THE UNIVERSITY  OF HONG KONG

Institute of Mathematical Research
Department of Mathematics

C O L L O Q U I U M

Brownian motion with asymptotically normal reflection in unbounded domains: from transience to stability

Professor Aleksandar Mijatović

Department of Statistics, University of Warwick

Date:	June 7, 2024 (Friday)
Time:	4:00 – 5:00pm
Venue:	Room 210, Run Run Shaw Bldg., HKU

Abstract

In this talk we quantify the asymptotic behaviour of multidimensional driftless diffusions in domains unbounded in a single direction, with asymptotically normal reflections from the boundary. We identify the critical growth/contraction rates of the domain that separate stability, null recurrence and transience. In the stable case we prove existence and uniqueness of the invariant distribution and establish the polynomial rate of decay of its tail. We also establish matching polynomial upper and lower bounds on the rate of convergence to stationarity in total variation. All exponents are explicit in the model parameters that determine the asymptotics of the growth rate of the domain, the interior covariance, and the reflection vector field. Proofs are probabilistic, and use upper and lower tail bounds for additive functionals up to return times to compact sets, for which we develop novel sub/supermartingale criteria, applicable to general continuous semimartingales. Time permitting, I will discuss the main ideas behind the proofs in the talk. This is joint work with Miha Bresar (Warwick) and Andrew Wade (Durham).

All are welcome