

PHY690J: Group Theory and its application to High Energy Physics
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Topics

1. Discrete groups
2. Lie group :
 - (A) Character and Haar measure
 - (B) Young Tableaux
- (i) Compact connected groups: $U(1)$, $SU(N)$, $Spin(2N)$, $Spin(2N+1)$, $Sp(2N)$
- (ii) Non-compact group: Lorentz group
3. Representation Theory:
 - (A) Roots, Weights, Cartan matrix, Dynkin diagrams
 - (B) Embeddings and Branching Rules.
 - (C) Gauge Theory
4. Invariant Polynomial construction: path to Lagrangian
5. Grand Unified Theory
6. Spinors and helicity Amplitude

Prerequisites

Quantum Field Theory-I, Particle physics, Mathematical Methods-I+II.

References

- (1) Rubakov: Classical Theory of Fields.
- (2) Dixon: A brief Introduction to Modern Amplitude Methods.
- (3) Slansky: Group Theory for unified model building.