* GROUP THEORY

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○ 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: continium symm.
$$\updownarrow$$
integrals of motion
conserved charges

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

Mathematical tool to study symmetries:

| Group + Representations |

<u>Aim</u>: introduction to group theory / representation theory

▶ <u>Topics covered</u>:

- ○ ABSTRACT GROUPS

- ○ REPRESENTATION THEORY

- ○ FINITE GROUP (S_n)

- ○ LIE GROUPS / -ALGEBRAS (SU(n), POINTCARÉ GROUP)

- ○ PROJECTIVE REPRESENTATION (central extension)

    → QM setup (explain ocurrance of SU(2))

   (• CLIFFORD ALGEBRA)

▶ <u>Literature</u>:

- 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.