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NOTICE

Ph.D. Thesis Defense (Viva-voce Examination) of
Mr. Deepesh Bhamre

Supervisor: Prof. Anuradha Misra

Title of Thesis: Study of Light Front Field Theory Methods and their Application to Quantum Chromodynamics

Light Front (LF) Field Theory, which is a Quantum Field Theory (QFT) with the quantisation surface being the light front, has emerged as a very useful formalism for studying particle physics, especially the non-perturbative regime of string interaction. We show the equivalence of covariant and LF Quantum Electrodynamics (QED) at one loop level by considering the standard covariant expressions for all the three fundamental one loop corrections in QED and establishing their equivalence with the LF expressions calculated using time-ordered Hamiltonian perturbation theory in the light front formalism. We resolve the important issue of the form of the gauge boson propagator to be used in such proofs of equivalence.

Infrared (IR) divergences arise in higher order calculations of gauge theories when loop momenta in Feynman diagrams vanish, or equivalently, when the massless propagators in the theory go on-shell. In conventional field theory calculations, infrared divergences cancel between real emission and virtual correction diagrams at the cross-section level. We discuss an alternative approach to the infrared problem in LFQED and LFQCD based on the coherent state approach which addresses cancellation of IR divergences at amplitude level. We construct the S-matrix elements using the LF formalism in the coherent state basis instead of using the conventional Fock basis, and investigate the cancellation of infrared divergences at the amplitude level.

Date: 17th June 2022, Friday **Time: 3:00 pm**

Zoom Link: https://us02web.zoom.us/j/83765784055?pwd=NHd4QStnSnNxNWdXeTgraURkcTZvZz09

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