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**Complex Analysis and Function Spaces**  
**Analyse complexe et espaces de fonctions**  
(Org: **Eric Schippers** and/et **Nina Zorboska** (Manitoba))

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**NADYA ASKARIPOUR**, University of Cincinnati  
*Poincaré series operator on spaces of automorphic forms*

Let  $R$  be a hyperbolic Riemann surface, and  $\Delta$  the unit disk. Let  $\Gamma$  be the fundamental group for  $R$ , so  $R = \Gamma \backslash \Delta$ . An automorphic form of weight  $k$  is a function  $\phi : \Delta \rightarrow \mathbb{C}$  with  $\phi(z) = \phi(\gamma z) \gamma'(z)^k$ , for any  $\gamma \in \Gamma$  and any  $z \in \Delta$ . Automorphic forms appear in various subjects of mathematics for example number theory and mathematical physics. Poincaré series is a way to construct automorphic forms. I will talk about some properties and applications of Poincaré series map on spaces of automorphic forms.

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**TATYANA BARRON**, University of Western Ontario  
*Toeplitz operators on Kähler and hyperkähler manifolds.*

This will be a survey-style talk, with discussion of some open questions at the end.

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**FLAVIA COLONNA**, George Mason University  
*Norm and essential norms of weighted composition operators acting on reproducing kernel Hilbert spaces of analytic functions.*

Let  $\psi$  be an analytic function on the open unit disk  $\mathbb{D}$  and let  $\varphi$  be an analytic self-map of  $\mathbb{D}$ . The weighted composition operator with symbols  $\psi$  and  $\varphi$  is defined on the space of analytic functions on  $\mathbb{D}$  as

$$W_{\psi, \varphi} f = \psi \cdot (f \circ \varphi).$$

Let  $\mathcal{H}$  be a reproducing kernel Hilbert space of analytic functions on the unit disk. In this talk, we determine conditions on  $\mathcal{H}$  and its kernel  $K$  which allow us to characterize the bounded and the compact weighted composition operators from  $\mathcal{H}$  into weighted-type Banach spaces. We obtain an exact formula for the operator norm and an approximation of the essential norm of the operators mapping into the space  $H_{\mu}^{\infty}$ , where the weight  $\mu$  is a positive continuous function on  $\mathbb{D}$ . We obtain an exact formula of the essential norm for a large class of weighted Hardy Hilbert spaces. We also discuss the case when the Hilbert space  $\mathcal{H}$  is replaced by a general Banach space of analytic functions such that all point evaluations are bounded linear functionals. This is joint work with Maria Tjani.

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**ZELJKO CUCKOVIC**, University of Toledo, Ohio  
*From the  $\bar{\partial}$ -Neumann operator to Axler-Zheng Theorem*

When studying compactness of Toeplitz and Hankel operators on domains in  $\mathbb{C}^n$  we show that the  $\bar{\partial}$ -Neumann operator plays an important role. We use this approach to prove a version of Axler-Zheng Theorem on a class of smooth bounded pseudoconvex domains. This is joint work with Sonmez Sahutoglu.

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**RICHARD FOURNIER**, Dawson College and CRM (Montreal)  
*An interpolation formula for the derivative of a polynomial*

We study an elegant interpolation formula arising from the work of Frappier, Rahman and Ruscheweyh (Trans. Amer. Math. Soc. 1985). We give a new and simple proof of that formula based on elementary properties of bound-preserving operators on classes of polynomials and we relate it to another improvement of the polynomial Bernstein inequality due to Ruscheweyh (1982, see MR0674296 ).

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**OLEG IVRII**, Harvard University  
*Lavaurs-Epstein boundary*

In this talk, I will discuss the Teichmüller and Weil-Petersson metrics on a space of decorated parabolic Blaschke products.

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**MYRTO MANOLAKI**, University of Western Ontario  
*Holomorphic functions with universal Taylor series and their boundary behaviour*

A holomorphic function on a planar domain  $\Omega$  is said to possess a universal Taylor series about a point in  $\Omega$  if the partial sums of the Taylor series have the following surprising property: they can approximate arbitrary polynomials on arbitrary compact sets  $K$  outside  $\Omega$  (provided only that  $K$  has connected complement). In the last few years, central questions about universal Taylor series have been addressed using potential theory. In this talk we will discuss some of these results and in particular we will focus on the boundary behaviour of such functions.

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**DAVID MINDA**, University of Cincinnati  
*Rescaling non-uniformly Lipschitz sequences*

In 1975 Zalcman established a rescaling characterization for a non-normal family of meromorphic functions that has proved important in function theory and related areas. The standard proof of Zalcman's Rescaling Theorem is analytic in nature. There is a geometric approach to Zalcman's result based on a simple method of rescaling a non-uniformly Lipschitz sequence of meromorphic functions. This approach yields a variation on Zalcman's original Rescaling Theorem from which it is possible to obtain the original result of Zalcman as a corollary. (Joint work with A.F. Beardon)

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**BRYAN PENFOUND**, University of Winnipeg  
*Matrix vector products of the coefficients of the conformal welding maps*

The Conformal Welding Theorem states that, given a quasi-symmetry  $\phi$  on the unit circle, there exists a unique pair of quasiconformally extendible, one-to-one and holomorphic maps  $F$  and  $G$  satisfying  $G^{-1} \circ F = \phi$ . We first introduce power matrices, matrix representations for formal power series at 0 and at  $\infty$ . Analyzing the block structure of these representations, we demonstrate that the coefficients of  $F$  and  $G$  can be determined using convergent matrix operations in the case when  $\phi$  is analytic on an annulus.

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**STAMATIS POULIASIS**, Laval University  
*Condenser capacity, exponential Blaschke products and universal covering maps*

First we shall present some basic facts about condenser capacity, Green functions and their relation with complex analysis. Then we will examine the asymptotic behavior of the capacity of the inverse image of a condenser under exponential Blaschke products and universal covering maps.

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**DAVID RADNELL**, American University of Sharjah  
*Determinant Line Bundles in Conformal Field Theory*

Conformal field theory requires the study of the determinant lines bundle over the moduli space of Riemann surfaces with parameterized boundary components. This moduli space is closely connected to the infinite-dimensional Teichmüller space of bordered Riemann surfaces. Additional regularity of the boundary curves is needed in the construction of the determinant line bundle, and so a refinement of the Teichmüller space must be used. A general overview of the subject will be given, followed by some recent results.

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**TOM RANSFORD**, Université Laval

*One-box conditions for Carleson measures for the Dirichlet space*

A measure  $\mu$  on the unit disk is called a Carleson measure for the Dirichlet space  $\mathcal{D}$  if  $\mathcal{D} \subset L^2(\mu)$ . Several characterizations of such measures are known, none of them simple. In this talk, I shall discuss a family of simple sufficient conditions for  $\mu$  to be a Carleson measure for  $\mathcal{D}$ , in the spirit of Carleson's original characterization of Carleson measures for the Hardy spaces. (Joint work with Omar El-Fallah, Karim Kellay and Javad Mashreghi.)

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**OLIVER ROTH**, University of Würzburg

*The Schramm-Loewner equation for multiple slits*

We prove that any disjoint union of finitely many simple curves in the upper half-plane can be generated in a unique way by the chordal multiple-slit Loewner equation with constant weights.

This is joint work with Sebastian Schleissinger.

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**RACHEL WEIR**, Allegheny College

*Normal Weighted Composition Operators on Weighted Dirichlet Spaces*

We characterize the normal weighted composition operators  $W_{\psi,\varphi}$  on the Dirichlet space  $\mathcal{D}$  in the case when  $\varphi$  is a linear-fractional self-map of the unit disk  $\mathbb{D}$  with fixed point  $p \in \mathbb{D}$  and  $\psi$  is bounded and analytic on  $\mathbb{D}$ . In particular, we show that no nontrivial normal weighted composition operators exist on the Dirichlet space, that is,  $W_{\psi,\varphi}$  is normal on  $\mathcal{D}$  if and only if  $\psi$  is constant and  $\varphi(z) = cz$ , where  $|c| \leq 1$ . We also extend some of these results to weighted Dirichlet spaces.

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**BROCK WILLIAMS**, Texas Tech University

*Biological Applications of Conformal Invariants*

We will describe our work connecting conformal invariants as estimated by circle packings with properties of disease simulations. Using our new LAZARUS lab's GPU cluster, we can conduct large-scale simulations of disease outbreaks in a network and study the effect of the structure of the network as measured by discrete extremal length on the survival rate of the outbreak.