The Hong Kong University of Science and Technology

Department of Mathematics

<u>Lecture Series</u>

A Survey on Vector Partition Functions: Quasi-Polynomiality and Beyond

By

Prof. Luca Moci
Université Paris 7

<u>Abstract</u>

The vector partition function is a classical object in mathematics: in the one-dimensional case it was studied at least since Euler, while in the case of root systems it appears in a formula by Kostant of great importance in representation theory. It can be seen as the function counting the integer points into a variable polytope. In these lectures (based on a book by De Concini and Procesi) we will sketch the proof of a fundamental theorem stating that this function is piecewise quasi-polynomial: more precisely, its support can be divided into "big cells", such that on every big cell the function agrees with a prescribed element of the "Dahmen Micchelli module". We will introduce this module, which admits a simple combinatorial description. We will also provide a wall-crossing formula. On the way we will meet some object introduced in my previous talk, such as toric arrangements and zonotopes: those provide respectively a decomposition of the Dahmen-micchelli module and a set of "initial data" for the vector partition function. If time allows, we will outline relations with the equivariant K-theory of some manifolds (based on work of De Concini-Procesi-Vergne and of Cavazzani and myself).

Lecture 1   *Tuesday, 21 February 2017*
Lecture 2   *Thursday, 23 February 2017*

Time: *2:00p.m. - 4:00p.m.*

Venue: *Room 4472, Academic Building
(near Lifts 25&26), HKUST*

All are welcome!