School of Mathematics
Colloquium Talks 2017-2018

The School Colloquia are given by world-famous speakers and present an overview of important topics of general interest in the mathematical sciences.

These invited lectures are intended to be accessible to all graduate students and academics in the department. MMath and MSc students may also benefit from these presentations.

The talks normally take place on Wednesdays, 15:10-16:10, at the lecture room E/0.15 on the ground floor of the School. All are welcome to attend.

8 November 2017

Speaker: Professor Constantin Teleman (Oxford)
Title: Gauge theory, Mirror symmetry and Lagrangians
Abstract: *A* basic invariant of an isolated hypersurface singularity $f(\mathbf{x})=0$ is its Jacobian ring, $\mathbf{C}[\mathbf{x}]/\langle \partialf/\partial x_i\rangle$. It is known to have a \emph{Frobenius algebra} structure, if a volume form is chosen in the ambient space. Frobenius algebras appear in connection to 2-dimensional topological field theories; the extended versions, posited by Segal, Kontsevich and others, involve a Frobenius category. Physicists understood that \emph{matrix factorisations} provided a ``categorification'' of the Jacobian ring, completing the structure of an extended TQFT. In this talk, I will discuss a possible generalisation of matrix factorisations, conjectured by Kapustin and Rozansky, and illustrate it with an example which provides a character calculus for 2-dimensional topological gauge theories, which is relevant to quantum cohomology and Gromov-Witten theory.

22 November 2017

Speaker: Professor Andrew Stuart (Caltech)
Title: Blending Mathematical Models and Data Abstract
Abstract: A central research challenge for the mathematical sciences in the 21st century is the development of principled methodologies for the seamless integration of (often vast) data sets with (often sophisticated) mathematical models. Such data sets are becoming routinely available in almost all areas of engineering, science and technology, whilst mathematical models describing phenomena of interest are often built on decades, or even centuries, of human knowledge creation. Ignoring either the data or the models is clearly unwise and so the issue of combining them is of paramount importance. In this talk we will give a historical perspective on the subject, highlight some of the current research directions that it leads to, and describe some of the underlying mathematical frameworks

being deployed and developed. The ideas will be illustrated by problems arising in the geophysical, biomedical and social sciences.

7 February 2018

Speaker: Professor Martin Hairer KBE FRS (Imperial)
Title: Noisy rubber bands
Abstract: A "rubber band" constrained to remain on a manifold evolves by trying to shorten its length, eventually settling on a closed geodesic, or collapsing entirely. It is natural to try to consider a noisy version of such a model where each segment of the band gets pulled in random directions. Trying to build such a model turns out to be surprisingly difficult and generates a number of nice geometric insights, as well as some beautiful algebraic and analytical objects. We will survey some of the main results obtained on the way to this construction.