Complex Analysis and Operator Theory
Analyse complexe et théorie des opérateurs
(Org: **Javad Mashreghi** (Laval University) and/et **Nina Zorboska** (University of Manitoba))

LINE BARIBEAU, Universite Laval
Hyperbolic divided differences and higher-order hyperbolic derivatives

We will give a brief survey of hyperbolic divided differences and higher-order hyperbolic derivatives for functions in the Schur class. We will also show how these ideas can be used for matrix-valued holomorphic functions to obtain results for some spectral Nevanlinna–Pick interpolation problems.

KELLY BICKEL, Bucknell University
Portraits of Rational Inner Functions

This talk focuses on two-variable rational inner functions ϕ with singularities on the two-torus $\mathbb{T}^2$. Such ϕ always possess well-behaved unimodular level sets whose analytic properties imply information about the zero set of ϕ and the fine numerical stability of ϕ near its singularities. Such results will be illustrated via pictures of key unimodular level sets. This is joint work with James Pascoe and Alan Sola.

IEVGEN BILOKOPYTOV, University of Manitoba
Which multiplication operators are surjective isometries?

Let $\mathbf{F}$ be a Banach space of continuous functions over a connected locally compact space X. We present sufficient conditions on $\mathbf{F}$ guaranteeing that the only multiplication operators on $\mathbf{F}$ that are surjective isometries are scalar multiples of the identity. The conditions are given via the properties of the inclusion operator from $\mathbf{F}$ into $\mathcal{C}(X)$, as well as in terms of geometric conditions on $\mathbf{F}$. An important tool in our investigation is the notion of Birkhoff Orthogonality.

ILIA BINDER, Universtiy of Toronto
Caratheodory convergence and weak convergence of Harmonic Measure.

We discuss several new characterizations of the classical Caratheodory convergence for simply connected domains in the plane. Some of this notions have natural generalizations for multiply-connected planar domains and even for domains in higher dimensions. The talk is based on a joint work with Cristobal Rojas (Universidad Andres Bello, Chile) and Michael Yampolsky (University of Toronto).

FLAVIA COLONNA, George Mason University
Weighted composition operators on iterated weighted-type Banach spaces of analytic functions

We study a class $\{V_n : n \geq 0\}$ of iterated weighted-type Banach spaces of analytic functions on the open unit disk of which the Bloch space and the Zygmund space are special cases. We characterize the bounded and the compact weighted composition operators on V_n thereby extending several known results in the literature. Lastly, we characterize the invertible weighted composition operators on V_n and prove that, for $n \neq 1$, a composition operator on V_n is an isometry if and only if its symbol is a rotation. This is joint work with Nacir Hmidouch.

CARL COWEN, I U P U I
Essential Spectrum of Some Composition Operators on $H^2(D)$

Let φ be an analytic function, not an automorphism, mapping the open disk into itself and suppose there is a point a with $|a| < 1$ for which $\varphi(a) = a$. The first general theorem about the spectrum of a composition operator on $H^2(D)$ with such a symbol was proved by H. Kamowitz (1975):

$$\sigma(C_\varphi) = \{\lambda : |\lambda| \leq \rho\} \cup \{\varphi'(a)^n : n = 1, 2, \cdots\} \cup \{1\}$$

where ρ is the essential spectral radius of C_φ. In joint work with Eva Gallardo-Gutiérrez, we show that the essential spectrum of C_φ is

$$\sigma_e(C_\varphi) = \{\lambda : |\lambda| \leq \rho\}$$

DOUGLAS FARENICK, University of Regina
Choquet boundaries in an operator-theoretic framework

The notion of a noncommutative Choquet boundary originates with the seminal work by W. Arveson in the late 1960s, yet it was only in 2014 that one of the most fundamental issues concerning the noncommutative Choquet boundary was resolved (by Davidson and Kennedy, building on a 2008 advance made by Arveson). In this lecture I will give an overview of the noncommutative Choquet boundary and present some explicit computations in the case of low-dimensional operator systems.

JAVAD MASHREGHI, Laval University
One-box Conditions for the Carleson measures for the Dirichlet space

We show that a finite measure μ on the unit disk is a Carleson measure for the Dirichlet space if it satisfies the Carleson one-box condition $\mu(S(I)) = O(\varphi(|I|))$, where $\varphi : (0, 2\pi] \to (0, \infty)$ is an increasing function such that $\int_0^{2\pi} (\varphi(x)/x)dx < \infty$. We also show that the integral condition on φ is sharp.

Joint work with O. El-Fallah, K. Kellay, T. Ransford.

THOMAS RANSFORD, Université Laval
Linear maps preserving inner functions

It is known that, for many holomorphic function spaces on the unit disk, a continuous endomorphism that sends outer functions to outer functions is necessarily a weighted composition operator. Here we establish the same result with 'outer' replaced by 'inner'. The proof is completely different. (Joint work with Javad Mashreghi)

MARIA TJANI, University of Arkansas
Closed range composition operators on $BMOA$

Let φ be an analytic self-map of the unit disk $\mathbb{D}$. We find necessary and sufficient conditions for the composition operator C_φ to be closed range on $BMOA$. Important ingredients are sampling and a reverse type Carleson condition due to Luecking. We extend Luecking's condition to a more general setting. This is joint work with Kevser Erdem.

MALIK YOUNSI, University of Hawaii
Analytic Capacity and Holomorphic Motions

In this talk, I will present recent joint work with S. Pouliasis and T. Ransford on the behavior of the analytic capacity of a compact set K under a holomorphic motion. More precisely, we will see that if the holomorphic motion defines a family of maps that are conformal on the complement of K, then the logarithm of the analytic capacity varies harmonically. This turns out to be false in general without the conformal assumption. This is motivated by an old result of Yamaguchi on the behavior of logarithmic capacity under analytic multifunctions.