



ICTS Statistical Physics & Condensed Matter Seminar (HYBRID)

Title : Controlling quantum systems and building quantum computers

Speaker : C. M. Chandrasekhar (Indian Institute of Science Bengaluru)

Date : Thursday, 16th November 2023

Time : 02:00 PM (IST)

Abstract : Harnessing controllable quantum evolution in accessible quantum systems in order to simulate other inaccessible complex quantum systems is one of the objectives of quantum simulators. Simulation of quantum systems is the first testing ground for quantum computers. In this talk, I will briefly review the operational and algorithmic approach for digital quantum simulation using quantum walks and present the example for simulating Dirac equations using Ion trap quantum processor [1]. I will also discuss the challenge one faces for simulating dynamics in complex quantum networks and open quantum systems, and present a theoretical framework to approximately simulate a system with an example [2]. Using quantum walks as a framework for controllable quantum evolution, I will present the scheme for realisation of the universal set of quantum gates [3] and building quantum computers using photons with the progress we have made in the experimental front [4].

[1] Nature Communications 11, 3720 (2020)

[2] Scientific Reports 11, 11551 (2021)

[3] New J. Phys. 22, 123027 (2020)

[4] EPJ Quantum Technology 10, 43 (2023)

Venue : **Offline:** Chern Lecture Hall (ICTS)

Online: Please click on the below link to join the seminar

<https://zoom.us/j/99582909255?pwd=S0crVlIKRTExWkFLV2lNbnU9DNmRoUT09>