Elementary Particles II

Organization, Contents, Literature

Academic Year 2012-2013

Logistics & Human Resources

Time

Monday 11-13, Wednesday 14-16, Friday 9-11

But: Watch for changes..

Place

Aula Avogadro - 3rd Floor "New" Building

People

E.Menichetti – Lectures

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

Organisation

6 CFU Course ~ 48 h

Exam Requirements

Oral examination (Will include a 20’ oral presentation on some agreed subject)

Exam Dates

Upon individual request

Course Web Page

http://www.ph.unito.it/~menichet/PARTICELLE2.html

Background

Required basic familiarity with:

[Special Relativity
Quantum Mechanics
Electricity & Magnetism
Relativistic Quantum Mechanics
Introductory Nuclear & Particle Physics]

Accelerators and Detectors
Introductory Quantum Field Theory
First Half of Elementary Particle Physics

Contents

QCD

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

Electroweak Interaction

Fermi Theory, Unitarity Violations, Intermediate Vector Boson, Neutral Currents, Spontaneous Symmetry Breaking, Electroweak Unification, Discovery of W and Z, Tests of the Standard Model

To be decided

Literature

Author(s)	*Title*	*One word comment*
General textbooks:		
Bettini	*Introduction to Elementary Particle Physics*	Original
Burcham and Jobes	*Nuclear and Particle Physics*	Detailed
Halzen and Martin	*Quark and Leptons*	Condensed
Griffiths	*Introduction to Elementary Particles*	Conceptual
Leader and Predazzi	*An Introduction to Gauge Theories and Modern Particle Physics, voll. 1 e 2*	Complete
Seiden	*Particle Physics A Comprehensive Introduction*	Modern
Morpurgo (in Italian)	*Introduzione alla Fisica delle Particelle*	Deep
Nagashima	*Elementary Particle Physics*	Global
Single subject books: (Mostly) Theory		
F.J. Yndurain	*The Theory of Quark and Gluon Interactions*	Detailed
J. Horejsi	*Fundamentals of Electroweak Theory*	Clear
Single subject books: (Mostly) Experiment		
G.Dissertori et al.	*Quantum Chromodynamics: High Energy Experiments and Theory*	Modern
R.Tenchini et al.	*The Physics of the Z and W Bosons*	Modern
Most useful single book (Phenomenological):		
C.Quigg	*Gauge Theories of the Strong, Weak, and Electromagnetic Interactions*	

Key Points

Same guidelines as for the first half-course:

Little interference with the (many) theoretical courses

'Experimental/Phenomenological', whatever it means

Difficult task (for both students *and* teacher):

Experimental particle physics notoriously difficult to either teach or learn in a classroom

Today's large, 'partonic' experiments and machines operating conditions quite far from common experience, filled with extreme technology, sometimes hard to understand at first contact

Goal definitely worth the effort: ***Exploration, Validation and Extension of the SM***
One of the most exciting intellectual challenges/time killers available on the market