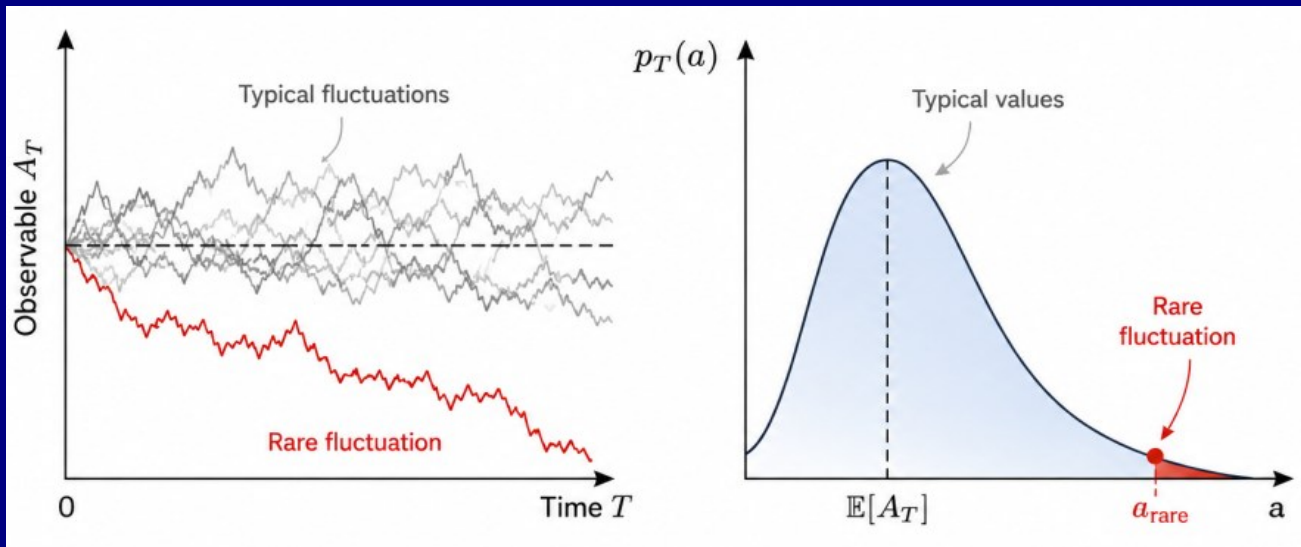


LTCC Intensive Course in Mathematical Sciences

Large Deviation Theory for Markov Processes: Spectral Theory, Variational Principles, and Beyond

By Dr Francesco Coghi, University of Leicester.



COURSE SUMMARY:

Large deviation theory provides a mathematical framework for quantifying rare events in stochastic systems. This intensive course introduces the theory for continuous-time Markov processes, focusing on empirical observables such as occupation measures, currents, and time-integrated quantities. Topics include tilted generators and spectral methods, large deviations of empirical measures and flows (level-2.5 theory), variational formulations based on relative entropy, and connections with stochastic optimal control. The emphasis will be on developing intuition and methods through Markov process theory, spectral, and variational formulations, rather than a measure-theoretic treatment of large deviations. Depending on participants' interests, the course may also briefly cover numerical methods for rare-event sampling. The course will conclude with an outlook on current research directions, including recent developments and open problems in non-Markovian and self-interacting stochastic processes.

PREREQUISITES:

Participants should be familiar with probability theory, continuous-time Markov chains, stochastic differential equations, and basic linear algebra, including eigenvalue problems. Familiarity with generators of Markov processes or statistical mechanics will be helpful but is not required.

Start: Thursday 11th November 2026

from 1pm to 5pm

Finish: Friday 12th November 2026

from 9am to 1pm

Venue: UCL, Department of Mathematics, Room 706,
7th Floor, 25 Gordon Street, London, WC1H 0AY

Register Now!

Participants are asked to register by emailing:

office@ltcc.ac.uk or

Fill form online by
following the QR Code.

www.ltcc.ac.uk



The London Taught Course Centre's Intensive Courses are freely open to all PhD students and academics in the Mathematical Sciences in the UK and outside, subject to suitable space being available.

The course will run within a 24 hour period.

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