In this lecture, symmetry and conservation law are applied to derive wave functions for elementary particles. Relativistic wave functions are analysed and applied for massive and massless particles. Different ideas on antiparticles are explored.

- Introduction to general concepts commonly used in atomic, nuclear and elementary particle physics.
- Symmetry principles.
- Description of forces.
- Scalar, spinor and vector field
- Relativistic wave function

Learning Prerequisites

Required courses
Quantum Mechanics
Electrodynamics
Special relativity

Recommended courses
Nuclear and particle physics

Important concepts to start the course
Symmetry and conservation
Lorentz invariance
Spin and statistics

Learning Outcomes

By the end of the course, the student must be able to:
- Sketch the basic concept of symmetry and conservation law
- Apply various hypotheses to a given problem

Transversal skills
• Assess one's own level of skill acquisition, and plan their on-going learning goals.

**Teaching methods**
Ex cathedra, exercises in class and assignment presentation

**Expected student activities**
Solving problems given as exercises

**Assessment methods**
Evaluating the Interaction during the courses

**Resources**
**Notes/Handbook**
Lecture notes and problems are handed out prior to the course