CoE-MaSS weekly seminar series

THE DST-NRF CENTRE OF EXCELLENCE IN MATHEMATICAL AND STATISTICAL SCIENCES (CoE-MaSS) AND THE SCHOOL OF COMPUTER SCIENCE AND APPLIED MATHEMATICS (CSAM) WOULD LIKE TO PRESENT A SEMINAR BY

Dr Christopher Angstmann

(School of Mathematics and Statistics, University of New South Wales, Australia)

"Reaction-subdiffusion from continuous time random walks"

Friday, 18 March 2016
10h30-11h30

Broadcast live from:
Videoconferencing Facility, 1st Floor
Mathematical Sciences Building, Wits West Campus

How to connect to this seminar remotely:
You can connect remotely via Vidyo to this research seminar by clicking on this link:
http://wits-vc.tenet.ac.za/flex.html?roomdirect.html&key=y0SSOwFsvsidbzg4qFdWXvvQtyI
and downloading the Vidyo software before the seminar.
You must please join in the virtual venue (called *"CoE Seminar Room (Wits)"* on Vidyo) strictly between **10h00-10h15**. No latecomers will be added.

Important videoconferencing netiquette:
Once the seminar commences, please mute your own microphone so that there is no feedback from your side into the virtual room. During the Q&A slot you can then unmute your microphone if you have a question to ask the speaker.

Title:
Reaction-subdiffusion from continuous time random walks

Presenter:
Dr Christopher Angstmann, School of Mathematics and Statistics, University of New South Wales, Sydney, Australia; c.angstmann@unsw.edu.au

Abstract:
A major theoretical challenge of the past decade in anomalous diffusion research has been to derive appropriate evolution equations for the probability density function of subdiffusive transport taking into account further complications from force fields and reactions. Starting with the continuous time random walk (CTRW) as the underlying stochastic process we derive the generalized master equation for an ensemble of particles undergoing reactions whilst being subject to an external force field. The reactions are treated as birth and death processes and the forces are incorporated as biased random walks. We first derive the master equation for a single particle undergoing a CTRW with a pure death process in a space- and time- dependent force field. We then consider an ensemble of such CTRWs, with the ensemble composed of all initial particles and subsequent particles generated by birth processes. From the generalized master equation we show reductions to special cases; including the fractional reaction diffusion equation for subdiffusion with nonlinear reactions kinetics and the fractional Fokker-Planck equation for sub diffusion in a space and time- dependent force field.