

# Conference CIRM 3465

30-03 – 03-04 2026

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## TALKS: title and abstract

Alexandru Aleman:

*About cyclicity in weighted Dirichlet spaces.*

Abstract: Given a bounded operator  $T$  acting on a Hilbert space  $H$ , a vector  $x \in H$  is called *cyclic* if  $\{p(T)x : p \text{ polynomial}\}$  is dense in  $H$ . This talk is concerned with the case when  $T$  is the forward shift on a class of Dirichlet-type spaces on the unit disc and pertains also to the case of several complex variables, where the definition of cyclicity is modified accordingly. It is quite obvious that in such Hilbert spaces of analytic functions, cyclic elements cannot have zeros in the domain in question, but sufficient conditions for cyclicity involves more subtle ideas. For example, one could consider the appropriate capacity of the set of zeros of the radial limits of the function in question a path which leads to the very natural, but still unsolved Brown-Shields conjecture. Alternatively, the lack of "boundary zeros" of the function  $f$  is also implied if  $1/f$ , or  $\log f$  belongs to the space and it turns out that these conditions imply cyclicity for such Dirichlet-type spaces. They can also be considered for Dirichlet-type spaces on the unit ball. The aim of the talk is to give an account about some recent results in this direction.

The material is based on joint work with S. Richter, and also with K.M. Perfekt, S. Richter, C. Sundberg, and J. Sunkes.

Frédéric Bayart :

*Highlights from Hervé Queffélec's work on Dirichlet series*

Abstract: We shall point out highlights of Hervé's work on Dirichlet series, in three different directions: quasi-sure properties of Dirichlet series, harmonic analysis and Dirichlet series, operator theory and Dirichlet series

Ole Fredrik Brevig :

*Norms of composition operators on the Hardy space of Dirichlet series .*

Abstract: I will discuss several interconnected problems about composition operators on the Hardy space of Dirichlet series that concern the relationship between the norm of the composition operator and the geometric properties of its symbol. Some results align well with corresponding results for the classical Hardy space in the unit disc, while for other results we discover new phenomena.

Isabelle Chalendar :

*When analytic Number Theory meets composition operators .*

Abstract: In this talk we will see several examples where analytic number theory makes appearance in the spectral study of (weighted or not) composition operators induced by rotation.

Stéphane Charpentier :

*Composition operators on  $\ell_a^p$  spaces.*

Abstract: We survey classical and recent developments concerning composition operators on  $\ell_a^p$  spaces for  $p \neq 2$ , with particular emphasis on recent contributions by P. Lefèvre, D. Li, H. Queffélec and L. Rodriguez-Piazza. We also present new results obtained jointly with Nicolas Espoullier and Rachid Zarouf.

Olivia Constantin :

*Some new Applications of Classical Complex Analysis to Water Waves .*

Abstract: Relying several results by Hardy et al., we establish convexity and monotonicity properties of fundamental flow quantities, including the kinetic energy and the flow force flux, for two-dimensional irrotational waves. Our results apply to both solitary and periodic wave solutions. The analysis highlights the role of complex methods in revealing qualitative features of nonlinear wave flows.

Emma D’Aniello :

*The specification property in Linear Dynamics, and its connections to other notions of chaos.*

Abstract: The Specification Property, introduced by Rufus Bowen in the 1970’s, is a very meaningful notion in topological dynamics, as it concerns the feature of arbitrary orbit segments being approximated by a single, periodic orbit with a uniform transition time. In this talk, we show the existence of a wide class of linear operators for which this notion of chaos coincides with other classical ones.

Udayan Darji :

*Dynamics of Composition Operators: From Dissipative to Conservative Systems .*

Abstract: Weighted backward shifts serve as a foundational tool in linear dynamics. Many dynamical characterizations established in the setting of weighted shifts extend naturally to composition operators on  $L^p$  spaces over dissipative systems. However, the behavior in the conservative setting remains distinct. In this talk, we investigate the dynamics of composition operators acting on  $L^p$  spaces over conservative systems, demonstrating how they differ markedly from their dissipative counterparts. We will place a particular emphasis on the structural role of odometers in these systems.

Verónica Dimant:

*Composition operators as distinguished elements of the vector-valued spectrum.*

Abstract: Given a complex Banach space  $X$ , we consider the uniform algebra  $\mathcal{H}^\infty(B_X)$  of bounded holomorphic functions on the open unit ball  $B_X$ , together with its subalgebra  $\mathcal{A}_u(B_X)$  of uniformly continuous holomorphic functions on  $B_X$ . Distinguished elements in the spectrum of  $\mathcal{H}^\infty(B_X)$  (respectively,  $\mathcal{A}_u(B_X)$ ), that is, the nonzero multiplicative linear functionals, are given by evaluations at points in  $B_{X''}$  (resp.,  $\overline{B_{X''}}$ ). These elements give rise to a natural fibering over  $\overline{B_{X''}}$  that has proven to be very useful in the research about the spectra.

In the same spirit, we study what we call *vector-valued spectrum*, the set of nonzero multiplicative linear mappings from either  $\mathcal{H}^\infty(B_X)$  or  $\mathcal{A}_u(B_X)$  to  $\mathcal{H}^\infty(B_Y)$ . The distinguished elements in this setting are composition operators with symbol in  $\mathcal{H}^\infty(B_Y, X'')$ , which induce a convenient fibering structure. In this talk, we present this construction and discuss several results regarding the size of the fibers and their interaction with Gleason parts.

The talk is based on joint work with Joaquín Singer.

Luis C. García Lirola :

*Holomorphic Lipschitz functions and composition operators .*

Abstract: We analyze composition operators induced by holomorphic Lipschitz functions between the unit balls of two complex Banach spaces. We show that the space of holomorphic Lipschitz functions admits a canonical predual, called the holomorphic Lipschitz-free space, in such a way that every composition operator is the adjoint of an operator acting between the corresponding preduals. We examine the analogies and differences between this space and the classical Lipschitz-free space, and we apply this framework to the study of composition operators, characterizing the multiplicative operators and analyzing their compactness and weak compactness properties.

This work is part of a joint project with R. Aron, V. Dimant, J. Guerrero Viu, and A. Procházka.

Karim Kellay :

*Improved Kahane–Katznelson Estimates and Interpolation in the Analytic Wiener Algebra.*

Abstract: We study the quotient algebra  $W^+/I^+(E)$ , where  $W^+$  denotes the analytic Wiener algebra and  $I^+(E)$  is the closed ideal of functions vanishing on a closed subset  $E$  of the unit circle. For sets  $E$  satisfying suitable geometric conditions, we obtain quantitative estimates for the norms of the exponential functions  $e^{-int}$  in this quotient algebra. These estimates extend the results of Kahane and Katznelson and yield interpolation results for certain classes of functions in Beurling algebras by functions in  $W^+$ . This is joint work with O. El-Fallah and Y. Omari.

Athanasios Kouroupis :

*On the analytic continuation and convergence of Dirichlet series.*

Abstract: This talk concerns the behavior of Dirichlet series in the regions where they can be extended as analytic functions. We will begin with a brief introduction to the theory, presenting classical results of Bohr and Titchmarsh, and then examine modern generalizations, studying when a convergent Dirichlet series can represent such an analytic continuation.

The talk is based on joint work with Ole Fredrik Brevig.

Łukasz Kosiński :

*Interpolation problem in the polydisc and related problems.*

Abstract: We shall discuss recent developments on the interpolation problem and its connections with other problems that arise in Complex Analysis and Operator Theory.

Pascal Lefèvre :

*A glimpse of Hervé's work in harmonic analysis.*

Abstract: Hervé Queffélec's work in harmonic analysis started in the early 70's. In this talk, we shall mainly focus on Hervé's contributions to the theory of thin sets in harmonic analysis.

María J. Martín :

*On Composition Operators on the Bloch Space.*

Abstract: In this talk we present some recent progress on the computation of the norm of composition operators acting on the Bloch space, which consists of analytic functions in the unit disk endowed with the norm  $\|f\|_{\mathcal{B}} = |f(0)| + \sup_{z \in \mathbb{D}} (1 - |z|^2)|f'(z)|$ .

The main approach relies on the hyperbolic geometry of the unit disk. We show that the hyperbolic derivative of the symbol, together with the hyperbolic distance between 0 and  $\varphi(0)$ , provides an upper bound for the norm of the composition operator. These geometric quantities offer a natural framework for controlling the norm and lead to useful estimates and, in many cases, exact norm formulas. Several representative examples — including affine symbols and Blaschke products — are discussed, along with conditions under which the obtained bounds are sharp.

Rubén Martínez-Avendaño :

*Dynamics of composition operators in the little Lipschitz space of a tree.*

Abstract: The little Lipschitz space of a tree is the space of complex-valued functions on the vertices of a tree such that their “derivatives” tend to zero away from the root. In this talk we will give sufficient and necessary conditions for multiples of composition operators defined on this space to be hypercyclic or even mixing.

Javad Mashregui :

*The Bounded Approximation Property and Its Applications to Polynomial Approximation.*

Abstract: The bounded approximation property (BAP) is a central concept in Banach space theory. The existence of Banach spaces lacking this property, long an open question, was first established by Per Enflo in 1973. In this work, we consider Banach spaces of holomorphic functions on the unit disk and introduce the notion of a linear polynomial approximation scheme (LPAS), namely, a sequence of bounded linear operators mapping the space into itself such that, for each function, the resulting sequence of polynomials converges in norm. We show that a complete characterization of spaces admitting such schemes naturally involves the BAP. In particular, and somewhat surprisingly, the mere density of polynomials in the space does not guarantee the existence of a polynomial approximation scheme; the space must also satisfy the bounded approximation property.

Valentin Matache:

*Weighted Composition Operators on Hardy–Smirnov Spaces.*

Abstract: By *composition operators* and *weighted composition operators*, we mean operators on function spaces  $\mathcal{S}$  of type  $f \rightarrow f \circ \varphi$  for  $f \in \mathcal{S}$ , respectively  $f \rightarrow \psi f \circ \varphi$  for  $f \in \mathcal{S}$ , where  $\varphi$  and  $\psi$  are fixed functions. We refer to fixed function  $\varphi$  as the *composition symbol* of the inducing operator, and in the case of weighted composition operators, the fixed function  $\psi$  is called the *weight* or even the *weight symbol* of the given operator. We will discuss how weighted composition operators appear as the natural isometries of the non–Hilbert Hardy spaces over a disc, and what the status of the isometric weighted composition operators on  $H^2$  is, where  $H^2$  is the Hilbert Hardy space over the unit disc. The Hardy–Smirnov spaces are spaces of analytic functions over simply connected domains. They are not conformal copies of  $H^2$  which generates a variety of properties. Many can be understood by noting that there is always an onto isometric transform which is a weighted composition operator and maps the given Hardy–Smirnov space onto the corresponding classical Hardy space over a circular disc. In this talk we will report on that property and its consequences.

Artur Nicolau :

*Contractive analytic selfmappings of the disc.*

Abstract: An analytic selfmapping of the unit disc is called contractive if its hyperbolic derivative is uniformly bounded by a constant smaller than one. Descriptions of contractive analytic mappings which involve Bekollé–Bonami weights, inner–outer factorization, boundary distortion and composition operators, will be discussed.

Inyoung Park:

*Compact differences of Composition operators on the Hardy space.*

Abstract: Motivated by the study of path-connected components in the space of composition operators, the theory of differences of composition operators has been developed over several decades. In this talk, I present characterizations of the compactness of differences of composition operators on the Hardy space in terms of Carleson measure and Reproducing kernel functions. Moreover, we study the space of composition operators on the Hardy space equipped with the uniform operator topology and characterize when two composition operators are linearly connected. As an application, we show that the set of all compact composition operators on the Hardy space is polygonally connected.

This talk is based on joint work with Boo Rim Choe, Koeun Choi, and Hyungwoon Koo.

Karl-Mikael Perfekt:

*Compact composition operators on spaces of Dirichlet series.*

Abstract: I aim to give an overview of the current research frontier on compact composition operators on Hardy spaces and other Hilbert spaces of Dirichlet series. I will discuss both the case of characteristic zero and the case of positive characteristic, where a full description of the compact operators still eludes us.

Luis Rodríguez-Piazza :

*Some results on composition operators in the unit disc.*

Abstract. The aim of this talk is to review some of the results obtained by Hervé Queffélec (and his colleagues) on composition operators in the unit disc. We will deal with different spaces such as Hardy and Bergman spaces, Dirichlet spaces, Hardy and Bergman Orlicz spaces and other function spaces.

If  $\varphi: \mathbb{D} \rightarrow \mathbb{D}$  is holomorphic, the composition operator  $C_\varphi$  of symbol  $\varphi$  is simply

$$C_\varphi: f \mapsto f \circ \varphi, \quad \text{for all } f \in \text{Hol}(\mathbb{D}).$$

Given a Banach space of analytic functions  $X \subset \text{Hol}(\mathbb{D})$ , one tries to characterize the properties of the operator  $C_\varphi: X \rightarrow X$  in terms of the properties of the symbol  $\varphi$ . I will review some of the characterizations we obtained. This will require the usage and explanation of concepts such as pullback measures, Carleson windows, Nevanlinna counting functions,...

I will try to illustrate the application of these characterizations with some examples.

Eero Saksman:

*On a random Dirichlet series and integral means spectra.*

Abstract: We consider a random Dirichlet series that has some interesting properties with regards to integral means spectrum problems in univalent mapping. The talk is based on collaboration with Bertrand Duplantier (Universite Paris-Saclay, CEA, CNRS) and Veronique Gayraud (Aix Marseille Univ.).

Daniel Seco :

*Zero-free regions of the Riemann zeta function and approximation in weighted Dirichlet spaces.*

Abstract: We study zero-free regions of the Riemann zeta function related to an approximation problem in a weighted Dirichlet space which is known to be equivalent to the Riemann Hypothesis since the work of Báez-Duarte. We prove, indeed, that analogous approximation problems for other standard weighted Dirichlet spaces give conditions so that other right half-planes become zero-free. Moreover, we extend such results to a large family of weighted Banach spaces of analytic functions. As a particular instance, we provide a new equivalent formulation of the Prime Number Theorem. This is a joint work with E. Gallardo-Gutiérrez.

## POSTER SESSION: title and abstract

Ihab Al Alam :

*Characterization of the membership of the Riemann-Liouville semigroup to some class of operators.*

Abstract: In this work, we revisit the Riemann–Liouville analytic semigroup. In particular, we completely characterize the membership to the Schatten class  $\mathcal{S}^r$  on  $L^2(0, 1)$ , as well as the membership to the class of nuclear operators on  $L^p(0, 1)$ ,  $p \geq 1$ , and the membership to the ideal of absolutely  $r$ -summing operators for any  $r \geq 1$ .

Viktor Andersson :

*Montel's theorem and composition operators for analytic almost periodic functions .*

Abstract: We consider the space  $H_{ap}^\infty$  consisting of all bounded analytic functions on the open right half-plane  $\mathbb{C}_0$  that are almost periodic on all strictly smaller half-planes. We show that a strong version of Montel's theorem holds for this space, generalizing the corresponding results for the  $H^\infty$ -space of bounded Dirichlet series. We also give a characterization of the symbols that induce bounded composition operators on  $H_{ap}^\infty$ , as well as the subspace  $A_{ap}$  of those elements of  $H_{ap}^\infty$  that are uniformly continuous on  $\mathbb{C}_0$ . Finally, we characterize compactness of composition operators on  $H_{ap}^\infty$ , and certain natural subspaces of it.

Vinícius V. Fávaro:

*Expansivity for operators on locally convex spaces.*

Abstract: A fundamental concept in dynamical systems is that of expansivity. Expansive and uniformly expansive operators on Banach spaces were studied by several authors. On the other hand, many important linear dynamical systems are defined on spaces that are not normable. In this work we introduce and investigate the notions of topological expansivity and uniform topological expansivity for operators on locally convex spaces. We prove that uniformly topologically expansive operators on Hausdorff locally convex spaces are never Li-Yorke chaotic. This result

generalizes a result obtained by Bernardes Jr et al. in 2018, in the case of Banach spaces. This work is based on a joint work with N. Bernardes Jr, B. Caraballo, U. Darji and A. Peris of 2025.

Mikhail Mironov :

*Sampling and interpolation in small Fock spaces .*

Abstract: In this poster, we study sampling and interpolation problems in small Fock spaces. We recall the classical results for Fock spaces and their extensions to supercritical weights. The main focus is on critical weights of order  $\log^2 |z|$ . We present a unified description of complete interpolating sequences and sets of shift-invariant sampling for small Fock spaces for the full range  $0 < p \leq \infty$ .

Jérémie Moukambi :

*Classes of weights related to Ornstein-Uhlenbeck operators.*

Abstract: Let  $L = \Delta + 2x\nabla$ , the Ornstein-Uhlenbeck operator acting on  $L^2(\mathbb{R}^d, d\gamma)$ , and let  $\exp(-tL)$  be its associated semigroup. It is known that  $\exp(-tL)$  is contractive on  $L^p(d\gamma)$  (for  $1 \leq p \leq +\infty$ ) and that operations derived from it, such as the maximal operator, the Riesz transforms, the Littlewood-Paley functional, as well as holomorphic spectral multipliers, are also bounded on  $L^p(d\gamma)$  (for  $1 < p < +\infty$ ). One of our questions is whether these operators remain bounded when the measure is modified by a weight, that is, a positive measurable function.

In our poster, we will present a new class of weights, larger than the Muckenhoupt class, sufficient to ensure weighted  $L^p$  boundedness of the maximal operator  $\sup_{t>0} e^{(-tL)}|f|$  and the Riesz transform  $\nabla(-L)^{(-1/2)}$ , associated with the Ornstein-Uhlenbeck semigroup.

Thomas Lamby :

*On Composition Operators in Generalized Sobolev Spaces Defined by Bessel-Type Operators.*

Abstract: We consider composition operators  $T_f(g) = f \circ g$  on generalized Sobolev spaces defined through a Bessel-type operator with parameter function  $\phi$ . These spaces extend classical Sobolev and Bessel potential scales. We discuss general questions of invariance, boundedness and regularity of  $T_f$ , and how assumptions on  $\phi$  influence them.

Antoni López Martínez:

*Chain recurrent subspaces that are not chain recurrent .*

Abstract: We exhibit the existence of continuous linear operators acting on Banach (and even Hilbert) spaces whose restrictions to their respective closed linear subspaces of chain recurrent vectors are not chain recurrent operators. This example completely solves in the negative a problem posed by Nilson C. Bernardes Jr. and Alfred Peris on chain recurrence in Linear Dynamics.

Pouriya Torkinejad Ziarati:

*Examples of critically cyclic functions in the Dirichlet spaces of the ball.*

Abstract: In this work, we construct examples of holomorphic functions in  $D_2(\mathbb{B}_2)$ , the Dirichlet space on  $\mathbb{B}_2$ , for which there exists an index  $\alpha_c \in [\frac{1}{2}, 2]$  such that the function is cyclic in  $D_\alpha(\mathbb{B}_2)$  if and only if  $\alpha \leq \alpha_c$ . To this end, we use the notion of *interpolation sets* in smooth ball algebras, as studied by Bruna and Ortega ('86) and Chaumat and Chollet ('87).

Aakriti Sharma:

*Some generalised Complex symmetric operators on analytic function spaces .*

Abstract: We will discuss some concrete operators Multiplication operator, composition operator, weighted composition operators and their generalisations. Then we will study the complex symmetric property of these operators by using different techniques.