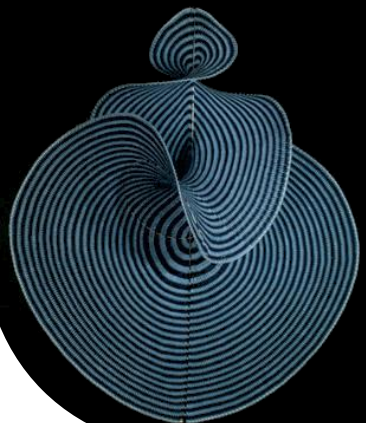




## *Excellence in Mathematical Sciences: A Celebration of Diversity*

This half-day symposium will be held in room 401.401 on Wednesday the 10<sup>th</sup> of September from 9:00am to 1:30pm.

We gratefully acknowledge the support of the Engineering Science, Mathematics, Computer Science, Statistics and Physics departments of the University of Auckland.



**9:00 – Opening**

Golbon Zakeri

**9:05 – The Lorenz Manifold: the Math, the Art and What Next**

Hinke Osinga

**Abstract**

The chaotic behavior of the famous Lorenz system is organized by an amazing surface: the Lorenz manifold. Initial conditions on different sides of this surface behave differently after some time, which means that the Lorenz manifold encodes how the chaotic dynamics manifests itself throughout the whole three-dimensional phase space. To convey its geometric properties, imagine a pancake that grows and grows to fill the entire space without creasing or developing self-intersections. This talk describes how our mathematical research into the Lorenz manifold naturally led to artistic expression and our involvement with the mathematical art community. In turn, our involvement with art contributed to the development of new ideas for studying and visualizing the Lorenz manifold.

**9:35 – Big Data: Hype or Reality**

Gill Dobbie

**Abstract**

In industry, there is a buzz around big data. There are new companies being founded that deal with big data, and established companies are using big data techniques to make better informed decisions.

My research focuses on the management and processing of big data. In this talk, I'll discuss characteristics of big data, and describe some projects I have worked on recently.

**10:05 – Design and analysis of experiments testing for biodiversity in ecology**

Rosemary Bailey

**Abstract**

It is now widely believed that biological diversity is good for the environment. One way that ecologists test this is to place random collections of species in mini-environments and then measure some outcome. I have been working with a group of fresh-water ecologists to improve this in two ways. The first is that our subsets of species are carefully chosen, not random. The second is that we fit a nested family of plausible models. Our results suggest that the underlying model for a single outcome is not diversity at all.

**10:35 – Morning Tea**

**11:00 – Maryam Mirzakhani and her Fields medal-winning work**

Marston Conder

**Abstract**

This talk is a brief summary of Maryam Mirzakhani's life and work, leading to her Fields medal last month. Aimed at non-experts, it will involve a few definitions and many pictures, to help describe Riemann surfaces, geodesics, and moduli spaces, and Maryam's major contributions to the study of these things. I will also include some illuminating biographical details.

**11:30 – Quantitative Models for Operations Management**

Tava Olsen

**Abstract**

In this talk I will give an overview of my work in operations management quantitative modelling. Particular operations applications include supply chain management, healthcare operations, service system design, and inventory management. For each application, I will give an example of a typical research question and outline the mathematical techniques used to tackle it. For the last half of the talk, I will detail my work on leadtime quotation and pricing. This will provide a deeper understanding of how quantitative models are used for operations management decision making.

**12:00 – Laser micromachining, spectroscopy and sperm sorting**

Cather Simpson

**Abstract**

Researchers in the Photon Factory exploit ultrashort (femtosecond) laser pulses for the extraordinary interaction they have with matter. In laser micromachining, the decoupling of electronic and nuclear degrees of freedom leads to exquisite control of the features generated by laser ablation. In exploring the consequences of the absorption of light by molecules, a 100 femtosecond temporal pulsewidth allows the precise establishment of time-zero so that photoinduced dynamics can be followed in "real" time by spectroscopy. We also use this technology in prototyping our ideas for sorting sperm by sex for the agriculture sector. This talk will present a brief overview of all of these areas.

**12:30 – Lunch**