

1. Course title: Quantum Field Theory – I

Instructors: Prof. Koushik Ray & Prof. Pushan Majumdar

Day & Time: Every Tuesday & Thursday from 2:30 p.m. - 4:00 p.m.

Tutorial every Friday from 2:30 p.m. - 3:30 p.m.

Venue: Seminar Room No. C406, Centenary Building

Course starting date: July 25, 2017

Course content:

Irreducible representations of the Lorentz group, connection to quantum fields. Symmetries and conservation laws: examples in relativistic field theories; translation, rotation, Lorentz boost/Galilean transformation and internal symmetry transformations; associated conserved charges.

Gaussian integrals & power series expansion, Path integrals in Quantum Mechanics & Feynman diagrams.

Classical Field Theory, symmetries and Noether's theorems. Functional differentiation & integration (free scalar, vector & spinor). Quantization of vector fields (Faddeev Popov). Green functions in functional integrals. Interacting scalar field theories. Dyson-Schwinger & Ward identities. Evaluation of Feynman diagrams (using dimensional regularization). Representation of Poincare group & classification of fields according to spin. Quantum Electrodynamics (QED) – 1-loop renormalization. Beta function and Landau pole in QED.