TMS-TFS Colloquium: Complex Geometry and Dynamics

University of Oslo, November 1 - 2, 2019

SPEAKERS:

- Bo Berndtsson
- Eleonora Di Nezza
- John Erik Fornæss
- Lucas S. Kauffman
- Tuyen T. Truong
- Xu Wang
- David Witt Nyström

Organisers: Håkan Samuelsson Kalm and Erlend F. Wold

BFS COLLOQUIUM - FALL 2019		
	Friday	**Saturday**
10:00-11:00		Fornæss
11:00-12:00	Kauffman	Witt Nystrøm
12:00-13:00	Lunch break	Wang
13:00-14:00	Truong	
14:00-15:00	Di Nezza	
15:00-16:00	Berndtsson	

Berndtsson

Title: Superforms, supercurrents and real differential geometry.

Abstract: Supercurrents were originally introduced (in the thesis by Lagerberg) as an approach to tropical geometry and a tool for handling convex functions. Here I will show (after a brief introduction) how a supercurrent can be associated to any real submanifold of $\mathbb{R}^n$ and how this can be used in the study of minimal manifolds and mean curvature flow.

Di Nezza

Title: Metric geometry of singularity types.

Abstract: (Quasi)-Plurisubharmonic functions are a key notion in complex geometry. The study of their singularity (in terms - for example - of integrability properties or smoothing procedures) is conceived to develop analytic techniques in order to solve problems in complex and algebraic geometry. In this talk we study the space of all possible singularity types of quasi-plurisubharmonic functions and we introduce a natural (pseudo)-distance on it. As applications we present a stability result for complex Monge-Ampére equations with prescribed singularity and a semicontinuity result for multiplier ideal sheaves associated to singularity types. This is a joint work with T. Darvas and C. Lu.

Fornæss

Title: Dynamics of transcendental Hénon maps.

Abstract: I will lecture about ongoing joint work with Arosio, Benini and Peters. This mixes the theories of iteration of entire functions in one complex variable and polynomial Hénon maps in two complex variables.

Kauffman

Title: Products of random matrices via holomorphic dynamics.

Abstract: The study of random walks on Lie groups is a classical topic in Homogeneous Dynamics. The goal is to understand products of the form $g_n...g_1$ where the g_j are i.i.d. random variables with values on some Lie group G. One is also interested on the action of such products on a given homogeneous space.

In this talk I will focus on the case where G is the group of 2 by 2 matrices acting on the Riemann Sphere by Möbius transformations. I will show how we can view such a problem as a holomorphic dynamical system.

This approach allows us to obtain some new results about such products as well as new and simplified proofs of classical results by Furstenberg, Guivarch, Le Page, Benoist-Quint, etc.

This is joint work with T.-C. Dinh and H. Wu.

Truong

Title: Some topics on dynamical degrees.

Abstract: This talk is about three topics in dynamical degrees which the speaker have experience to: relation to fibration, relation to periodic points, and relation to Weil?s RH and Standard conjectures in AG. The talk will mention both known results and open questions, as well as ongoing work by the speaker with collaborators. (Because of time limit, many more and interesting applications cannot be mentioned.)

Wang

Title: Bergman kernel and oscillation theory of plurisubharmonic functions.

Abstract: This is a joint work with Bo-Yong Chen. A sharp upper oscillation estimate is obtained for the logarithm of the modulus of a complex polynomial. Moreover, based on Harnack's inequality and convex analysis we show that every plurisubharmonic function is locally BUO (bounded upper oscillation) with respect to polydiscs of finite type but not for arbitrary polydiscs. As an application we obtain an approximation formula for the Bergman kernel that preserves all directional Lelong numbers. For smooth plurisubharmonic functions we derive a new asymptotic identity for the Bergman kernel from Berndtsson's variation formula, which also yields a slightly better version of the sharp Ohsawa-Takegoshi extension theorem in some special cases.

Witt Nyström

Title: An analytic approach to Okounkov bodies.

Abstract: Okounkov bodies were introduced by Okounkov in the 90's as a way of generalizing the correspondence between line bundles and polytopes in toric geometry to the setting of ample line bundles on projective manifolds. I will give a brief introduction to this, and then discuss a new way of thinking of Okounkov bodies, which is more analytic/geometric rather than algebraic. More specifically it uses certain degenerations of the manifold together with its Kähler structure. This is work in progress together Ya Deng.