

Elementary Particles I

Organisation, Contents, Literature

Academic Year 2009-2010

Logistics & Human Resources

Time

Monday 9-11, Tuesday 11-13 Lectures

Friday 11-13 Exercises

But: Watch for changes..

Place

Sala Franzinetti - 3rd Floor "New" Building

People

E.Menichetti – Lectures

menichetti@to.infn.it <http://www.ph.unito.it/~menichet/>

S.Argiro' – Exercises

argiro@to.infn.it <http://www.ph.unito.it/~argiro/>

Organisation

6 CFU Course ~ 48 h

Student Assistance

Feel free to contact EM, SA when needed

Exam Requirements

Oral examination (Will include an exercise to be solved at the blackboard)

Exam Dates

Monthly upon request, except December, April, May, August

Course Web Page

<http://www.ph.unito.it/~menichet/PARTICELLE1.html>

Background

Required familiarity with:

Special Relativity

Quantum Mechanics

Electricity & Magnetism

Introductory Nuclear & Particle Physics

Well advised students will find useful to take courses on

Accelerators and Detectors

Relativistic Kinematics and Scattering

Relativistic Quantum Mechanics

Introductory Quantum Field Theory

Contents

Symmetries Symmetry in Quantum Mechanics, Invariance and Conservation, Discrete Symmetries, C,P,T, Continue Symmetries, Groups, Representations

Electromagnetic Interaction Form Factors, Structure Functions, Scaling, Partons

Strong Interaction Isospin, Strangeness, Resonances, SU(2), SU(3)

Quarks Quark Model, Light Quarks, Mesons, Baryons, Heavy Quarks, Quarkonium

QCD Color, Color Gauge Theory, Gluons, Color Interaction, Asymptotic Freedom, Confinement

Weak Interaction Beta Decay, Neutrinos, P and C Violation, Current-Current Lepton Interaction, Extension to Quarks, Cabibbo Angle, GIM, Neutral Currents

Literature

Among the huge amount of material available in the Library or across the Web, you will find rewarding to spend some (a lot of?) time on these introductory, well written and entertaining books:

Author(s)	Title	One word comment
Bettini	<i>Introduction to Elementary Particle Physics</i>	Original
Braibant et al. (in Italian)	<i>Particelle e Interazioni Fondamentali</i>	Experimental
Burcham and Jobes	<i>Nuclear and Particle Physics</i>	Detailed
Halzen and Martin	<i>Quark and Leptons</i>	Condensed
Griffiths	<i>Introduction to Elementary Particles</i>	Conceptual
Mann	<i>An Introduction to Particle Physics and the Standard Model</i>	Modern
Morpurgo (in Italian)	<i>Introduzione alla Fisica delle Particelle</i>	Deep

More textbooks and references to be found in the course web page

Do not forget the Particle Data Group book(let) and Web site

<http://pdg.lbl.gov/>

You may find it somewhat difficult to navigate at the beginning, but definitely worth your effort

Disclaimer

While the whole framework and text result from my understanding and wording of the subject, it should be clearly stated that many different sources of data and pictures have been freely used in preparing these slides, as well as the accompanying, typewritten notes.

Since this process has taken a fairly long time during several years, it is now unfortunately impossible to acknowledge individual authorships.

Where appropriate, I have posted pictures with the sign “© TBA” (=To Be Acknowledged) in order to remind readers of the situation. I hope this solution is acceptable to all involved parties, given the limited circulation foreseen for this provisional, free-of-charge material.

Needless to say, while thanking collectively my colleagues for providing the materials, I should stress that all mistakes found are my own glory.