

THE UNIVERSITY



OF HONG KONG

*Institute of Mathematical Research
Department of Mathematics*

GEOMETRY SEMINAR

Rank of Hermitian polynomials and local orthogonal maps

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Date: July 15, 2025 (Tuesday)

Time: 4:30 – 5:30pm

Venue: Rm 210, Run Run Shaw Bldg., HKU

Abstract

A Hermitian polynomial on \mathbb{C}^n is a real-valued polynomial $h(z, \bar{z}) \in \mathbb{C}[z, \bar{z}]$, where $z = (z_1, \dots, z_n) \in \mathbb{C}^n$. It follows from the diagonalizability of Hermitian matrices that there exist linearly independent holomorphic polynomials $f_1, \dots, f_p, g_1, \dots, g_q \in \mathbb{C}[z]$ such that $h(z, \bar{z}) = |f_1|^2 + \dots + |f_p|^2 - |g_1|^2 - \dots - |g_q|^2$, in which p, q are uniquely determined by $h(z, \bar{z})$. We call $r := p + q$ the rank of $h(z, \bar{z})$. Motivated by the study of the proper holomorphic maps between the complex unit balls, Ebenfelt raised a conjecture, called the SOS conjecture, regarding the rank of a Hermitian polynomial of the form $\|z\|^2 A(z, \bar{z})$. We are going to discuss how this purely algebraic problem can be studied geometrically using local orthogonal maps between complex projective spaces.

All are welcome