SCHEDULE WITH ABSTRACTS

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Monday June 4

Time	Speaker	Title
9:30am	Håkan Hedenmalm	Opening remarks
10:00am	Anton D. Baranov	Differentiation invariant subspaces in the space of infinitely differentiable functions
11:00am	William T. Ross	Inner vectors, inner functions, and zeros of analytic functions
12 noon-2pm	Lunch	
2:00pm	Thomas Ransford	Gleason-Kahane-Żelazko theorems in function spaces
3:00pm	Kristian Seip	Extreme values of the Riemann zeta function and its argument
4:00pm	Evgueni Abakumov	Krein-type theorems and ordered structure for Cauchy-de Branges spaces
4:30pm-7pm	Break	
7pm	Conference dinner	

Tuesday June 5

Time	Speaker	Title
9:30am	Constanze Liaw	Finite Rank Perturbations
10:00am	John E. McCarthy	The Krzyż conjecture and entropy of polynomials with roots on the unit circle
11:00am	Stefan Richter	Some aspects of the function theory for the Drury-Arveson space.
12 noon-2pm	Lunch	
2:00pm	Dmitry V. Yakubovich	Operator inequalities that are sufficient for similarity to a contraction
2:30pm	Eva Gallardo Gutíerrez	On the spectrum of composition operators
3:30pm	Eugenia Malinnikova	An improvement of Liouville theorem for discrete harmonic functions
4:30-7pm	Break	
7pm	Informal get-together	

Evgueni Abakumov, Université Paris-Est:
Krein-type theorems and ordered structure for Cauchy-de Branges spaces

We extend some results of M. G. Krein to the class of entire functions which can be represented as ratios of discrete Cauchy transforms in the plane. As an application we obtain new versions of de Branges? Ordering Theorem for nearly invariant subspaces for a class of Hilbert spaces of entire functions. This is joint work with A. Baranov and Yu. Belov.

Anton D. Baranov, St Petersburg State University/National Research University Higher School of Economics:
Differentiation invariant subspaces in the space of infinitely differentiable functions

In the space of all infinitely differentiable functions on an interval (a, b) consider a differentiation invariant subspace and assume that the restriction of differentiation onto this subspace has discrete spectrum. Is it true that in this case the subspace is generated by the exponential monomials it contains? In general, the answer is negative, since the subspace may have the so-called "residual" part (all functions vanishing on some subinterval). In 2007 A. Aleman and B. Korenblum posed the spectral synthesis problem: is any invariant subspace generated by its residual part and the corresponding exponentials? We give a complete description of subspaces which admit spectral synthesis in terms of their spectra. The talk is based on joint works with A. Aleman and Yu. Belov.

Eva Gallardo Gutíerrez, Universidad Complutense de Madrid:
On the spectrum of composition operators

In this talk, we will first review some classical results regarding the spectrum of composition operators acting on spaces of analytic functions on the unit disc $\mathbb{D}$. Lately, we will prove a conjecture posed by Cowen and MacCluer in 1995 about the spectral picture of composition operators acting on the Hardy space. Finally, we will consider two related conjectures regarding the spectra of composition operators, proving that one of them holds, and showing that the other one (which is still open) is satisfied in particular cases.

(Based on a joint work with Valentin Matache).

Constanze Liaw, University of Delaware:
Finite Rank Perturbations

Kato-Rosenblum theorem and Aronszajn-Donoghue theory provide us with reasonably good understanding of the subtle theory of rank one perturbations. We will briefly discuss these statements. For higher rank perturbations, the situation is different. While the Kato-Rosenblum theorem still ensures the stability of the absolutely continuous part of the spectrum, the singular parts can behave more complicated. Nonetheless, some results prevail in the finite rank setting.

John E. McCarthy, Washington University in St Louis:
The Krzyż conjecture and entropy of polynomials with roots on the unit circle

In 1969, J. Krzyż conjectured that, over all holomorphic functions

$$f(z) = \sum_{n=0}^{\infty} \hat{f}(n) z^n$$

that map the unit disk $\mathbb{D}$ to $\mathbb{D} \setminus \{0\}$, we have

$$\sup |\hat{f}(n)| \ = \ \frac{2}{e}$$

for every positive integer n. The conjecture has been proved up to $n = 5$, but is open for larger n.

The entropy conjecture is that for all non-constant polynomials p that have all their roots on the unit circle $\mathbb{T}$ and with L^2-norm 1 there, we have

$$\int_{\mathbb{T}} |p|^2 \log |p|^2 \ \geq \ 1 - \log(2).$$

We will discuss how these two conjectures are related, show how the entropy conjecture implies the Krzyż conjecture provided a non-degeneracy condition is satisfied, and prove a special case of the entropy conjecture.

The talk is based on joint work with J. Agler.

Eugenia Malinnikova, Norges teknisk-naturvitenskapelige universitet:
An improvement of Liouville theorem for discrete harmonic functions

We discuss the discrete version of the Laplace operator on the standard lattice $\mathbb{Z}^2$ and $\mathbb{Z}^d$. On $\mathbb{Z}^2$ we prove that if a harmonic function is bounded on a large portion of the lattice then it is constant. This is no longer true on $\mathbb{Z}^d$, $d > 2$. The talk is based on a joint work with L. Buhovsky, A. Logunov and M. Sodin.

Thomas Ransford, Université Laval:
Gleason-Kahane-Żelazko theorems in function spaces

The Gleason-Kahane-Żelazko theorem states that a linear functional on a Banach algebra that is non-zero on invertible elements is necessarily a scalar multiple of a character. I shall discuss extensions of this result to function spaces that are not algebras. Some of these extensions rely on a theorem of Serguei Shimorin. (Joint work with Javad Mashreghi and Julian Ransford.)

Stefan Richter, University of Tennessee:
Some aspects of the function theory for the Drury-Arveson space

The Drury-Arveson space of analytic functions in the unit ball of $\mathbb{C}^d$ has been shown to be of importance for the theory of tuples of commuting Hilbert space operators. The emerging function theory for the space takes advantage of the facts that the reproducing kernel has the Pick property and that the space is a weighted Besov space.

In this talk I will speak about multipliers and cyclic vectors in the Drury-Arveson space.

William T. Ross, University of Richmond:
Inner vectors, inner functions, and zeros of analytic functions

Inspired by work of Beurling, Halmos, and Shimorin, we survey the notion of an inner vector (sometimes called an wandering vector) and how this gives us the notion of an inner function for various Hilbert spaces of analytic functions. Further inspired by Birkhoff and James, we develop a notion of inner vector (inner function) for Banach spaces of analytic functions. With all of this, we will show that inner functions for Hilbert/Banach spaces have special properties and have been, and continue to be, useful tools in describing the zeros of analytic functions.

Kristian Seip, Norges teknisk-naturvitenskapelige universitet:
Extreme values of the Riemann zeta function and its argument

It is of central importance in the theory of the Riemann zeta function $\zeta(s)$ to have as precise information as possible about the size of $\zeta(1/2 + it)$ and its argument. I will present improved lower estimates for the growth of these two functions, which in the case of the argument require the assumption that the Riemann hypothesis is true. The talk is based on joint work with Andriy Bondarenko.

Dmitry V. Yakubovich, Universidad Autónoma de Madrid :

Operator inequalities that are sufficient for similarity to a contraction

Let T be a bounded linear operator on a Hilbert space H such that

$$\alpha[T^*, T] := \sum_{n=0}^{\infty} \alpha_n T^{*n} T^n \geq 0,$$

where $\alpha(t) = \sum_{n=0}^{\infty} \alpha_n t^n$ is a rather general analytic function on the unit disc $\mathbb{D}$ with real coefficients. It will be shown that if $\alpha(t) = (1-t)\tilde{\alpha}(t)$, where $\tilde{\alpha} > 0$ on $[0, 1]$, then T is similar to a contraction.

We will write down an explicit Nagy-Foias type model for T and will discuss its consequences. It will be shown that in general, the limit of the norms $\|T^n h\|$ as n tends to infinity need not exist, but it does exist if an extra assumption on α is imposed.

Our approach is based on a factorization lemma for weighted Wiener algebras of analytic functions on the disc.

These are joint results with Glenier Bello Burguet.