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University of Luxembourg
Inaugural Lecture
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Tuesday, 6 December 2011

6 pm

Campus Limpertsberg

Lecture Hall Tavenas

102a, avenue Pasteur

L-2311 Luxembourg



Faculty of Science,
Technology
and Communication

Prof. Dr. Giovanni Peccati

A gentle introduction to universality



From a probabilistic standpoint, the world evolves randomly over time, with wild and unpredictable fluctuations at a microscopic level. However, the analysis of the large-scale structure of a typical random system (such as a human population, a financial market or a physical system) reveals that macroscopic fluctuations can be described by a relatively small number of probability distributions, such as the Benford's and Zipf's laws, or the Gaussian, Poisson and Tracy-Widom distributions. This crucial phenomenon is known as universality, and is one of the most fascinating subjects of current research in theoretical and applied mathematics.

This lecture is a soft introduction to universality, from the point of view of modern probability theory. Examples taken from several fields will be provided, showing that the concept of universality is indeed one of the cornerstones of the modern statistical reasoning. The discussion will involve some extraordinary scientists from the past:

Robert Brown observing pollen suspended in water, Simon Newcomb perusing old logarithmic books, and Carl Friedrich Gauss looking for a lost planet in the sky. In a final twist, it will be shown that some universal probability distributions can be actually used in order to describe the primordial structures of our Universe. This is related to the statistical analysis of the Cosmic Microwave Background radiation, that is one of the main objects of modern Cosmology.

Prof. Giovanni Peccati (b. 1975) graduated at Bocconi University (Milan) in 1998, and received a Ph. D. in Mathematics at the Pierre and Marie Curie University (Paris) in 2002. He worked for five years as a researcher inside the Laboratoire de Statistique Théorique et Appliquée of the Pierre and Marie Curie University. In 2008, he joined the University of Paris Ouest as a full professor in Mathematics. Prof. Peccati is the author of more than fifty mathematical papers and of three monographs. He is currently in the editorial board of the Journal of Multivariate Analysis. Prof. Peccati has joined the Mathematics Research Unit of Luxembourg University in February 2010.

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*Introduction by Prof. Dr. Paul Heuschling, Dean of the Faculty of Science, Technology and Communication.
A reception will take place after the inaugural lecture.*