Ergodic optimisation of marginally unstable linear switched systems

**Supervisor:** Ian Morris

**Research Group:** Dynamical Systems and Statistical Physics

**Funding:** For September 2022 entry: Funding may be available through QMUL Principal's Postgraduate Research Studentships, School of Mathematical Sciences Studentships, and EPSRC DTP, in competition with all other PhD applications.

Studentships will cover tuition fees, and a stipend at standard rates for 3-3.5 years.

We welcome applications for self-funded applicants year-round, for a January, April or September start.

**Project description:**

It is an elementary matter that the fastest-growing solution to a given linear differential or difference equation grows as an exponential term multiplied by an integer power whose exponent is strictly smaller than the dimension. In the more general context of a system which is allowed to repeatedly switch between two (or more) prescribed linear differential or difference equations at chosen times the behaviour of the fastest-growing solution is much less well understood, and a conjecture that the behaviour of this growth rate in the switched case should typically be similar to that in the non-switched case was recently disproved by the primary supervisor. The purpose of this project is to investigate the ways in which this growth rate is linked to the ergodic-theoretic structure of the set of worst-case control sequences by treating the differential or difference equation together with the set of switching laws as a single skew-product dynamical system. Depending on the interests of the student this project may focus on either the discrete-time or the continuous-time version of the problem.

**Further information:**

- [How to apply](#)
- [Entry requirements](#)
- [Fees and funding](#)