

# Elementary Particles I

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Organisation, Contents, Literature

Academic Year 2009-2010

# Logistics & Human Resources

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## Time

Monday 9-11, Tuesday 11-13 Lectures

Friday 11-13 Exercises

But: Watch for changes..

## Place

Sala Franzinetti - 3<sup>rd</sup> Floor "New" Building

## People

E.Menichetti – Lectures

[menichetti@to.infn.it](mailto:menichetti@to.infn.it) <http://www.ph.unito.it/~menichet/>

S.Argiro' – Exercises

[argiro@to.infn.it](mailto:argiro@to.infn.it) <http://www.ph.unito.it/~argiro/>

# Organisation

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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

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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

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**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

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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

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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.