

* GROUP THEORY

NO EXAM
NO TUTORIAL

PROBLEM SETS (ca. EVERY TWO WEEKS or so...)

15/04/15

• INTRODUCTION

Symmetry

- guiding principle to device models of physical systems.
- special / general relativity postulated from symm. considerations
- particle spectrum of SM is governed by gauge group:
 $SU(3) \times SU(2) \times U(1)$

- symmetries can be used to solve theories.

Noether theorem: continuum symm.,

↕
integrals of motion
conserved charges

example: spectrum of H-atom is fixed by representation theory

Mathematical tool to study symmetries:

Group + Representations

Aim: introduction to group theory / representation theory

► Topics covered:

- ABSTRACT GROUPS
- REPRESENTATION THEORY
- FINITE GROUP (S_n)
- LIE GROUPS / -ALGEBRAS ($SU(n)$, POINCARÉ GROUP)
- PROJECTIVE REPRESENTATION (central extension)
→ QM setup (explain occurrence of $SU(2)$)
- (• CLIFFORD ALGEBRA)

► Literature:

- Fulton-Harris • Representation theory.
- Hamermestrn. Group Theory and its application.
- Ma • Group Theory for Physicists.
- Tung • Group Theory in Physics.
- Burns • Introduction to group theory.
- Fuchs - Schweigert. Symmetries, Lie algebras.
- Knapp • Lie groups beyond an introduction.