



# A Modern Introduction to Particle Physics

By Fayyazuddin, Riazuddin

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Most of the progress made in particle physics during the last two decades has led to the formulation of the so called “Standard Model” of elementary particles and its quantitative experimental test. The book deals with this progress but includes chapters which provide the necessary background material to modern particle physics. Particle physics forms an essential part of physics curriculum. This is a textbook but will also be useful for people working in this field and for nuclear physicists, particularly those who work on topics concerning interface between nuclear and particle physics. The book is designed for a semester course for senior undergraduates and a semester course for graduate students. Formal quantum field theory is not used; a knowledge of non-relativistic quantum mechanics is required for some parts of the book; but for the remaining parts the familiarity with the Dirac equation is essential. However, some of these topics are included in the appendix.

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### **Review**

"I consider this book to be a must for all those who are beginning the study of electroweak theory and quark models. The book is a must because in their unique fashion, Riazuddin, together with his younger twin brother, Fayyazuddin, have given us an up to date perspective of particle physics ..." A Salam ICTP "This book is a good text or supplement for a graduate particle physics course that covers a wide range of phenomena without going deeply into field theory methods. ... A Modern Introduction to Particle Physics uses Feynman diagram rules and proceeds from there. The presentation is fairly complete and easy to follow ... The book is also an excellent reference for the practicing physicist X theorist or experimenter X and a source for learning about different areas of particle physics. In most chapters, calculations are given for important experiments relevant to the presented theory and recent data are discussed. Each chapter has a good bibliography, includes references to other texts, classic papers, reviews, summer-school lectures and recent papers. Especially useful for a course are the problems given at the end of many chapters; most introductory particle physics texts lack these. The first six chapters give a good treatment of the basic quark model and in addition include Young's tableau for tensor representations in group theory, scattering cross sections (including the helicity formalism), discrete symmetries and SU(6). The electroweak unification and Higgs mechanism are of course covered, and so also are W, Z and Higgs physics and searches. The authors discuss particle mixing and CP violation with thoroughness, explicitly defining the various asymmetries and deriving their results. The unitarity triangle and p- O plots are defined, and B mesons are discussed along with the standard K meson treatment. Several more of the many current topics covered, often as full chapters, are radiative corrections, the triangle anomaly, grand unified theories (but not supersymmetry), heavy flavors, quarkonium, Dirac and Majorana neutrinos, the Mikheyev-Smirnov-Wolfenstein mixing effect, cosmology, baryon asymmetry and inflation. An appendix contains a translation between the Euclidean four-vector and the Pauli representation for the Dirac matrices used in the text, and the Minkowski four-vector and the Bjorken-Drell choice for the Dirac matrices, making the conventions largely irrelevant. With the large amount of material covered in the book, the instructor will have a conveniently wide latitude when designing his or her course. Although the authors claim the book could be used for a one-semester course, there is enough material for a two-quarter or year-long course. In summary, this book deals with many of the most current topics, yet with a simplicity of presentation that will please both instructors and students." Physics Today, 1994

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