Probability Seminar

Title: Entrance and exit at infinity for stable jump diffusions

Speaker: Andreas Kyprianou (Bath)

Date: Tue 3rd March 2020 at 2:00PM

Location: Seminar Room SCN 1.25

Abstract: In his seminal work from the 1950s, William Feller classified all one-dimensional diffusions in terms of their ability to access the boundary (Feller's test for explosions) and to enter the interior from the boundary. Feller's technique is restricted to diffusion processes as the corresponding differential generators allow explicit computations and the use of Hille–Yosida theory. In this talk we study exit and entrance from infinity for jump diffusions driven by a stable process. Many results have been proved for jump diffusions, employing a variety of techniques developed after Feller's work but exit and entrance from infinite boundaries has long remained open. We show that the these processes have features not observes in the diffusion setting. We derive necessary and sufficient conditions on so that (i) non–exploding solutions exist and (ii) the corresponding transition semigroup extends to an entrance point at 'infinity'. Our proofs are based on very recent developments for path transformations of stable processes via the Lamperti–Kiu representation and new Wiener–Hopf factorisations for Lévy processes that lie therein. The arguments draw together original and intricate applications of results using the Riesz-Bogdan–Żak transformation, entrance laws for self–similar Markov processes, perpetual integrals of Lévy processes and fluctuation theory, which have not been used before in the SDE setting, thereby allowing us to employ classical theory such as Hunt–Nagasawa duality and Getoor's characterisation of transience and recurrence.

mailto:neil.oconnell@ucd.ie