香 港 大 學
THE UNIVERSITY OF HONG KONG

Institute of Mathematical Research
Department of Mathematics

Frontiers of Mathematics Lecture

Characteristic Polynomials of Random Unitary Matrices, Partition Sums, and Painlevé Equations

Abstract

The moments of characteristic polynomials play a central role in Random Matrix Theory. They appear in many applications, ranging from quantum mechanics to number theory. The mixed moments of the characteristic polynomials of random unitary matrices, i.e. the joint moments of the polynomials and their derivatives, can be expressed recursively in terms of combinatorial sums involving partitions. These combinatorial sums are not easy to compute, however, and so this does not give an effective method for calculating the mixed moments in general. I shall describe a new, alternative evaluation, in terms of solutions of Painlevé differential equations, that facilitates their computation and which allows one to prove previous conjectures concerning their asymptotics when the matrices are large.

Biography

Professor Jon Keating is a mathematical physicist who is renowned for his contributions to quantum chaos, random matrix theory and connections with number theory.

Professor Keating is currently the Sedleian Professor of Natural Philosophy at the University of Oxford. He was elected a Fellow of the Royal Society in 2009 and is a former EPSRC Senior Research Fellow. He was awarded the London Mathematical Society's Frölich Prize in 2010 and a Royal Society Leverhulme Senior Research Fellowship in 2014. He currently holds a Royal Society Wolfson Research Merit Award and an ERC Advanced Grant.

Professor Jon Keating

Sedleian Professor of Natural Philosophy
University of Oxford, UK

Date :
November 19, 2019 (Tuesday)

Time :
5:00 – 6:00 pm
(Tea Reception starts at 4:30 pm)

Venue :
Lecture Theatre A, G/F,
Chow Yei Ching Building,
The University of Hong Kong

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