



Workshop on Complex Geometry

July 19 - 20, 2018

Room 210, Run Run Shaw Building, HKU

Thursday, July 19	
9:30 – 10:30	Sai-Kee Yeung, Purdue U., USA <i>On hyperbolicity properties of some families of polarized manifolds</i>
<i>Coffee / tea break</i>	
10:50 – 11:50	Shan Tai Chan, HKU, Hong Kong <i>Holomorphic isometries from the Poincaré disk to bounded symmetric domains and applications</i>
<i>Lunch Break</i>	
14:00 – 15:00	Sui-Chung Ng, East China Normal U., Shanghai <i>Sheaf of cycles-respecting maps on rational homogeneous spaces</i>
15:10 – 16:10	Aeryeong Seo, KIAS, Korea <i>Pseudoconcavity of flag domains</i>
<i>Coffee / tea break</i>	
16:30 – 17:30	Jonathan Tsai, HKU, Hong Kong <i>The squeezing function in planar domains</i>
Friday, July 20	
9:30 – 10:30	Fei Ye, QCC of City U. of New York, USA <i>Higher syzygies on Abelian Threefolds</i>
<i>Coffee / tea break</i>	
10:50 – 11:50	Wing-Keung To, National U. Singapore, Singapore <i>Characterization of certain positive polynomials</i>

Abstracts

Shan Tai Chan, HKU, Hong Kong

Holomorphic isometries from the Poincaré disk to bounded symmetric domains and applications

In general, it is difficult to classify all holomorphic isometries from the unit disk to bounded symmetric domains of rank ≥ 2 with respect to their Bergman metrics up to normalizing constants. In this talk, we will first consider holomorphic isometries from the Poincaré disk to the product of the unit disk and the complex unit n -ball for $n \geq 2$ with respect to certain canonical Kähler metrics. We then classify all such holomorphic isometries. This also yields proper holomorphic maps from the unit disk to a complex unit n -ball for any $n \geq 2$, which are algebraic, not rational and can be extended holomorphically to a neighborhood of the closed unit disk. On the other hand, we also construct new examples of holomorphic isometries from the Poincaré disk to irreducible bounded symmetric domains of rank ≥ 2 . Next, we obtain rigidity theorems for (1) holomorphic isometries from the Poincaré disk to a product of complex unit balls which are rational maps and (2) holomorphic isometries between products of complex unit balls such that each complex unit ball is of complex dimension at least 2. These results come from my recent joint work with Yuan Yuan, and also the joint work with Yuan Yuan and Ming Xiao.

Sui-Chung Ng, East China Normal U., Shanghai

Sheaf of cycles-respecting maps on rational homogeneous spaces

Motivated by the rigidity problems of the holomorphic maps pertaining to flag domains, we study the extension problem for the germs of holomorphic mappings that respect a certain kind of homogeneous submanifolds on rational homogeneous spaces. There are a family of sheaves naturally associated to these local holomorphic mappings on a given rational homogeneous space. By studying the pullbacks of these sheaves to some universal spaces associated to the homogeneous submanifolds, we are able to show that any germ of such sheaves extends to a global section, which in turn gives a biholomorphism of the base manifold. This is a recent joint work with Jaehyun Hong.

Aeryeong Seo, KIAS, Korea

Pseudoconvexity of flag domains

In this talk I will present that if a flag domain is not pseudoconvex, then it is pseudoconcave by relating it to the ampleness of the normal bundle of the base cycle.

Wing-Keung To, National U. Singapore, Singapore

Characterization of certain positive polynomials

In this talk, I will discuss some joint work with Colin Tan which gives a characterization of polynomials whose sufficiently high powers have all positive coefficients. Some related work on effective Hermitian Positivstellensatz will be also discussed.

Jonathan Tsai, HKU, Hong Kong

The squeezing function in planar domains

For bounded domains $\Omega \subset \mathbb{C}^n$, Deng, Guan and Zhang defined the squeezing function $S_\Omega(z)$ to be the supremum over all holomorphic embeddings ϕ of Ω satisfying $\phi(z) = 0$ of the ratio $\frac{a}{b}$ where a and b satisfy $B(0; a) \subset \phi(\Omega) \subset B(0; b)$. The squeezing function was introduced to study pseudoconvexity properties of Ω . We discuss the problem of finding an explicit formula for the squeezing function in planar domains. Classical tools from the theory of univalent functions will be used to obtain our results. This is joint work with T. W. Ng and C. C. Tang.

Fei Ye, QCC of City U. of New York, USA

Higher syzygies on Abelian Threefolds

In this talk, I will present a numerical criterion for an ample line bundle on an abelian threefold to satisfy property (N_p) . Based on a result of Lazarsfeld, Pareschi, and Popa, the main goal in the proof is to create a divisor whose multiplier ideal sheaf is supported at a single point. For that, the same idea used to prove Fujita's base point freeness conjecture can be used together with additional tools including Seshadri constants, base loci, and restricted volumes.

Sai-Kee Yeung, Purdue U., USA

On hyperbolicity properties of some families of polarized manifolds

We would report on some joint work with Wing-Keung To on hyperbolicity of moduli spaces of polarized algebraic manifolds using the method of Weil-Petersson metric. Hyperbolicity properties are studied in terms of Kobayashi hyperbolicity as well as being of log-general type, the former has classical origin and the latter was a conjecture of Viehweg, a generalization of which has been given by Campana. Our approach was geometric and is applied to families or moduli spaces of Kaehler-Einstein manifolds of negative scalar curvature or trivial scalar curvature, and some log-general type manifolds.