PH5211 - High Energy Physics

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Abstract

Instructor :James Libby (HSB 116A) **Lecture Timings** : E Slot (Tue – 11am, Wed – 10am, Thu - 8am)
Venue : HSB 210
Course Outline:

1. Nuclear Physics
2. Elementary Particle Properties
3. Particle Dynamics
4. Particle accelerators and detectors

Textbooks :

1. Introductory Nuclear Physics, Kenneth S. Krane, Wiley India Pvt Ltd.
2. Introduction to High Energy Physics, Donald H. Perkins, Cambridge.
3. Introduction to Elementary Particles, 2nd Edition, David Griffiths, Wiley-VCH.
4. Refer to Syllabus for more text books.

Evaluation :

1. **Problem sets** (10 marks): one question of three or four will be selected for marking - best ten of eleven will be averaged to give the grade.
2. **Quiz I** (20 marks): 8am Thursday 1st of September
3. **Quiz II** (20 marks): 8am Thursday 29th of October
4. **End - Semester** (50 marks): 1pm-4pm Friday 18th of November CRC 303

Contents

Chapter 1

Introduction

Lecture 1: First Lecture

1.1 Overview

So far you have worked at order of 10^{-10}
We are going to work at order of $10^{-15} = 1fm$

- Nuclear Physics: Strong and weak interactions.
- Particle Properties: Welcome to the zoo.
- Particle dynamics: how things happen.
- Introduce accelerators + detectors.

1.2 Nomenclature

$$^{A}_{Z}X_{N}$$

X = H, He, Li ...
Z = Atomic Number = No. of protons

1.2.1 Magnetic moments

$$\bar{\mu} = \frac{e\bar{h}}{2m_p}\bar{l}$$

$$n : \bar{\mu} = 0$$

$$p : \bar{\mu} = \mu_n \bar{l}$$

where μ_n = nuclear magneton**Intrinsic spin**

$$\bar{\mu} = g_s \bar{s} \mu_N$$

However

$$proton \Rightarrow g_s = 5.59$$

$$neutron \Rightarrow g_s = -3.82$$

Appendix