Theoretical Statistics and Mathematics Unit

Seminar

Date: 16 March, 2018 Time: 04.30 P.M.

Venue: L-Infinity, Stat-Math Unit (5th Floor, A.N. Kolmogorov Bhavan)

Balint Toth
University of Bristol UK and Alfred Renyi Institute of Mathematics Hungary

Ashok Maitra Memorial Lectures: Brownian motion and "Brownian motion" - Public Lecture

Abstract

The physical phenomenon called Brownian motion is the apparently random displacement of a particle suspended in a fluid, driven by collisions and interactions with the molecules of the fluid which are in permanent thermal agitation. Its discovery is usually credited to Scottish botanist Robert Brown (1827), however earlier observations of this phenomenon were also made by Dutch physiologist Jan Ingenhousz (1785) and Roman naturalist Lucretius (60 BC). One of the idealised mathematical models of this random drifting is the stochastic process called commonly "Brownian motion", or the Wiener process. This is a random process characterised by
(1) independence of increments in non-overlapping time intervals,
(2) time-stationarity of increments, and
(3) continuity of its sample paths. This is a truly wonderful mathematical object whose rigorous construction was completed by Norbert Wiener (1923) and Paul Lévy (1939). A dynamical theory of Brownian motion should link these two: derive in a mathematically satisfactory way – as a kind of macroscopic scaling limit – the idealised mathematical description from microscopic principles. The first steps were made by Einstein and Smoluchowski in their celebrated 1905/1906 papers and we are still very

far from the end of this road. I will survey some attempts and samples from the cultural history of these ideas.

All are cordially invited