Elementary Particles II

Organization, Contents, Literature

Academic Year 2015-2016

Logistics & Human Resources

Time

- Monday 11-13, Wednesday 16-18, Friday 9-11
- But: Watch for changes..

Place

- Aula Wick – Monday
- Sala Castagnoli – Wednesday
- Aula Avogadro – Friday

People

- E.Menichetti – Lectures

Organization

6 CFU Course ~ 48 h

Exam Requirements

Oral examination

(Will include a 15' oral presentation on some agreed subject)

Exam Dates

Upon individual request

Course Web Page

http://www.ph.unito.it/~menichet/Particelle2-1516.html

Background

Required basic familiarity with:

[Special Relativity
Quantum Mechanics
Introductory Nuclear & Particle Physics]

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

Contents

QCD

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

Electroweak Interaction

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

To be decided among:

Higgs, Neutrinos, Quarkonia, BSM

Literature

Author(s)	*Title*	*One word comment*
General textbooks:		
Braibant et al.	*Particles and Fundamental Interactions*	Experimental
Burcham and Jobes	*Nuclear and Particle Physics*	Detailed
Halzen and Martin	*Quark and Leptons*	Condensed
Leader and Predazzi	*An Introduction to Gauge Theories and Modern Particle Physics, voll. 1 e 2*	Complete
Seiden	*Particle Physics A Comprehensive Introduction*	Modern
Nagashima	*Elementary Particle Physics, voll. 1 ,2* , 3	Global
Thomson	*Modern Particle Physics*	Modern
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 (Theoretical):		
Quigg	*Gauge Theories of the Strong, Weak, and Electromagnetic Interactions – 2nd ed.*	Pedagogical
Most useful single book (Experimental):		
Bettini	*Introduction to Elementary Particle Physics*	Original

Key Points

Guidelines:

Little interference with the (many) theoretical courses
'Experimental/Phenomenological', whatever it means

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

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

Today's large experiments and machines operating conditions are 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