



DEPARTMENT OF APPLIED MATHEMATICS

應 用 數 學 系

**The Hong Kong Polytechnic University
Department of Applied Mathematics**

Colloquium

Quantum Entanglement Classes from an Algebraic Point of View

by

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Abstract

Entanglement is a key feature of composite quantum system which is directly related to the potential power of quantum computers. Entangled quantum states are a resource for many tasks. The talk will give an overview of algebraic methods that allow to define and, in principle, compute entanglement classes.

In the case of local unitary operations, a finite set of polynomial invariants provides a complete characterisation of the entanglement classes. Unfortunately, one faces the problem of combinatorial explosion so that computing such a complete set of invariants becomes difficult already for quite small system.

For so-called SLOCC operations, polynomial invariants only provide a necessary condition for two states to be in the same class, so that one needs the more general notion of covariant.

While for more than three qubits there are infinitely SLOCC classes, there are always finitely many so-called entanglement polytopes which can be derived from covariant. What is more, entanglement polytopes are related to the local spectra of pure quantum states, which can be obtained experimentally by local measurements. Furthermore, a duality between entanglement polytopes and algebraic varieties yields a description of different types of entanglement.

Date : 8 March, 2017 (Wednesday)

Time : 4:00p.m. – 5:00p.m.

Venue : TU801, The Hong Kong Polytechnic University

***** ALL ARE WELCOME *****