



INTRODUCTION TO QUANTUM FIELD THEORY (THEORY OF SCALAR FIELDS)

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PRE-REQUISITES : Quantum Mechanics and Classical Mechanics at MSc Physics level, Classical Electrodynamics.

INTENDED AUDIENCE : MSc. Physics and PhD students.; Btech students of Engineering Physics/ Electrical Engineering in their final years will also find it useful.

ABOUT INSTRUCTOR:

Prof. Anurag Tripathi is Assistant Professor in the Department of Physics at IIT Hyderabad since 2015 and his area of research is Theoretical High Energy Physics. For more details visit <https://www.iith.ac.in/~tripathi/>.

COURSE PLAN :

Week 1: Theory of Classical Fields, Lagrangian, Hamiltonian

Week 2: Theory of Classical Fields, Noether's theorem

Week 3: Quantization of Klein Gordon Theory

Week 4: Quantization of Klein Gordon Theory continued

Week 5: Feynman propagator for Klein Gordon Theory

Week 6: Interacting Phi-4 Theory, local vs nonlocal theories

Week 7: Correlation Functions in Interacting theory

Week 8: Correlation Functions in Interacting theory continued

Week 9: Wick's theorem, Feynman diagrams, Feynman rules in position space

Week 10: Feynman rules in Momentum space, Cross-section and the S-matrix

Week 11: Expansion of the S-matrix in Feynman diagrams

Week 12: Expansion of the S-matrix in Feynman diagrams continued, Quick overview of Advanced topics.