



**POLITECNICO
DI TORINO**



Dipartimento di
Scienze Matematiche
G. L. Lagrange

ECCELLENZA 2018 • 2022

Tuesday the **27 November 2018** at 10:00

Politecnico di Torino, DISMA, Direzione (third floor)

Kevin PAINTER

Full Professor at Heriot-Watt University

Incorporating Nonlocality into Movement Models

Prof. Luigi Preziosi introduces the seminar

Abstract

A large literature has emerged on the modelling of cells or organism movement, due to its indisputable importance in a wide variety of processes. The velocity-jump random walk description has proven particularly popular, where individual particles are assumed to alternate between ballistic movements with fixed velocities and turning events where new orientations are selected. Standard assumptions typically result in local diffusion-advection models in a macroscopic limit. Yet, movement behaviour often incorporates various elements of nonlocality. Environmental sensing can be nonlocal, in that the particle detects an environmental cue over some spatially extended region. Movement can be nonlocal, in that a particle may range from short movements that restrict it locally to occasional long movements taking it to a distant location.

In this seminar Prof. Painter will show how considering nonlocality impacts on the macroscopic limiting equations. Along the way, he will discuss the relevance of the work within a number of biological applications, including population structuring according to topography and immunosurveillance of the central nervous system.

Biography

Kevin Painter holds the title of Full Professor at Heriot-Watt University, Edinburgh. He moved to Heriot-Watt in 2000 and has held positions of Lecturer (from 2000), Senior Lecturer (2008) and Reader (2010). Prior to Heriot-Watt, he graduated in Applied Mathematics in 1994 from the University of Warwick, obtained a Doctor of Philosophy in 1998 from the University of Oxford and held a two-year Research Associate position in the USA (Universities of Utah and Minnesota) from 1998-2000. During this time, I have been a Leverhulme Trust Research Fellowship holder (2011-2013) and held a year-long Visiting Professor position at the Politecnico di Torino (October 2016-September 2017).

His primary field is Mathematical Biology, where he works on a range of modelling problems that involve collaboration with mathematicians and biologists/clinicians. His principal topic focuses on modelling cell migration and tissue dynamics, applied to embryonic development, tissue maintenance, wound repair and cancer. Another topic concerns how patterns arise in nature, such as pigmentation patterns on animals, and how animals and cells find their way through their environments.

Save the date for the next event: November 29, 2018

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