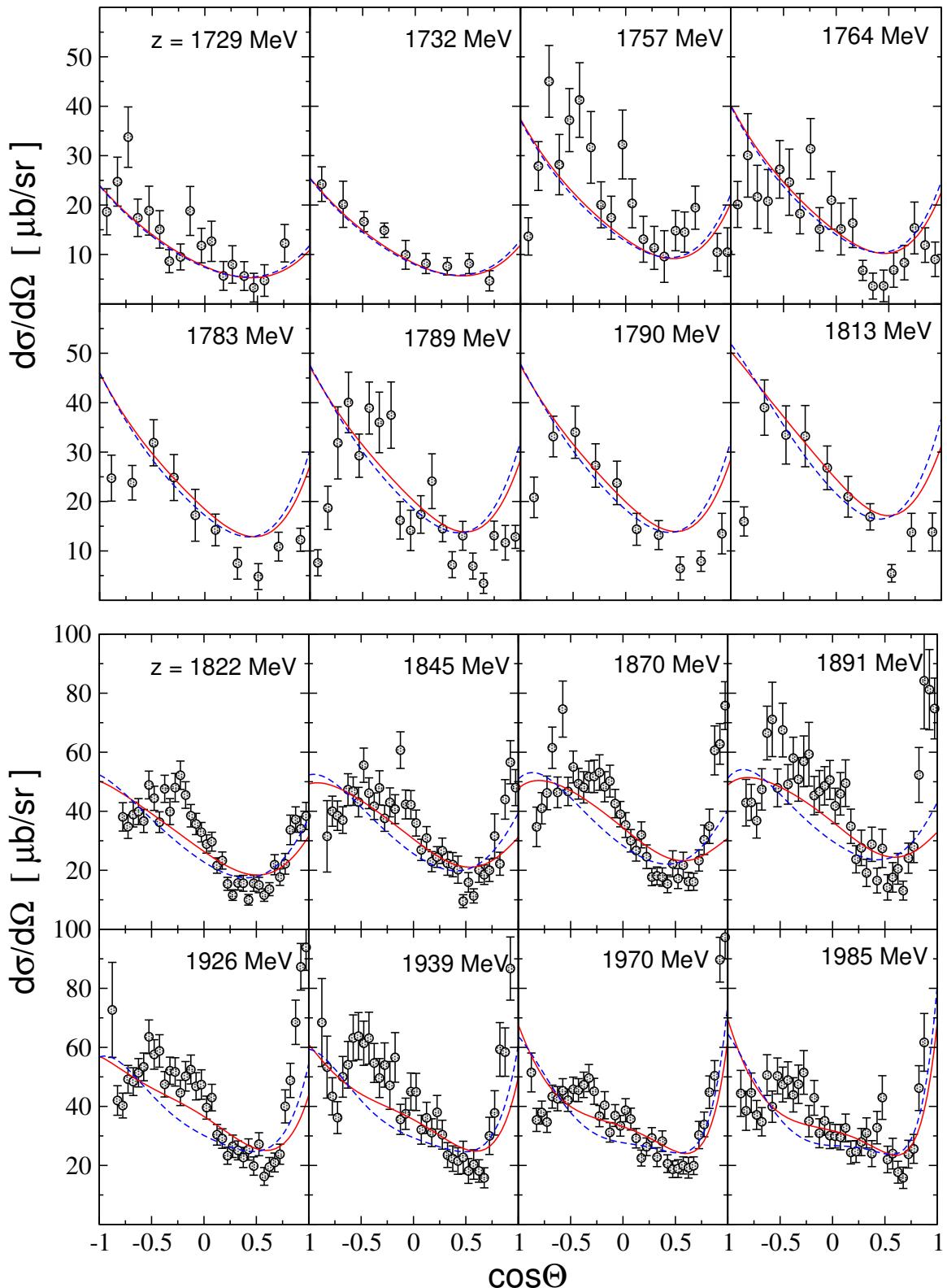
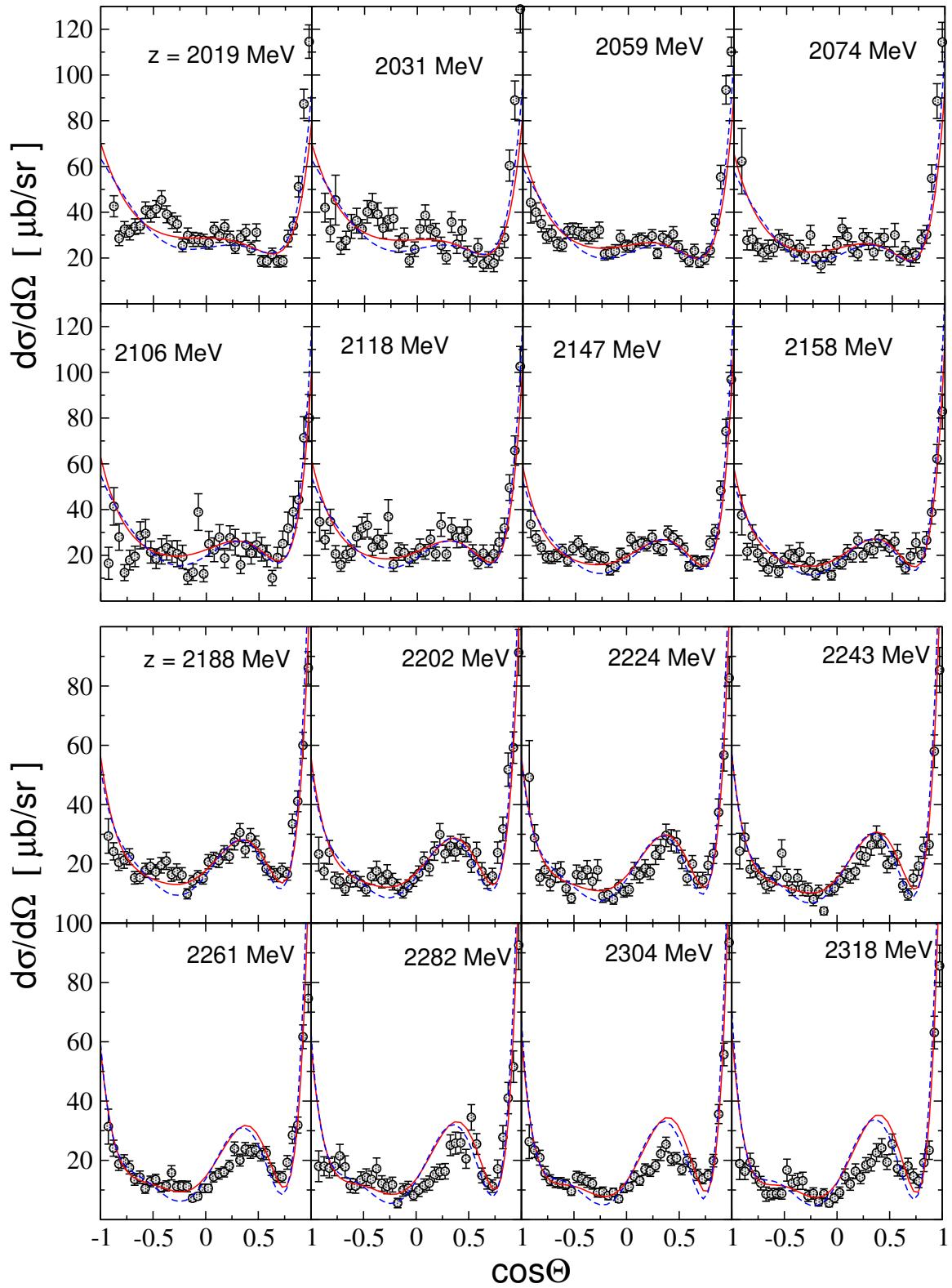


Figure 21: Differential cross section [1/2] of the reaction $\pi^+ p \rightarrow K^+ \Sigma^+$. Data: Ref. [35], except: $z = 1729, 1757, 1789$ MeV from Ref. [40]; $z = 1732, 1783, 1813$ MeV from Ref. [41]; $z = 1764$ MeV from Ref. [43]; $z = 1790$ MeV from Ref. [42].

Figure 22: Differential cross section [2/2] of the reaction $\pi^+ p \rightarrow K^+ \Sigma^+$. Data from Ref. [35].

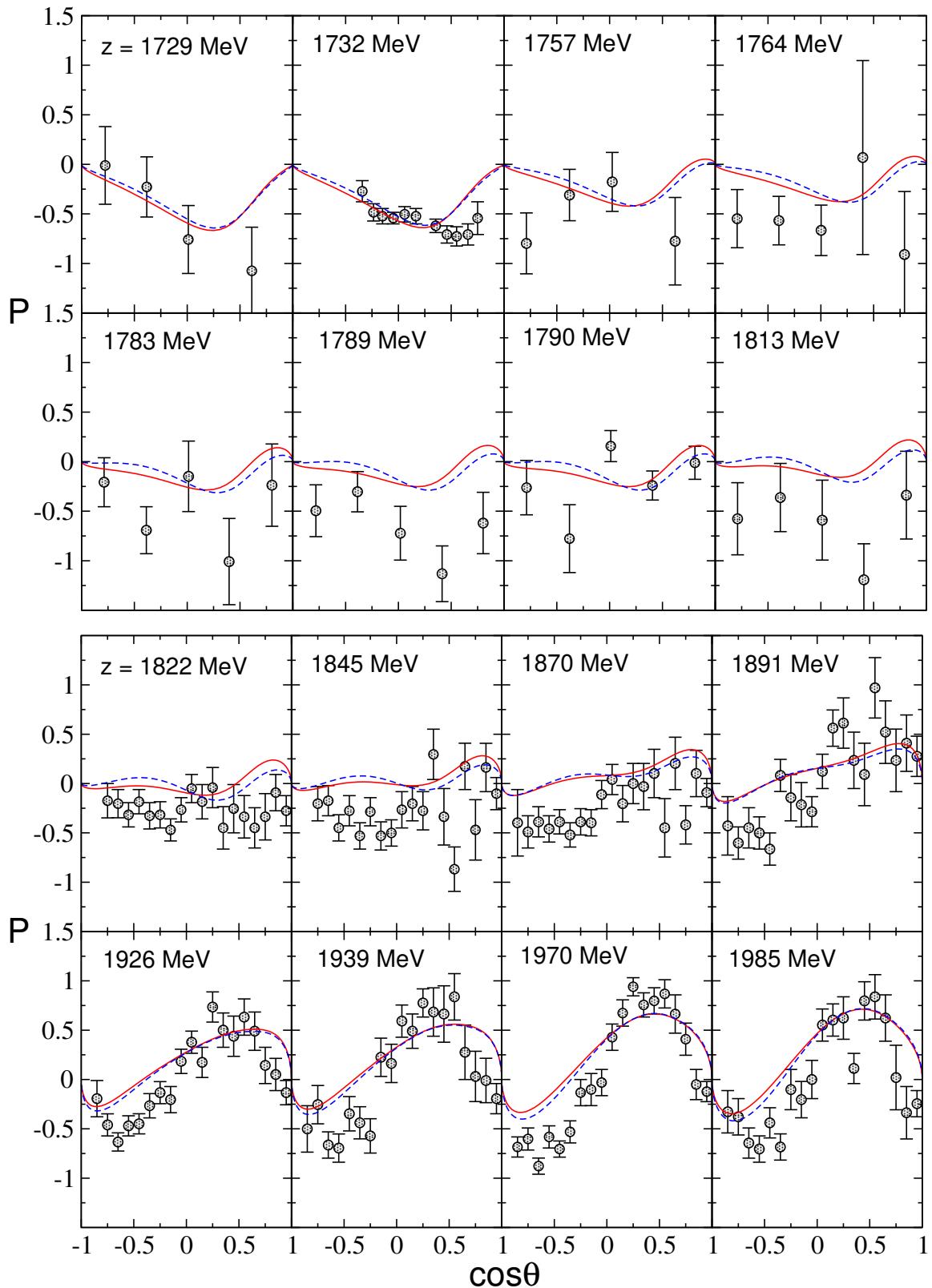
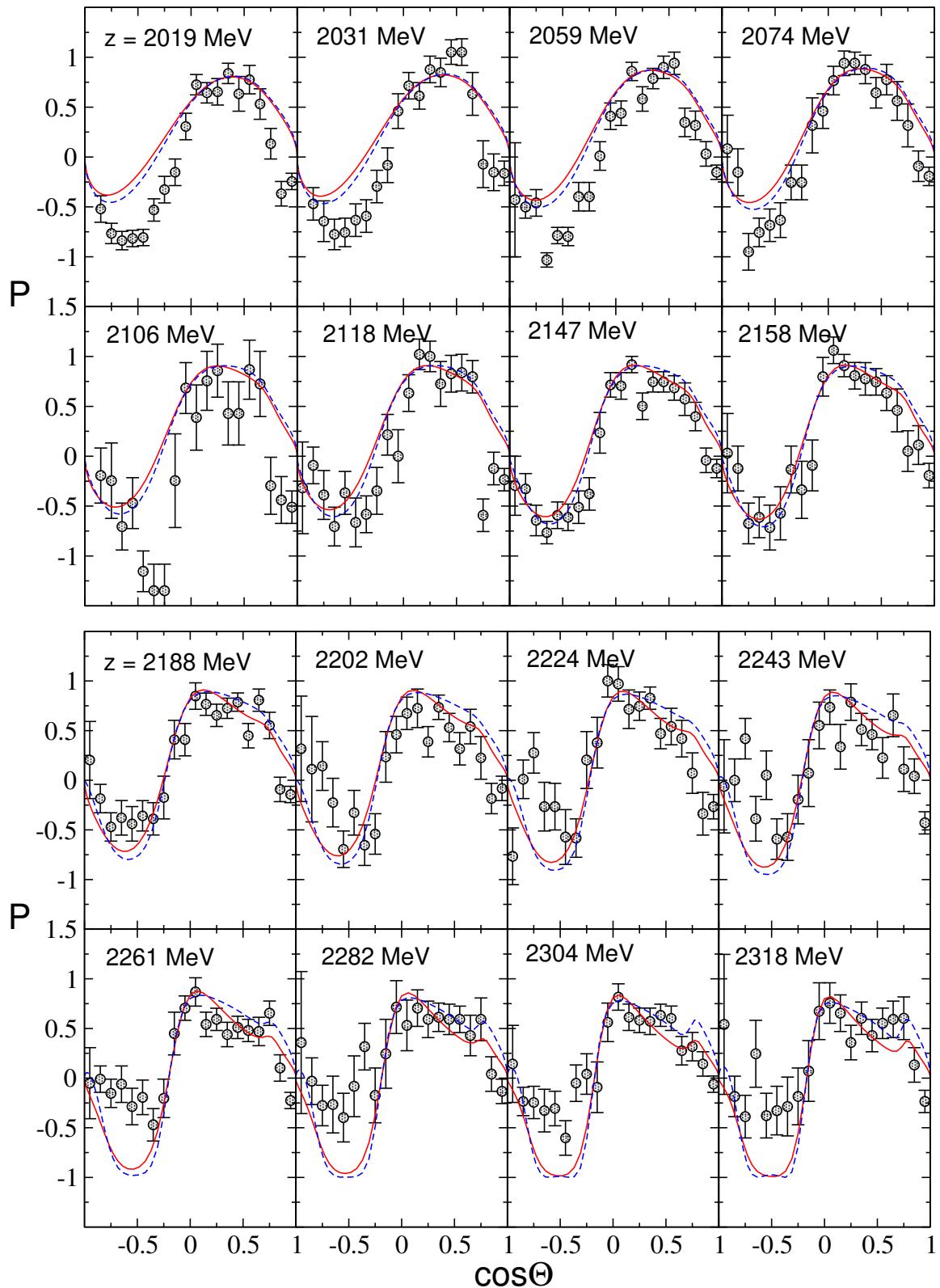
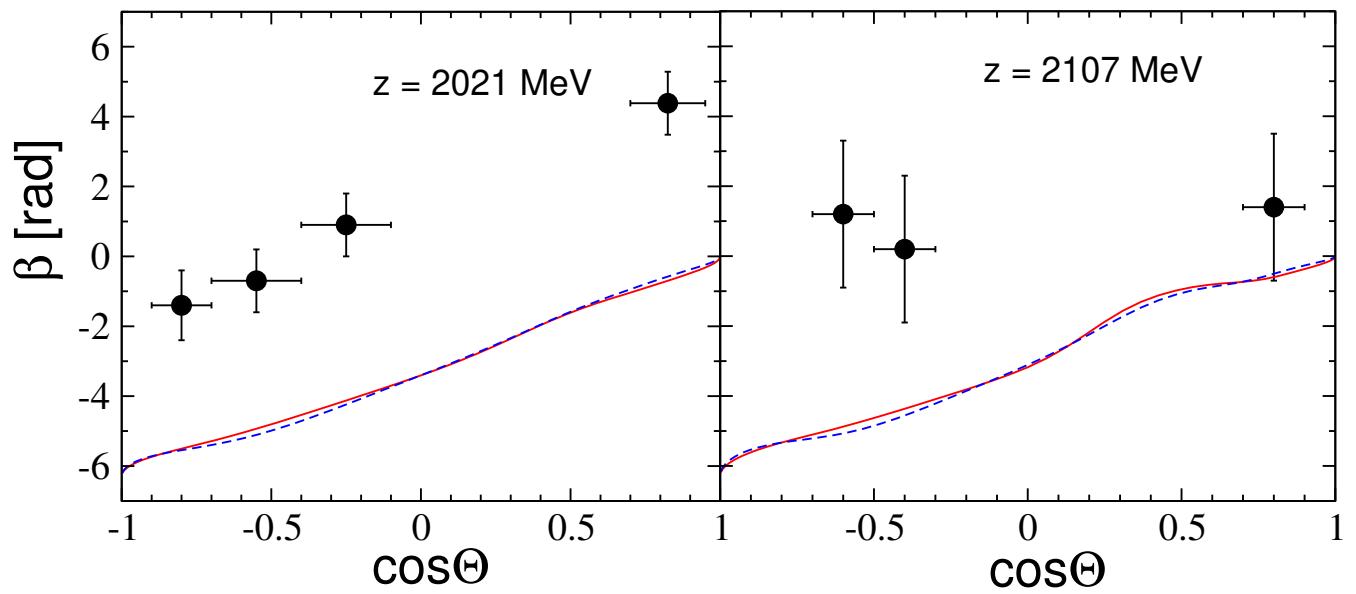


Figure 23: Polarization [1/2] of the reaction $\pi^+ p \rightarrow K^+ \Sigma^+$. Data: Ref. [35], except: $z = 1729, 1757, 1789$ MeV from Ref. [40]; $z = 1783, 1813$ MeV from Ref. [41]; $z = 1764$ MeV from Ref. [43]; $z = 1790$ MeV from Ref. [42]; $z = 1732$ MeV from Ref. [44].

Figure 24: Polarization [2/2] of the reaction $\pi^+ p \rightarrow K^+ \Sigma^+$. Data: Ref. [35].

Figure 25: Spin-rotation parameter β of the reaction $\pi^+ p \rightarrow K^+ \Sigma^+$. Data: Ref. [37].

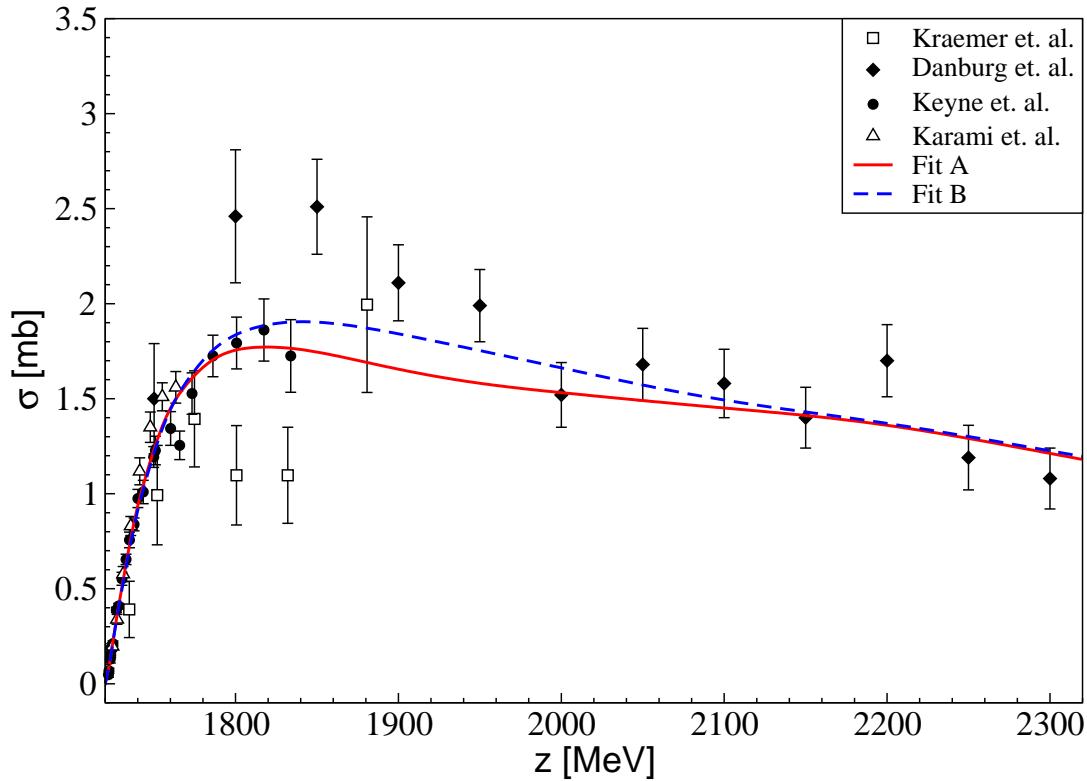
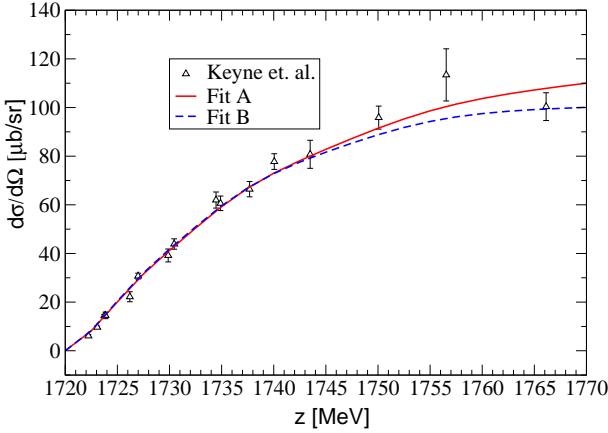
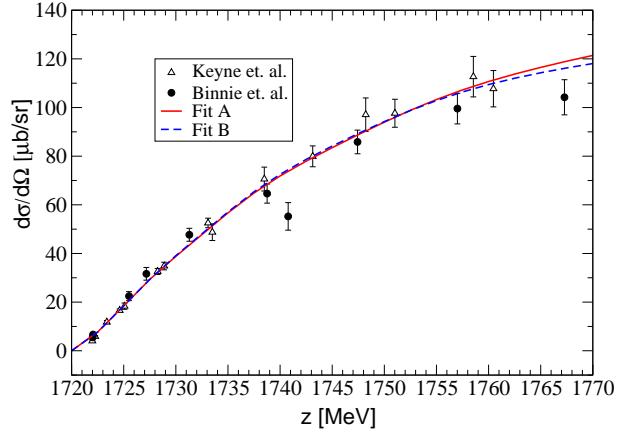


Figure 26: The total cross section for $\pi N \rightarrow \omega N$ reaction. The data are from Kraemer et al. [53], Danburg et al. [54], Keynes et al. [55] and Karami et al. [56].



(a) Backward differential cross section.



(b) Forward differential cross section.

Figure 27: The backward and forward differential cross sections of $\pi^- p \rightarrow \omega n$. The data are from Binnie et al. [57] and Keynes et al. [55].

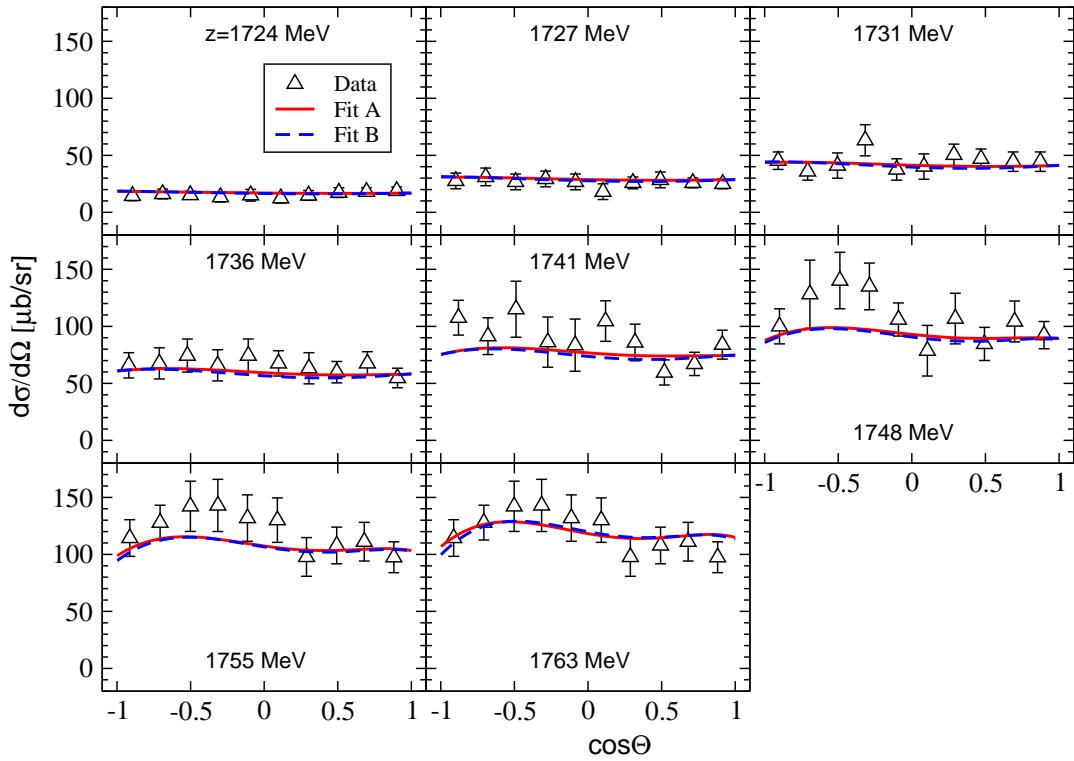


Figure 28: Differential cross section of $\pi^- p \rightarrow \omega n$ at different energies. The data are from Ref. [56].

References

- [1] R. A. Arndt, W. J. Briscoe, I. I. Strakovsky, R. L. Workman and M. M. Pavan, Phys. Rev. C **69**, 035213 (2004).
- [2] S. Prakhov, B. M. K. Nefkens, C. E. Allgower, R. A. Arndt, V. Bekrenev, W. J. Briscoe, M. Clajus and J. R. Comfort *et al.*, Phys. Rev. C **72**, 015203 (2005).
- [3] D. E. Bayadilov, Y. A. Beloglazov, A. B. Gridnev, N. G. Kozlenko, S. P. Kruglov, A. A. Kulbardis, I. V. Lopatin and D. V. Novinsky *et al.*, Eur. Phys. J. A **35**, 287 (2008).
- [4] T. W. Morrison, Ph.D. Thesis, The George Washington University, 2000
- [5] N. G. Kozlenko, V. V. Abaev, V. S. Bekrenev, S. P. Kruglov, A. A. Koulbardis, I. V. Lopatin, A. B. Starostin and B. Draper *et al.*, Phys. Atom. Nucl. **66**, 110 (2003) [Yad. Fiz. **66**, 112 (2003)].
- [6] N. C. Debenham, D. M. Binnie, L. Camilleri, J. Carr, A. Duane, D. A. Garbutt, W. G. Jones and J. Keyne *et al.*, Phys. Rev. D **12**, 2545 (1975).
- [7] W. Deinet, H. Mueller, D. Schmitt, H. M. Staudenmaier, S. Buniatov and E. Zavattini, Nucl. Phys. B **11**, 495 (1969).
- [8] W. B. Richards, C. B. Chiu, R. D. Eandi, A. C. Helmholtz, R. W. Kenney, B. Moyer, J. A. Poirier and R. J. Cence *et al.*, Phys. Rev. D **1**, 10 (1970).
- [9] J. Feltesse, R. Ayed, P. Bareyre, P. Borgeaud, M. David, J. Ernwein, Y. Lemoigne and G. Villet, Nucl. Phys. B **93**, 242 (1975).
- [10] R. M. Brown, A. G. Clark, P. J. Duke, W. M. Evans, R. J. Gray, E. S. Groves, R. J. Ott and H. R. Renshall *et al.*, Nucl. Phys. B **153**, 89 (1979).
- [11] R. D. Baker, R. M. Brown, A. G. Clark, J. K. Davies, J. De Pagter, W. M. Evans, R. J. Gray and E. S. Groves *et al.*, Nucl. Phys. B **156**, 93 (1979).
- [12] R. D. Baker, J. A. Blissett, I. J. Bloodworth, T. A. Broome, G. Conforto, J. C. Hart, C. M. Hughes and R. W. Kraemer *et al.*, Nucl. Phys. B **141**, 29 (1978).
- [13] D. H. Saxon, R. D. Baker, K. W. Bell, J. A. Blissett, I. J. Bloodworth, T. A. Broome, J. C. Hart and A. L. Lintern *et al.*, Nucl. Phys. B **162**, 522 (1980).
- [14] T. O. Binford, M. L. Good, V. G. Lind, D. Stern, R. Krauss and E. Dettman, Phys. Rev. **183**, 1134 (1969).
- [15] O. I. Dahl, L. M. Hardy, R. I. Hess, J. Kirz, D. H. Miller and J. A. Schwartz, Phys. Rev. **163**, 1430 (1967) [Erratum-ibid. **183**, 1520 (1969)].
- [16] L. Bertanza, P. L. Connolly, B. B. Culwick, F. R. Eisler, T. Morris, R. B. Palmer, A. Prodell and N. P. Samios, Phys. Rev. Lett. **8**, 332 (1962).
- [17] T. M. Knasel, J. Lindquist, B. Nelson, R. L. Sumner, E. C. Swallow, R. Winston, D. M. Wolfe and P. R. Phillips *et al.*, Phys. Rev. D **11**, 1 (1975).
- [18] L. L. Yoder, C. T. Coffin, D. I. Meyer and K. M. Terwilliger, Phys. Rev. **132**, 1778 (1963).
- [19] O. Goussu, M. Sene, B. Ghidini, S. Mongelli, A. Romano, P. Waloschek and V. Alles-Borelli, Nuovo Cim. A **42**, 606 (1966).
- [20] K. W. Bell, J. A. Blissett, T. A. Broome, H. M. Daley, J. C. Hart, A. L. Lintern, R. Maybury and A. G. Parham *et al.*, Nucl. Phys. B **222**, 389 (1983).
- [21] J. J. Jones, T. Bowen, W. R. Dawes, D. A. Delise, E. W. Jenkins, R. M. Kalbach, E. I. Malamud and K. J. Nield *et al.*, Phys. Rev. Lett. **26**, 860 (1971).
- [22] O. Van Dyck, R. Blumenthal, S. Frankel, V. Highland, J. Nagy, T. Sloan, M. Takats and W. Wales *et al.*, Phys. Rev. Lett. **23**, 50 (1969).
- [23] J. Keren, Phys. Rev. **133**, B457 (1964).
- [24] F. Eisler *et al.*, Nuovo Cim. **10**, 468 (1958).

- [25] D. H. Miller, A. Z. Kovacs, R. McIlwain, T. R. Palfrey, and G. W. Tautfest, Phys. Ref. **140**, B360 (1965).
- [26] A. Baldini, V. Flaminio, W. G. Moorhead, and D. R. O. Morrison, *Total Cross Sections of High Energy Particles: Landolt-Börnstein, Numerical Data and Functional Relationships in Science and Technology*, edited by H. Schopper (Springer-Verlag, New York, 1988), Vol. 12a.
- [27] R. D. Baker, J. A. Blissett, I. J. Bloodworth, T. A. Broome, J. C. Hart, V. K. Magon, R. Maybury and A. G. Parham *et al.*, Nucl. Phys. B **145**, 402 (1978).
- [28] J. C. Hart, R. D. Baker, K. W. Bell, J. A. Blissett, I. J. Bloodworth, T. A. Broome, A. L. Lintern and V. J. Magon *et al.*, Nucl. Phys. B **166**, 73 (1980).
- [29] J. A. Anderson, F. S. Crawford, Jr., and J. C. Doyle, Phys. Rev. **152**, 1139 (1966).
- [30] D. W. Thomas, A. Engler, H. E. Fisk and R. W. Kraemer, Nucl. Phys. B **56**, 15 (1973).
- [31] P. Livanos, J. P. Baton, C. Coutures, C. Kochowski and M. Neveu, Contribution presented at 4th Int. Conf. on Baryon Resonances, Toronto, Canada, Jul 14-16, 1980. Published in Baryon 1980:35.
- [32] M. L. Good and R. R. Kofler, Phys. Rev. **183**, 1142 (1969).
- [33] J. C. Doyle, F. S. Crawford and J. A. Anderson, Phys. Rev. **165**, 1483 (1968).
- [34] F. S. Crawford, Jr. *et al.*, Phys. Rev. Lett. **3**, 394 (1959).
- [35] D. J. Candlin *et al.*, Nucl. Phys. B **226**, 1 (1983).
- [36] D. J. Candlin *et al.* [Edinburgh-Rutherford-Westfield Collaboration], Nucl. Phys. B **238**, 477 (1984).
- [37] D. J. Candlin *et al.*, Nucl. Phys. B **311**, 613 (1989).
- [38] R. A. Arndt, W. J. Briscoe, I. I. Strakovsky and R. L. Workman, Phys. Rev. C **74**, 045205 (2006).
- [39] R. L. Workman, R. A. Arndt and M. W. Paris, Phys. Rev. C **79**, 038201 (2009).
- [40] M. Winik, S. Toaff, D. Revel, J. Goldberg and L. Berny, Nucl. Phys. B **128**, 66 (1977).
- [41] N. L. Carayannopoulos, G. W. Tautfest and R. B. Willmann, Phys. Rev. **138**, B433 (1965).
- [42] C. Baltay et al., Rev. Mod. Phys. **33**, 374 (1961).
- [43] F. S. Crawford, F. Grard and G. A. Smith, Phys. Rev. **128**, 368 (1962).
- [44] E. H. Bellamy *et al.*, Phys. Lett. B **39**, 299 (1972).
- [45] P. Livanos, J. P. Baton, C. Coutures, C. Kochowski and M. Neveu, Contribution presented at 4th Int. Conf. on Baryon Resonances, Toronto, Canada, Jul 14-16, 1980. Published in Baryon 1980:35.
- [46] J. Haba *et al.*, Nucl. Phys. B **299**, 627 (1988).
- [47] A. Berthelot, A. Daudin, O. Goussu, F. Gard, M. A. Jabiol, F. Levy, C. Lewin, A. Rogozinski, J. Laberrigue-Frolow and C. Ouannés *et al.*, Nuovo Cim. **21**, 693 (1961).
- [48] A. Berthon, J. Mas, J. L. Narjoux and P. Ladron De Guevara, Nucl. Phys. B **81**, 431 (1974).
- [49] G. E. Kalmus, G. Borreani and J. Louie, Phys. Rev. D **2**, 1824 (1970).
- [50] P. Daronian *et al.*, Nuovo Cim. **41A**, 503 (1966).
- [51] Y. -L. Pan, F. L. Forman, W. Ko, V. Hagopian and W. Selove, Phys. Rev. D **2**, 449 (1970).
- [52] S. Dagan, Z. Ming Ma, J. W. Chapman, L. R. Fortney and E. C. Fowler, Phys. Rev. **161**, 1384 (1967).
- [53] R. Kraemer *et. al.*, Phys. Rev. **136**, B496 (1964).
- [54] J. S. Danburg *et. al.*, Phys. Rev. D **2**, 2564 (1970).
- [55] J. Keyne *et. al.*, Phys. Rev. D **14**, 28 (1976).
- [56] H. Karami *et. al.*, Nucl. Phys. B **154**, 503 (1979).
- [57] D. M. Binnie *et. al.*, Phys. Rev. D **8**, 2789 (1973).