

# Bibliography

- [1] E. C. G. Sudarshan and R. E. Marshak, Proc. Padua-Venice Conf. on Mesons and Recently Discovered Particles (1957); Phys. Rev. **109** (1958) 1860; R. P. Feynman and M. Gell-Mann, Phys. Rev. **109** (1958) 193; J. J. Sakurai, Nuovo Cimento **7** (1958) 649.
- [2] E. Fermi, Nuovo Cimento **11** (1934) 1; Z. Phys. **88** (1934) 161.
- [3] S. L. Glashow, Nucl. Phys. **22** (1961) 579; A. Salam and J. C. Ward, Phys. Lett. **13** (1964) 168; S. Weinberg, Phys. Rev. Lett. **19** (1967) 1264.
- [4] For a detailed exposition see e.g. R. E. Marshak, Riazuddin and C. P. Ryan, '*Theory of Weak Interactions in Particle Physics*', Wiley Interscience (1968).
- [5] W. Pauli, Proc. VII Solvay Congress, Brussels (1933), p. 324, Gauthier-Villars, Paris.
- [6] J. Goldstone, Nuovo Cimento **19** (1961) 154.
- [7] P. W. Higgs, Phys. Lett. **12** (1964) 132; *ibid.* **13** (1964) 508; Phys. Rev. **145** (1966) 1156. F. Englert and R. Brout, Phys. Rev. Lett. **13** (1964) 321. G. S. Guralnik, C. R. Hagen and T. W. Kibble, Phys. Rev. Lett. **13** (1964) 585. T. W. Kibble, Phys. Rev. **155** (1967) 1554.
- [8] N. Cabibbo, Phys. Rev. Lett. **10** (1963) 531. M. Kobayashi and K. Maskawa, Prog. Theor. Phys. **49** (1973) 652.
- [9] S. Maiani, Phys. Lett. **B 62** (1976) 183; Proc. 1977 Lepton-Photon Symp. (Hamburg) p.867.
- [10] W. J. Marciano and A. Sirlin, BNL preprint, BNL-39658 (1987).

- [11] ARGUS Collaboration, H. Albrecht *et al.* Phys. Lett. **B** **192** (1987) 245.
- [12] J. R. Cudell, F. Halzen, X. G. He and S. Pakvasa, University of Wisconsin, Madison preprint no. MAD/PH/376 (1987).
- [13] Review of Particle Properties, Particle Data Group, Phys. Lett. **B** **239** (1990), 1.
- [14] E. H. Thorndike, Proc. 1985 Lepton-Photon Symp (Kyoto). S. Behrends *et al.* Phys. Rev. Lett. **59** (1987) 407.
- [15] J. Gasser and H. Leutwyler, Phys. Rep. **87** (1987) 77 and the references quoted therein.
- [16] UA1 Collaboration, S. Geer in EPS Conference on High Energy Physics, Uppsala (1987).
- [17] CDF Collaboration, C. Campagnari in Proc. 25th. International Conf. on High Energy Physics, Singapore (1990).
- [18] U. Amaldi *et al.*, University of Pennsylvania preprint no. UPR-0331T (1987).
- [19] G. Lüders, Kgl. Danske Videnskab. Selskab. Matfys. Medd. **28(5)** (1954) 1.  
W. Pauli, *Niels Bohr and the Development of Physics* ed. W. Pauli, Pergamon (1955).
- [20] J. H. Christenson, J. W. Cronin, V. L. Fitch and R. Turlay, Phys. Rev. Lett. **13** (1964) 138.
- [21] A. Datta and E. A. Paschos in *CP Violation* ed. C. Jarlskog, World Scientific (1989).
- [22] T. Devlin and J. Dickéy, Rev. Mod. Phys. **54** (1979) 237.
- [23] H. Burkhardt *et. al.*, Phys. Lett. **B** **206** (1988) 169.
- [24] B. Winstein (E731 Collaboration) in Proc. 1989 Int. Symp. on Lepton Photon Interactions at Hgh Energies, ed. M. Riordan (World Scientific, 1990).
- [25] V. M. Lobashov *et al.*, Phys. Lett. **B** **25** (1967) 104.

- [26] E. M. Henley, Ann. Rev. Nucl. Sci. **19** (1969) 367. K. Kleinknecht, Ann. Rev. Nucl. Sci. **26** (1976) 1.
- [27] F. J. Gilman and M. B. Wise, Phys. Rev. D **27** (1983) 1128.
- [28] A. J. Buras and J. M. Gerard, Max Planck Institute, Munich preprint no. MPI-PAE/PTh 84/87 (1987).
- [29] B. Stech, Phys. Lett. B **130** (1983) 189.
- [30] M. Gronau and R. N. Mohapatra, Phys. Lett. B **168** (1986) 248; G. Ecker and W. Grimus, Phys. Lett. B **153** (1985) 279.
- [31] A. Kagan, R. N. Mohapatra and P. B. Pal, Phys. Rev. Lett. **59** (1987) 2005.
- [32] H. Fritzsch, Phys. Lett. B **70** (1977) 436; Phys. Lett. B **73** (1987) 317.
- [33] M. Shin, Phys. Lett. B **145** (1984) 285.
- [34] M. Gronau, R. Johnson and J. Schechter, Phys. Rev. Lett. **54** (1985) 2176.  
R. Johnson, S. Ranfone and J. Schechter, Phys. Rev. D **35** (1987) 282.
- [35] D. Choudhury and U. Sarkar, Phys. Lett. B **217** (1989) 341.
- [36] H. Harari and Y. Nir, Phys. Lett. B **195** (1987) 586. Y. Nir, Nucl. Phys. B **306** (1983) 14.
- [37] F. Halzen, C. S. Kim and S. Pakvasa, University of Wisconsin, Madison preprint no. MAD/PH/394 (1987).
- [38] D. Choudhury and U. Sarkar, Phys. Rev. D **39** (1989) 3425.
- [39] M. Gronau, A. Kfir and R. Loewy, Phys. Rev. Lett. **56** (1986) 1538; C. Jarlskog, Phys. Rev. D **36** (1987) 2128; M. Gronau and R. Loewy, Phys. Rev. D **39** (1987) 986(C); C. Jarlskog, Phys. Rev. D **36** (1989) 988(C).
- [40] E. Majorana, Nuovo Cimento **14** (1937) 170.
- [41] J. Schechter and J. W. F. Valle, Phys. Rev. D **23** (1981) 1666.
- [42] B. Pontecorvo, Zh. Eksp. Teor. Fiz. **33** (1957) 549 [Sov. Phys. -JETP **6** (1958) 429]; *ibid.* **34** (1958) 247.

- [43] R. Davis *et al.*, Phys. Rev. Lett. **20** (1968) 1205; J. K. Rowley, B. T. Cleveland and R. Davis in *Solar Neutrinos and Neutrino Astrophysics*, AIP Conf. Proc. No. 126, p. 1 (1985); J. N. Bahcall *et al.*, Astrophys. J. **292** (1985) L79. K. S. Hirata *et al.*, Phys. Rev. Lett. **63** (1989) 16.
- [44] J. N. Bahcall *et al.*, Rev. Mod. Phys. **54** (1982) 767.
- [45] L. Wolfenstein, Phys. Rev. D **17** (1978) 2369; Phys. Rev. D **20** (1979) 2634.
- [46] S. P. Mikheyev and A. Yu. Smirnov, Yad. Fiz. **42** (1985) 1441 [Sov. Jour. Nucl. Phys. **42** (1985) 913]; H. Bethe, Phys. Rev. Lett. **56** (1986) 1305.
- [47] R. Davis, Proc. of "Neutrino 88", Boston, June 1988; P. Raychaudhuri, Mod. Phys. Lett. **A 3** (1988) 1319.
- [48] Ya. B. Zeldovich, Dok. Akad. Nauk. SSSR **86** (1952) 505; E. J. Konopinsky and H. Mahmoud, Phys. Rev. **92** (1953) 1045.
- [49] G. Racah, Nuovo Cimento **14** (1937) 322.
- [50] W.H. Furry, Phys. Rev. **56** (1939) 1184.
- [51] L. Wolfenstein, Phys. Lett. B **107** (1981) 77.
- [52] L. Wolfenstein, Nucl. Phys. B **186** (1981) 147; D. Wyler and L. Wolfenstein, Nucl. Phys. B **218** (1983) 205.
- [53] D. Choudhury and U. Sarkar, Phys. Rev. D **41** (1990) 1591.
- [54] S. M. Bilenky and S. T. Petcov, Rev. Mod. Phys. **59** (1987) 671.
- [55] M. Gell-Mann *et al.*, in *Supergravity*, eds. P. van Nieuwenhuizen and D. Z. Freedman (North-Holland, 1979) p.315; T. Yanagida, Progr. Theor. Phys. **64** (1980) 1103.
- [56] To be precise, they are pseudo-Dirac if  $m' \neq 0$ . In this case the symmetry of the mass matrix is not the symmetry of the Lagrangian and radiative corrections generate a small mass difference. For details, see W. Pauli, Nuovo Cimento **6** (1957) 204; C. Leung and S. T. Petcov, Phys. Lett. B **125** (1985) 461. Also see Refs. [52] and [54].

- [57] P. Roy *et al.*, Phys. Rev. Lett. **52** (1984) 713; Phys. Rev. **D 30** (1984) 1949; Phys. Lett. **B 150** (1985) 270.
- [58] M. Roncadelli and D. Wyler, Phys. Lett. **B 133** (1983) 325. For an overview, see U. Sarkar, in *Standard Model and Beyond* eds. D. P. Roy and P. Roy (World Scientific, 1989).
- [59] V. A. Lubimov, XXIIth. Int. Conf. on High Energy Physics, eds. A. Meyer and E. Wieczorek (Akad. der Wiss. der Deutsche Democratiche Republic, Zeuthen, 1984) Vol II, p 108. S. Boris *et al.*, Phys. Lett. **B 159** (1985) 217.
- [60] D. O. Caldwell *et al.*, in *Int. Symp. on Weak and Electromagnetic Interactions in Nuclei*, Heidelberg, eds. Klapdor and J. Metzinger (Springer, Berlin 1986) p. 686.
- [61] Although phenomenological models were discussed where contributions of various Majorana neutrinos to  $(\beta\beta)_{0\nu}$  cancel each other (see for example, M. Dugan *et al.*, Phys. Rev. Lett. **55** (1985) 170; P. Langacker *et al.*, Nucl. Phys. **B 266** (1986) 669.), none of them arise naturally.
- [62] J. J. Simpson, Phys. Rev. Lett. **54**, 1891 (1985); J. J. Simpson and A. Hime, Phys. Rev. **D 39**, 1825 (1989); *ibid*, 1837; A. Hime and N. A. Jelley, Oxford preprint (1990).
- [63] B. Sur *et al.*, Berkeley preprint (1990).
- [64] An extension of the models considered in J. Maalampi and J. Pulido, Nucl. Phys. **B 228** (1983) 242 can give such a hierarchy.
- [65] M. Dugan *et al.*, Phys. Rev. Lett. **54** (1985) 2302; S. Glashow and A. Manohar, Phys. Rev. Lett. **54** (1985) 2306; A. S. Joshipura, Institute of Mathematical Sciences preprint no. IMSc/TP/85 -005 (1985, unpublished).
- [66] D. Choudhury and U. Sarkar, Phys. Lett. **B 235** (1990) 113.
- [67] M. B. Voloshin, M. I. Vysotskii and L. Okun, Yad. Fiz. **44** (1986) 677 [Sov. J. of Nucl. Phys. **44** (1986) 440].

- [68] R. Barbieri and R. N. Mohapatra, Phys. Rev. Lett. **61** (1988) 27; J. Lattimer and J. Cooperstein, Phys. Rev. Lett. **61** (1988) 23; I. Goldman et al., Phys. Rev. Lett. **60** (1988) 1789; D. Notholz, Max Planck Preprint (1988).
- [69] M. Voloshin, Sov. J. of Nucl. Phys. **48** (1988) 512.
- [70] R. Barbieri and R. N. Mohapatra, Phys. Lett. **B 218** (1989) 225; J. Liu, Phys. Lett. **B 225** (1989) 148.
- [71] K. S. Babu and R. N. Mohapatra, Phys. Rev. Lett. **63** (1989) 228.
- [72] D. Choudhury and A. Raychaudhuri, Proc. Topical Meeting on *CP* Violation, Calcutta (1990).
- [73] E. Kh. Akhmedov, Phys. Lett. **B 213** (1988) 64.
- [74] D. Choudhury, M. V. N. Murthy and N. D. Hari Dass, Classical and Quantum Gravity **6** (1989) L167.
- [75] K. J. F. Gaemers, R. Gandhi and J. M. Lattimer, Phys. Rev. **D 40** (1989) 309.
- [76] L. D. Landau and E. M. Lifschitz, *The Classical Theory of Fields* (Pergamon Press, New York) (1988) p 304.
- [77] N. D. Hari Dass, Phys. Rev. Lett. **36** (1976) 393.
- [78] N. D. Hari Dass, Ann. Phys. NY **107** (1977) 337.
- [79] M. B. Voloshin, Phys. Lett. **B209** (1988) 360.
- [80] D. Dicus, E. Kolb and V. Teplitz, Phys. Rev. Lett. **39** (1977) 169.
- [81] S. L. Glashow, Harvard preprint, HUTP-90/A075 (1990).
- [82] K. S. Babu and R. N. Mohapatra, Maryland preprint UMD-PP-91-186 (1991); R. Foot and S. F. King, Highfield preprint SHEP 90/91-18 (1991); A. Acker, S. Pakvasa and J. Pantaleone, Hawaii preprint UH-511-719-91 (1991); K. Choi and A. Santamaria, San Diego preprint UCSD/PTH 91/01 (1991); A. S. Joshipura, PRL preprint PRL-TH/91-06 (1991); X-G. He,

CERN preprint CERN-TH.6013/91 (1991); M. K. Samal and U. Sarkar, PRL preprint PRL-TH/91-09.

- [83] Y. Chikashige, R. N. Mohapatra and R. Peccei, Phys. Rev. Lett. **39**, 169 (1981).
- [84] D. Choudhury and U. Sarkar, PRL preprint PRL-TH/91-10 (1991) (communicated to Phys. Rev. Lett.).
- [85] R. Foot, G. C. Joshi, H. Lew and R. R. Volkas, Mod. Phys. Lett. **A** **5** (1990) 95; Erratum, *ibid*, 2085; K. S. Babu and R. N. Mohapatra, Phys. Rev. **D** **41**, (1990) 271.
- [86] J. E. Kim, Phys. Rept. **149** (1987) 1.