## ICTS Synopsis Seminar

**Title**       : Numerical Filter Stability, Fokker Planck Equations and Infinite Dimensional Optimization with Deep Learning

**Speaker**    : Pinak Mandal (ICTS-TIFR, Bengaluru)

**Date**        : Friday, 14th July 2023

**Time**        : 11:00 AM (IST)

**Abstract**    : We tackle three different problems. Each problem is connected to the previous one in one or more ways, either directly or through the method of solution. Moreover, all three topics are comfortably enveloped by the overarching theme of numerical optimization. Our first problem is to evaluate stability of nonlinear filtering algorithms when the underlying dynamics is deterministic. We demonstrate that popular filtering algorithms are exponentially stable and discover a relationship between filter RMSE and filter stability. Our second problem is to devise an algorithm to solve Fokker-Planck equations in high dimensions. We use a deep learning algorithm to first compute non-trivial zeros of the Fokker-Planck operator combining which with an appropriate Feynman-Kac formula gives us the final solution. Lastly, we discuss two deep learning algorithms for solving infinite dimensional optimization problems. We test these algorithms on some classic problems in calculus of variations and some toy problems inspired by physics.

**Venue**       : Feynman Lecture Hall & Online
Zoom link: https://icts-res-in.zoom.us/j/85384664547?pwd=THZuaWJ6SmpuR0ozSWVUc0lDbVJEZz09
Meeting ID: 853 8466 4547
Passcode: 141422