Sefydliad Gwyddorau Mathemategol a Chyfrifiannol Cymru

Wales Institute of Mathematical and Computational Sciences

# Mathematical Physics Colloquium

*Friday 26th February 2010, Swansea University*

Lecture Theatre: Robert Recorde Room, Faraday Building, 2nd floor

**Programme**

14.00 – 15.00      *Professor Richard Thomas  (Imperial)*

Title:  Curves on K3 surfaces and modular forms.

Abstract: The Katz-Klemm-Vafa formula is a conjecture expressing Gromov-Witten invariants of K3 surfaces in terms of modular forms. In genus 0 it reduces to the (proved) Yau-Zaslow formula. I will explain how a correspondence between "stable pairs" and Gromov-Witten theory for toric 3-folds (proved by Maulik-Oblomkov-Okounkov-Pandharipande), some calculations with stable pairs (due to Kawai-Yoshioka) and some deformation theory lead to a proof of the KKV formula.

15.00 – 15.30      Tea

15.30 – 16.30      *Professor Marcos Marino Beiras (Geneva)*

Title: Quantum theory and enumerative problems

Abstract: Many problems in mathematics involve counting objects. For example, in combinatorics, one is often interested in counting graphs with certain conditions. Another example is enumerative algebraic geometry, where one counts curves in algebraic varieties. Many of these problems turn out to be deeply related to quantum theories. In this talk I will explore this relation in three important examples: the enumeration of maps, the enumeration of Hurwitz coverings, and the LMO invariant of rational homology spheres. I will show how ideas of quantum theory lead to new insights in these problems, and in particular I will also explain the connection between non-perturbative effects in quantum theory and the asymptotic behavior of these enumerative problems.

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