Mathematical Analysis in Athens

A conference to honor
Aristides Katavolos and Vassili Nestoridis

Department of Mathematics
University of Athens
December 15-19, 2017

Speakers

Evgeny Abakumov (Paris): *Proper holomorphic embeddings, radial approximation, and tropical power series*

Nicholas Alikakos (Athens): *On the Structure of Phase Transition Maps*

Anthony Carbery (Edinburgh): *Joints and multijoints*

Stéphane Charpentier (Marseille): *Hypercyclic sets*

Adam Dor-On (Haifa): *Operator algebras for higher rank structures and applications to factorial languages*

Theodosios Douvropoulos (Paris): *Perhaps the best way to count: Using complex analytic geometry and Riemann's existence theorem*

Georgios Eleftherakis (Patras): *Morita embeddings for dual operator algebras*

Alexandros Eskenazis (Princeton): *Non-positive curvature is not coarsely universal*

Grigoris Fournodavlos (Cambridge): *Singularity formation in black hole interiors*

Maria Fragoulopoulou (Athens): *Bounded and unbounded generalizations of C^*-algebras*

Nikos Frantzikinakis (Crete): *An ergodic approach to the Chowla and the Sarnak conjecture*

Damien Gaboriau (Lyon): *On Approximability in Orbit Equivalence and Applications to Bernoulli Percolation*

Stephen Gardiner (Dublin): *Taylor series, universality and potential theory*

Paul Gauthier (Montreal): *Approximation by Random Complex Polynomials and Rational functions*

Michail Gerapetritis (Philadelphia): *The Mirror Symmetry conjectures*

Loukas Grafakos (Missouri): *A sharp version of the Hörmander multiplier theorem*

Alexander Helemskii (Moscow): *Projectivity, freeness and tensor products in matricially normed spaces*

Marina Iliopoulou (Berkeley): *Sharp estimates for Hörmander-type operators with positive-definite phase*

Evgenios Kakariadis (Newcastle): *Amalgamated free products of operator algebras*

Eleftherios Kastis (Lancaster): *The norm closed triple semigroup algebra*

Emmanouil Katsoprinakis (Crete): *Counterexamples to a question of S. K. Pichorides*

Elias Katsoulis (East Carolina): *All semicrossed products of operator algebras are stably isomorphic to crossed products*

Mihalis Kolountzakis (Crete): *Steinhaus sets: a geometric question's approach via Harmonic Analysis*

Manuel Maestre (Valencia): *Some properties of the algebra of the ball*

Konstantinos Makridis (Athens): *Nowhere differentiable complex functions*

Myrto Manolaki (South Florida): *Overconvergence and universality of Dirichlet series*

Stylianos Negrepontis (Athens): *The deductive power of Mathematics derives from its paradoxical nature*

Evita Nestoridi (Princeton): *Optimal strong stationary times for random walks on the chambers of a hyperplane arrangement*

Christoforos Panagiotis (Warwick): *Percolation and Complex Analysis*

Nickos Papadatos (Athens): *On the completeness of classical orthogonal polynomials*

Athanase Papadopoulos (Strasbourg): *On some theorems on spherical geometry from Menelaus' Spherics*

John Pardon (Princeton): *Wrapped Floer theory on Liouville sectors*

Yiannis Petridis (London): *Functional analytic methods for counting problems in number theory and geometry*

Stephen Power (Lancaster): *Semigroup Operator Algebras: An Anglo Greek View*

Edward Saff (Vanderbilt): *The Chebyshev Problem for Riesz Potentials*

Georgios Sakellaris (Barcelona): *Green's function for second order elliptic equations with singular lower order coefficients*

Aristomenis Siskakis (Thessaloniki): *Spaces of Dirichlet series and multiplicative Hankel forms*

Yiorgos Smyrlis (Cyprus): *Optimal analyticity estimates for non-linear dispersive-dissipative systems*

Nikos Stylianopoulos (Cyprus): *Since Approximation Theory is already there... Bring Potential Theory to Operator Theory!*

Samis Trevezas (Athens): *Asymptotic calculus with a functional analytic approach for estimation in Markov type models*

Nikos Tsirivas (Ioannina): *Determination of a universal Taylor series*

Lyudmyla Turowska (Gothenburg): *Compact operator synthesis and reduced spectral synthesis in harmonic analysis*

Vagia Vlachou (Patras): *20 years of Universal Taylor Series*

Ilias Zadik (MIT): *The Representability question in Mixed Integer Convex Programming*

Talks

The plenary talks will take place in the amphitheater "Constantine Carathéodory". In the afternoons there will be two parallel sessions at the Amphitheatres A23 and A24. The Study Room will be open all day long for informal discussions. Coffee will be served there. All the above are located on the second floor of the Department of Mathematics of the National and Kapodistrian University of Athens.

Friday, December 15, 2017

09:15-09:30 – *Welcome*

09:30-10:20 – **Stephen Power**, *Semigroup Operator Algebras: An Anglo Greek View.*

10:30-11:00 – *Coffee*

11:00-11:50 – **Stephen Gardiner**, *Taylor series, universality and potential theory.*

12:00-12:50 – **Nicholas Alikakos**, *On the Structure of Phase Transition Maps.*

13:00-15:00 – *Lunch*

15:00-15:50 – **Paul Gauthier**, *Approximation by Random Complex Polynomials and Rational functions.*

16:00-16:35 – **Nikos Stylianopoulos**, *Since Approximation Theory is already there... Bring Potential Theory to Operator Theory!*

16:00-16:35 – **Evgeny Abakumov**, *Proper holomorphic embeddings, radial approximation, and tropical power series.*

16:40-17:00 – *Coffee*

17:00-17:35 – **Nickos Papadatos**, *On the completeness of classical orthogonal polynomials.*

17:00-17:35 – **Konstantinos Makridis**, *Nowhere differentiable complex functions.*

17:50-18:25 – **Alexandros Eskenazis**, *Non-positive curvature is not coarsely universal.*

17:50-18:25 – **Nikos Tsirivas**, *Determination of a universal Taylor series.*

18:40-19:15 – **Michail Gerapetritis**, *The Mirror Symmetry conjectures.*

18:40-19:15 – **Emmanouil Katsoprinakis**, *Counterexamples to a question of S. K. Pichorides.*

Saturday, December 16, 2017

09:30-10:20 – **Anthony Carbery**, *Joints and multijoints.*

10:30-11:00 – *Coffee*

11:00-11:50 – **Nikos Frantzikinakis**, *An ergodic approach to the Chowla and the Sarnak conjecture.*

12:00-12:50 – **Athanase Papadopoulos**, *On some theorems on spherical geometry from Menelaus' Spherics.*

13:00-15:00 – *Lunch*

15:00-15:50 – **Mihalis Kolountzakis**, *Steinhaus sets: a geometric question's approach via Harmonic Analysis.*

16:00-16:35 – **Maria Fragoulopoulou**, *Bounded and unbounded generalizations of C*-algebras.*

16:00-16:35 – **Edward Saff**, *The Chebyshev Problem for Riesz Potentials.*

16:40-17:00 – *Coffee*

17:00-17:35 – **George Eleftherakis**, *Morita embeddings for dual operator algebras.*

17:00-17:35 – **Aristomenis Siskakis**, *Spaces of Dirichlet series and multiplicative Hankel forms.*

17:50-18:25 – **Yiorgos Smyrlis**, *Optimal analyticity estimates for non-linear dispersive-dissipative systems.*

17:50-18:25 – **Vagia Vlachou**, *20 years of Universal Taylor Series.*

18:40-19:30 – **Elias Katsoulis**, *All semicrossed products of operator algebras are stably isomorphic to crossed products.*

Monday, December 18, 2017

09:30-10:20 – **Alexander Helemskii**, *Projectivity, freeness and tensor products in matricially normed spaces.*

10:30-11:00 – *Coffee*

11:00-11:50 – **John Pardon**, *Wrapped Floer theory on Liouville sectors.*

12:00-12:50 – **Damien Gaboriau**, *On Approximability in Orbit Equivalence and Applications to Bernoulli Percolation.*

13:00-15:00 – *Lunch*

15:00-15:50 – **Stephane Charpentier**, *Hypercyclic sets.*

16:00-16:35 – **Evgenios Kakariadis**, *Amalgamated free products of operator algebras.*

16:00-16:35 – **Theodosios Douvropoulos**, *Perhaps the best way to count: Using complex analytic geometry and Riemann's existence theorem.*

16:40-17:00 – *Coffee*

17:00-17:35 – **Adam Dor-On**, *Operator algebras for higher rank structures and applications to factorial languages.*

17:00-17:35 – **Myrto Manolaki**, *Overconvergence and universality of Dirichlet series.*

17:50-18:25 – **Eleftherios Kastis**, *The norm closed triple semigroup algebra.*

17:50-18:25 – **Evita Nestoridi**, *Optimal strong stationary times for random walks on the chambers of a hyperplane arrangement.*

18:40-19:30 – **Yiannis Petridis**, *Functional analytic methods for counting problems in number theory and geometry.*

Tuesday, December 19, 2017

09:30-10:20 – **Manuel Maestre**, *Some properties of the algebra of the ball.*

10:30-11:00 – *Coffee*

11:00-11:50 – **Lyudmyla Turowska**, *Compact operator synthesis and reduced spectral synthesis in harmonic analysis.*

12:00-12:50 – **Marina Iliopoulou**, *Sharp estimates for Hörmander-type operators with positive-definite phase.*

13:00-15:00 – *Lunch*

15:00-15:35 – **Samis Trevezas**, *Asymptotic calculus with a functional analytic approach for estimation in Markov type models.*

15:00-15:35 – **Loukas Grafakos**, *A sharp version of the Hörmander multiplier theorem.*

15:50-16:25 – **Ilias Zadik**, *The Representability question in Mixed Integer Convex Programming.*

15:50-16:25 – **Christoforos Panagiotis**, *Percolation and Complex Analysis.*

16:40-17:15 – **Georgios Sakellaris**, *Green's function for second order elliptic equations with singular lower order coefficients.*

16:40-17:15 – **Grigoris Fournodavlos**, *Singularity formation in black hole interiors.*

17:20-17:40 – *Coffee*

17:40-18:30 – **Stylianos Negrepontis**, *The deductive power of Mathematics derives from its paradoxical nature.*

Abstracts

Evgeny Abakumov, University of Paris-Est.

Proper holomorphic embeddings, radial approximation, and tropical power series

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We study the problem of approximation of radial weights on the unit disc and the complex plane by finite sums of moduli of holomorphic functions. Relations to other approximation problems are discussed. As applications, quantitative aspects of proper holomorphic embeddings of planar domains and complex balls into $\mathbb{C}^N$ are considered, as well as some questions of operator theory in growth spaces.

The talk is based on joint work with E. Dubtsov.

Nicholas Alikakos, National and Kapodistrian University of Athens.

On the Structure of Phase Transition Maps

The scalar Allen-Cahn equation models coexistence of two phases, and is related to Minimal Surfaces. The 1978 De Giorgi conjecture that has been settled relatively recently, is the PDE analog of the celebrated result of Simons on the flatness of minimal cones in low dimensions.

The vector Allen-Cahn equation models coexistence of three or more phases and is related to singular minimal cones (triple junctions in the plane, four junctions in $\mathbb{R}^3$ etc). These are minimal objects with a hierarchical structure. The analog of the De Giorgi question in the vector case is open.

After stating an existence theorem for equivariant solutions under a reflection group, we focus on vector extensions of the Caffarelli-Cordoba Density Estimates. Utilizing these we obtain a detailed description of the minimizing solutions in the equivariant class, analogous to that for singular cones.

Anthony Carbery, University of Edinburgh.

Joints and multijoints

We discuss an alternative approach to the recent theorem of Ruixiang Zhang on joints and multijoints. This is joint work with Marina Iliopoulou.

Stéphane Charpentier, Aix-Marseille Université.

Hypercyclic sets

A bounded linear operator T on a Banach or Fréchet space X is said to be hypercyclic if there exists a vector x in X whose orbit $\mathrm{Orb}(x,T) := \{T^n x,\, n \geq 0\}$ under T is dense in X. Two classical results show that the definition of a hypercyclic operator can be somehow weakened: 1) If the union $\bigcup_{i=1}^{l} \mathrm{Orb}(x_i,T)$ of finitely many orbits is dense in X, then one of these orbits also [Costakis/Peris, 2000/2001, independently]; 2) If the set

$$\mathrm{Orb}(\mathbb{T}x,T) := \{\lambda T^n x,\, n \geq 0,\, |\lambda| = 1\}$$

is dense in X, then $\mathrm{Orb}(x,T)$ also [Léon-Müller, 2004]. In this talk we will be interested in extensions of these results and we will discuss the following general question: which sets have the property that the density of their orbit under some operator T automatically implies the hypercyclicity of T? This is a joint work with R. Ernst, which is the continuation of a previous work with R. Ernst and Q. Menet.

Adam Dor-On, Technion – Israel Institute of Technology.

Operator algebras for higher rank structures and applications to factorial languages

An effective model for encoding multivariable $\mathbb{Z}_+^N$-dynamical systems via C^*-correspondences is given by the Toeplitz-Nica-Pimsner algebras introduced by Fowler. In the work of Carlsen, Larsen, Sims and Vitadello, the existence of a "Cuntz-Nica-Pimsner" minimal quotient algebra that retains the dynamics is established, but the precise relations between minimal generators are sometimes very difficult to ascertain.

In joint work with Evgenios Kakariadis we introduce a new class of product systems over $\mathbb{N}^d$ that yield tractable relations for associated Cuntz-Nica-Pimsner algebras in terms of the coefficient algebra. We showcase our new relations in concrete examples such as higher rank graphs, $\mathbb{N}_+^N$ C^*-dynamical systems and higher-rank factorial languages. We provide a case study of higher-rank factorial languages and their C^*-algebras, showing that many rank-one results of Matsumoto, Carlsen, and of Kakariadis-Shalit extend to, or have analogues in the higher-rank world.

Theodosios Douvropoulos, University of Paris VII.

Perhaps the best way to count: Using complex analytic geometry and Riemann's existence theorem

Already in 1889, Cayley knew that there are n^{n-2} trees on n labeled vertices. Two years later, Hurwitz showed that this same number counts certain topological classes of ramified coverings of the sphere by itself. Although he used combinatorics to encode (and solve) this Riemann surfaces problem, a different approach might be better:

According to Arnol'd, the easiest way to produce Cayley's and Hurwitz's theorems is to calculate the degree of the quasi-homogeneous Lyashko-Looijenga morphism, a map that sends a polynomial to its (unordered) set of critical values. In fact, this observation is clear in Looijenga's work, where the connection to combinatorics is through Riemann's existence theorem.

Arnol'd, however, was the first to explicitly use this approach to answer purely enumerative questions. This has led to quite a few difficult combinatorial results produced via complex analytic techniques. We will mostly present and elaborate on the story sketched above but, if time allows, we will discuss generalizations to reflection groups, and some of our own contributions there.

Georgios Eleftherakis, University of Patras.

Morita embeddings for dual operator algebras

We define a relation $\subset_\triangle$ for dual operator algebras. We say that $B \subset_\triangle A$ if there exists a projection $p \in A$ such that B and pAp are Morita equivalent in our sense. We show that $\subset_\triangle$ is transitive, and we investigate the following question: If $A \subset_\triangle B$ and $B \subset_\triangle A$, then is it true that A and B are stably isomorphic?

Alexandros Eskenazis, Princeton University.

Non-positive curvature is not coarsely universal

A Hadamard space is a complete geodesic metric space of non-positive curvature in the sense of Alexandrov. We will review the (short) history of what is known regarding coarse embeddability into Hadamard spaces with an emphasis on Hilbert spaces, culminating to a recent result: there exist metric spaces (even reflexive Banach spaces) which do not admit a coarse embedding into any Hadamard space. The main technical contribution of this work lies in the fact that Hadamard spaces are shown to satisfy the metric cotype 2 inequality with sharp scaling parameter. The talk is based on joint work with M. Mendel and A. Naor.

Grigoris Fournodavlos, University of Cambridge.

Singularity formation in black hole interiors

The prediction that solutions of the Einstein equations in the interior of black holes must always terminate at a singularity was originally conceived by Roger Penrose in 1969, under the name of "strong cosmic censorship hypothesis". However, the nature of this break-down (i.e. the asymptotic properties of the space-time metric as one approaches the terminal singularity) is not predicted, and remains a very hotly debated question to this day. One key question is the causal nature of the singularity (space-like vs null for example). Another is the rate of blow-up of natural physical/geometric quantities at the singularity. Mutually contradicting predictions abound in this topic. Much work has been done under the assumption of spherical symmetry (for various matter models). We will discuss recent developments that go beyond this restrictive class.

Maria Fragoulopoulou, National and Kapodistrian University of Athens.

Bounded and unbounded generalizations of C^*-algebras

We shall refer to some "generalizations" of C^*-algebras that occur on the one hand, in the context of Banach *-algebras and on the other hand, in the context of locally convex *-algebras. In the first case, the symmetric ($\Leftrightarrow$ hermitian) Banach *-algebras belong (D. A. Raikov, 1946), while in the second case, the so called GB*-algebras (G. R. Allan, 1967) and locally convex quasi C^*-algebras pertain. The latter were introduced in a joint work with F. Bagarello, A. Inoue and C. Trapani.

In this talk, we shall present examples of the above mentioned "generalizations" of C^*-algebras and discuss Gelfand-Naimark type theorems for them, as well as questions related with uniqueness of their topology and conditions that make some of them to be reduced to classical C^*-algebras.

Nikos Frantzikinakis, University of Crete.

An ergodic approach to the Chowla and the Sarnak conjecture

The Liouville and the Mobius functions are multiplicative functions which encode important information related to distributional properties of the prime numbers. It is widely believed that their values fluctuate between plus and minus one in a random way. Two famous conjectures in this direction, formulated by Chowla in the 60's and more recently by Sarnak, have been the object of extensive study. We are going to reinterpret these conjectures in ergodic terms and make some progress regarding their solution. A key advantage in our approach is that it makes a connection with some deep results in ergodic theory which we use in order to study structural properties of measure preserving systems naturally associated with bounded multiplicative functions. This is in part joint work with Bernard Host.

Damien Gaboriau, Université de Lyon.

On Approximability in Orbit Equivalence and Applications to Bernoulli Percolation

Hyperfiniteness consists in approximating an object by finite pieces. It plays a central role in the orbit equivalence theory of probability measure preserving group actions. In a joint work with Robin Tucker-Drob we initiate a general study of the notion of *approximation* of such actions by sub-equivalence relations.

For non-amenable product groups, we identify circumstances where there exists no approximation at all. This result has a consequence in Bernoulli percolation on Cayley graphs for these groups: the uniqueness threshold p_u doesn't belong to the uniqueness phase.

I shall present these notions and give an overview of the subject.

Stephen Gardiner, University College Dublin.

Taylor series, universality and potential theory

Universal approximation properties of Taylor series outside the disc of convergence have been studied intensively over the past 20 years. This talk will highlight the role that potential theory has played in such investigations. In particular, it will describe how subharmonic functions, harmonic measure, ideal boundaries and intrinsic topologies have recently been used to shed light on the existence and properties of holomorphic functions that possess universal Taylor series.

Paul Gauthier, Université de Montréal.

Approximation by Random Complex Polynomials and Rational functions

We seek random versions of some classical theorems on complex approximation by polynomials and rational functions, as well as investigate properties of random compact sets in connection with complex approximation.

Michail Gerapetritis, University of Pennsylvania.

The Mirror Symmetry conjectures

Deriving from string theory, mirror symmetry (MS) arose as a tool to count solutions to geometric questions; in particular, it was used to count rational curves on a Calabi-Yau manifold. This idea evolved into an expanding duality theory between symplectic geometry and complex algebraic geometry, starting from Calabi-Yau manifolds and diving into more obstructed objects in the respective categories. In this talk, we will discuss the different ways the conjectured duality can be formulated (Hodge MS, Homological MS, T-Duality). Time permitting, we will also explore how these conjectures are related.

Loukas Grafakos, University of Missouri.

A sharp version of the Hörmander multiplier theorem

We discuss an improvement of the classical Hörmander multiplier theorem in which the Sobolev space condition that appears is replaced by another one built on a Lorentz space.

Alexander Helemskii, Moscow State University.

Projectivity, freeness and tensor products in matricially normed spaces

I shall report about several results, concerning general (not necessarily operator) matricially normed spaces in the sense of Effros/Ruan.

First, we describe metrically projective and metrically free matricially normed spaces in terms of a special space $\widehat{M}_n$, the space of $n \times n$ matrices, endowed with a special matrix–norm. We show that metrically free matricially normed spaces are matricial ℓ_1–sums of some distinguished families of matricially normed spaces $\widehat{M}_n$, whereas metrically projective matricially normed spaces are complete direct summands of matricial ℓ_1–sums of arbitrary families of spaces $\widehat{M}_n$.

Second, we show that matricially normed spaces have a special tensor product possessing the universal property with respect to completely bounded bilinear operators. We study some general properties of this tensor product (among them a kind of adjoint associativity), and compute it for some tensor factors, notably for L_1 spaces. In particular, we obtain what could be called the matricially normed version of the Grothendieck theorem about classical projective tensor products by L_1 spaces.

References

[1] E. G. Effros, Z.-J. Ruan, On matricially normed spaces, Pacific J. Math, 132, (1988) 243-64.

[2] A. Ya. Helemskii, Projective tensor product of proto–quantum spaces, Projective tensor product of protoquantum spaces. olloquium Mathematicum 149 (2017), no. 1, 45–73.

[3] A. Ya. Helemskii, Projective and free matricially normed spaces:
05 2017, arXiv:1706.00627[math.FA].

[4] Z.-J. Ruan, Subspaces of C^*-algebras, J. Funct. Anal., 76 (1988), 217-230.

Marina Iliopoulou, University of California, Berkeley.

Sharp estimates for Hörmander-type operators with positive-definite phase

In the heart of harmonic analysis lies the restriction problem: the study of Fourier transforms of functions that are defined on curved surfaces. The problem came to life in the late 60s, when Stein observed that such Fourier transforms have better behaviour than if the surfaces were flat. Soon after, Hörmander conjectured that oscillatory integral operators with more general phase functions should also demonstrate similar agreeable behaviour. Surprisingly, 20 years later Bourgain disproved Hörmander's conjecture. However, under additional assumptions on the phase function one can expect better estimates than the sharp ones by Bourgain. In this talk, we present such better estimates in the sharp range, under the assumption that the phase function is positive definite. This is joint work with Larry Guth and Jonathan Hickman, and builds on recent work of Guth that improved on the restriction problem via the polynomial method.

Evgenios Kakariadis, University of Newcastle.

Amalgamated free products of operator algebras

The amalgamated free product of C^*-algebras has become a standard construction in the subject. It is central in studying group C^*-algebras, free probability, quantum information, dynamical systems on C^*-algebras, and the Connes Embedding Conjecture via its connection to Kirchbergs conjecture and also to Tsirelsons conjectures.

Bocas result on completely positive maps on amalgamated free products has become a useful technical tool in this endeavour. In this talk we will show a general method of extending unital completely positive maps to amalgamated free products of C^*-algebras that covers Boca's Theorem. Several applications on the C^*-envelope will be discussed.

(This talk is based on joint work of Davidson-Kakariadis (Proc. R. Soc. Ed. A) and Davidson-Fuller-Kakariadis (Memoirs AMS).

Eleftherios Kastis, Lancaster University.

The norm closed triple semigroup algebra

The triple semigroup algebra was introduced by Power and the speaker, as the operator algebra acting on $L^2(\mathbb{R})$, that is generated by the multiplication, translation and dilation semigroups. Using the theory of binest algebras, it was proved to be reflexive and chiral, in the sense of not being unitarily equivalent to its adjoint algebra.

In this talk, we consider an analogous norm-closed triple semigroup algebra $\mathcal{A}_{ph}$. Taking advantage of the theory of semi-crossed products we prove that $\mathcal{A}_{ph}$ can be naturally identified with a triple semi-crossed product, in order to determine its isometric isomorphisms and show that it is chiral with respect to isometric isomorphisms.

Emmanouil Katsoprinakis, University of Crete.

Counterexamples to a question of S. K. Pichorides

In connection with a theorem of Marcinkiewicz and Zygmund, Stelios Pichorides suggested a research line at the University of Crete from 1985 to 1992 (the last period of his life). One of the questions posed by Pichorides is the following:

> (i) Let $f(z) = \sum_{n=0}^{\infty} a_n z^n$ be a power series with radius of convergence 1 and suppose that its partial sums
>
> $$S_N(f,0)(z) := \sum_{n=0}^{N} a_n z^n \in L(z,f),$$
>
> where $L(z,f)$ is the set of limit points in $\mathbb{C} \cup \{\infty\}$ of the sequence $S_N(f,0)(z)$, for every z in a "large" set $E \subset \mathbb{T}$ and for every $N = 0, 1, 2, \ldots$. Is it then true that the series $\sum_{n=0}^{\infty} a_n z^n$ constitutes the Taylor development of a rational function?
>
> (ii) Same question as in (i) provided that our series is moreover $C, 1)$-summable on the above set E.

In order to answer (in the negative) case (i) of the above question, Vassili Nestoridis defined in 1996 a stronger version (than that of Luh and Chui nd Parnes) of Universal Taylor Series (Universal Taylor Series in the sense of Nestoridis). For the case (ii) we give here three counterexamples. The first one concerns "large" sets $E \subset \mathbb{T}$ in the sense of Baire category theorem (G_δ and dense in $\mathbb{T}$). In this case the set E is uncountable. In the second one the set E is chosen countable and dense in $\mathbb{T}$. The last counterexample deals with subsets of $\mathbb{T}$ with Lebesgue measure as close to 2π as we want.

This work is part of a joint paper with G. Costakis. Another part of this paper was presented in the 14th Panhellenic Conference of Mathematical Analysis.

Elias G. Katsoulis, East Carolina University.

All semicrossed products of operator algebras are stably isomorphic to crossed products

As the title suggests, we will show that Arvesons semicrossed products are stably isomorphic to crossed products of operator algebras. The latter class of operator algebras was introduced recently by Chris Ramsey and the author for the study of various problems in operator algebra theory. Using the stable isomorphism, we obtain definitive results regarding the permanence of semisimplicity under crossed products.

Mihalis Kolountzakis, University of Crete.

Steinhaus sets: a geometric question's approach via Harmonic Analysis

A Steinhaus set S for a set B in Euclidean space is a set S that has exactly one point in common with $\tau(B)$, for every rigid motion τ of Euclidean space. The question of the existence of such a Steinhaus set has come up for various different sets B, the most famous such case being the so-called Steinhaus lattice tiling set, where B is the set of integer points of the plane. We recall various results concerning Steinhaus sets, in various settings (measurable or not, in groups, for finitely many "rigid" motions, applications to other areas of Mathematics) and we also show some recent results concerning special sets B. We show that if B is a finite set of at least two points then there is no such Steinhaus set S which is Lebesgue measurable. An old result of Komjath says that there exists a Steinhaus set for B being the set of integers on the x-axis in 2-space. We also show here that such a set cannot be Lebesgue measurable. We prove the latter result by way of showing that there is no measurable set in the plane which intersects almost every line L at measure 1 (this is still not possible if we ask that the intersection with almost every line is between two positive constants).

This is joint work with M. Papadimitrakis.

Manuel Maestre, University of Valencia.

Some properties of the algebra of the ball

On this talk we will survey on the infinite dimensional counterpart of the algebra of the disk $A(\mathbb{D})$ of all complex functions continuous on the closed unit disk $\mathbb{D}$ and holomorphic in its interior. It is a kind of crossover of complex analysis and Banach theory. On the one hand we will discuss the size and structure of the maximal ideal space of the algebra of the ball of some classical Banach spaces as c_0, ℓ_1 and ℓ_2. On the other, we will survey on properties of interest in Banach spaces as Daugavet property, numerical radius and the Schur property.

Kostas Makridis, National and Kapodistrian University of Athens.

Nowhere differentiable complex functions

Let $\mathbb{D} = \{z \in \mathbb{C} : |z| < 1\}$ be the open unit disc and $A(\mathbb{D})$ the disc algebra; that is, the set of all functions $f : \overline{\mathbb{D}} \to \mathbb{C}$ which are continuous on $\overline{\mathbb{D}}$ and holomorphic in $\mathbb{D}$.

We consider the class $S \subseteq A(\mathbb{D})$ which contains precisely all functions $f \in A(\mathbb{D})$ such that the limit

$$\lim_{\substack{z \to z_0 \\ z \in J}} \frac{f(z) - f(z_0)}{z - z_0}$$

does not exist in $\mathbb{C}$ and that holds for every $z_0 \in J \subseteq \mathbb{T} = \partial\mathbb{D}$, where J is a compact set without isolated points. We prove that the class S contains a G_δ-dense set.

Our proof takes advantage of the natural parametrization of the boundary $\partial\mathbb{D}$ of the open unit disc. Our result can be altered in order to produce similar results where the set $\mathbb{D}$ is replaced by a bounded or unbounded domain Ω, without requesting any parametrization of a specific part $J \subseteq \partial\Omega$ of the boundary. Then, the new classes of functions are either void, or they contain a G_δ-dense set. In addition, we give a few examples relevant to the above in various cases.

Myrto Manolaki, University of South Florida.

Overconvergence and universality of Dirichlet series

In 1996, Nestoridis showed that the Taylor series of "most" holomorphic functions on the unit disc $\mathbb{D}$ are universal, in the sense that their partial sums can approximate every plausible function outside $\mathbb{D}$. This strong notion of universality was extended to various types of series and inspired results of independent interest. In this talk, we will discuss some of these results; in particular, we will focus on the intimate connections between the boundary behaviour of a holomorphic function representable as absolutely convergent Dirichlet series in a half-plane, and the limiting behaviour of subsequences of its partial sums. Finally, we will see applications to universal Dirichlet and Taylor series. (Joint work with Stephen Gardiner.)

Stylianos Negrepontis, National and Kapodistrian University of Athens.

The deductive power of Mathematics derives from its paradoxical nature

According to the truth value of the conditional, a contradictory statement implies every other statement, and is thus, by Modus Ponens, deductively most powerful. It is fascinating to note that significant parts of Mathematics follow from assumptions and axioms that are approximations of the contradictory, in particular finitisations of an infinite, (hopefully) consistent ones. We will locate this paradoxical principle in Euclidean geometry, proofs of incommensurability, and Platos philosophy (in Antiquity), in the real numbers, Mathematical Analysis, mathematical induction and Godels theorem (in classical Mathematics), and in the infinitary combinatorics, ultrafilters, and large cardinals in set theory (in current Mathematics). It allows for the conjecture that the "unreasonable effectiveness" of Mathematics in the Sciences, an unexplained "miracle" according to Wigner, derives ultimately from this principle.

This is joint work with Vassiliki Farmaki.

Evita Nestoridi, Princeton University.

Optimal strong stationary times for random walks on the chambers of a hyperplane arrangement

The Bidigare-Hanlon-Rockmore random walk on the chambers of real hyperplane arrangements is a Markov chain that generalizes famous examples, such as the Tsetlin library and riffle shuffles. We will introduce lower bounds for the separation distance and a strong stationary time, which allow for the first time to study cutoff for hyperplane arrangement walks under certain conditions. We will also discuss how the method for the lower bound can be used to prove a uniform lower bound for the mixing time of Glauber dynamics on a monotone system, such as the Ising model.

Christoforos Panagiotis, University of Warwick.

Percolation and Complex Analysis

Since its introduction by Broadbent and Hammersley, the model of independent percolation has attracted interest from the physical and mathematical communities. In this talk, we will briefly introduce the model and prove some new results concerning the percolation probability θ and the percolation threshold p_c with the use of Complex Analysis.

Nickos Papadatos, National and Kapodistrian University of Athens.

On the completeness of classical orthogonal polynomials

Fourier expansions in terms of orthogonal polynomials is a well-developed topic in applied mathematics. In probability, the most convenient cases arize when the density (weight function) belongs to the Integrated Pearson Family - then the polynomials are called classical. In this talk we present a simple expression for the Fourier coefficients of any smooth L^2 function, involving only the derivatives of the function (i.e., we do not need to know the explicit form of the polynomials). It is also possible to give a series expression for the variance of the function, since the polynomials are complete in the corresponding L^2 space. A simple proof of this last fact is also given.

Athanase Papadopoulos, Université de Strasbourg.

On some theorems on spherical geometry from Menelaus' Spherics

The "Spherics" by Menelaus of Alexandria (1st-2nd c. A.D.) is probably the most important book ever written on spherical geometry. It is a profound work, introducing new methods in geometry, intrinsic to the sphere, containing 91 propositions, some of which are very difficult to prove.

An edition, from Arabic texts (the Greek original does not survive), was just by De Gruyter, in their series Scientia Graeco-Arabica, No. 21.

https://www.degruyter.com/view/product/496630

This publication contains the first English translation of Menelaus treatise together with an extensive commentary.

In this talk, I will present the content of the Spherics and explain some of the major theorems it contains.

John Pardon, Princeton University.

Wrapped Floer theory on Liouville sectors

I will introduce the basics of wrapped Floer homology. In two dimensions, this involves drawing simple pictures, though becomes more complicated in higher dimensions. Usually wrapped Floer theory takes place on certain non-compact symplectic manifolds, for example a complex submanifold of $\mathbb{C}^n$, or (the total space of) a cotangent bundle of a compact manifold. In joint work with Sheel Ganatra and Vivek Shende, we introduce a larger class of symplectic manifolds (this time with boundary), called Liouville sectors, on which wrapped Floer theory makes sense. I will explain how one can use this formalism to study wrapped Floer on many Liouville manifolds by decomposing them into simpler Liouville sectors.

Yiannis Petridis, University College London.

Functional analytic methods for counting problems in number theory and geometry

For certain counting problems in number theory and geometry the natural generating function is a generalized Dirichlet series that can be analytically continued using tools from functional analysis. These are the spectral theory of the Laplace operator and, in particular, its resolvent and perturbation theory of linear operators.

I will describe how these ideas are applied to the distribution of modular symbols, which encode the homology of modular curves and relate to central values of twists of elliptic curve L-functions. Mazur, Rubin, and Stein have recently formulated a series of conjectures about statistical properties of modular symbols. Two of these conjectures relate to the asymptotic growth of the first and second moments of the modular symbols. We prove these on average using analytic properties of Eisenstein series twisted with modular symbols. We also prove another conjecture predicting the Gaussian distribution of normalized modular symbols ordered according to the size of the denominator of the cusps. This is joint work with Morten S. Risager.

Stephen Power, Lancaster University.

Semigroup Operator Algebras: An Anglo Greek View

I will discuss aspects of operator algebras on the Hilbert space of the real line which are the weakly closed span of semigroups (Lie semigroups in fact) of unitary operators. These algebras, with their multiple nonselfadjoint nature and links with classical analysis and analytic functions, are really quite intriguing. In a nontechnical way I will outline past work with Aristides and with Rupert Levene, as well as recent work with Eleftherios Kastis. I will also mention open problems. (It is still not known if the Weyl commutation relations semigroup algebra is an integral domain.) Last but not least, I have a few old photographs to share.

Edward Saff, Vanderbilt University.

The Chebyshev Problem for Riesz Potentials

This talk concerns optimal discrete measures from the perspective of a max-min problem for potentials on a given compact set A. More precisely, for a kernel $K : A \times A \to \mathbb{R} \cup \{+\infty\}$, the so-called Chebyshev (or polarization) problem is the following: determine N-point configurations $\{x_j\}_{j=1}^N$ on A so that the minimum of $\sum_{j=1}^N K(x, x_j)$ for $x \in A$ is as large as possible. Such optimization problems relate to the following practical question: if $K(x, x_j)$ denotes the amount of a substance received at x due to an injector of the substance located at x_j, what is the smallest number of like injectors and their optimal locations on A so that a prescribed minimal amount of the substance reaches every point of A?

The Chebyshev nomenclature for this max-min problem emanates from the case when K is the logarithmic kernel, $K(x, y) = \log \frac{1}{|x-y|}$, and A is a subset of the complex

plane. Then the problem is equivalent to finding the constrained N-th degree Chebyshev polynomial for A; that is, the monic polynomial in the complex variable z with all its zeros on A having minimal uniform norm on A.

Georgios Sakellaris, Universitat Autonoma de Barcelona.

Green's function for second order elliptic equations with singular lower order coefficients

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In this talk we will discuss the construction of Green's function for second order elliptic operators of the form $Lu = -\mathrm{div}(A\nabla u + bu) + c\nabla u + du$. Under specific regularity assumptions, we will describe that Green's function and its derivative are members of certain weak-L^p spaces.

In the subcritical case, the weak-L^p bounds will lead to the classical estimate $G(x,y) \leq C|x-y|^{2-n}$, where $n \geq 3$ is the underlying dimension. Moreover, we will show the pointwise bound $|\nabla G(x,y)| \leq C|x-y|^{1-n}$, if A satisfies a mild smoothness assumption. However, in the critical case, we will construct counterexamples showing that the first pointwise estimate fails, even for small perturbations of the Laplacian.

This is joint work with Seick Kim.

Aristomenis Siskakis, Aristotle University of Thessaloniki.

Spaces of Dirichlet series and multiplicative Hankel forms

Spaces of Dirichlet series have been studied recently as the multiplicative analogues of classical spaces of power series. They have strong connections to Number Theory. The classical Hilbert matrix $H = (\frac{1}{n+k+1})_{n,k\geq 0}$ is the prototype of Hankel matrices, i.e. matrices whose entries $a_{n,k}$ depend only on the sum $n+k$. It can be viewed as the matrix of the integral operator

$$H(f)(z) = \int_0^1 f(t)\frac{1}{1-tz}\,dt$$

on the Hardy space $H^2(\mathbb{D})$ of power series on the unit disc, with respect to the standard basis $\{z^n\}$.

In this talk we will discuss the multiplicative analogue of the Hilbert matrix. This is the matrix $M = (\frac{1}{\sqrt{nk}\log(nk)})_{n,k\geq 2}$ of the integral operator

$$M(f)(s) = \int_{1/2}^{\infty} f(t)(\zeta(t+s)-1)\,dt$$

with respect to the basis $\{n^{-s}\}$ on a space of Dirichlet series $f(s) = \sum_{n=2}^{\infty}\frac{a_n}{n^s}$. Here $\zeta(s)$ is the Riemann zeta function. It turns out that M has properties very similar to H, and M can be considered as a canonical example of multiplicative Hankel matrices i.e. matrices whose entries $a_{n,k}$ depend only on the product nk.

Yiorgos Smyrlis, University of Cyprus.

Optimal analyticity estimates for non-linear dispersive-dissipative systems

We investigate the spatial analyticity of solutions of a class of evolutionary pseudo-differential equations with Burgers' nonlinearity, which are periodic in space, and possess global attractors. We examine their analyticity by utilising a criterion involving the rate of growth of suitable norms of the n-th derivative of the solution, with respect to the spatial variable, as n tends to infinity. An estimation of the rate of growth of the n-th spatial derivative is obtained by a spectral method. We prove that the solutions are analytic if the order of the pseudo-differential operator is higher than one. We also present numerical evidence suggesting that this is optimal, i.e., if the order is not larger that one, then the solution is not in general analytic. These ideas can be applied to a wide class of dissipative-dispersive pseudo-differential equations.

Nikos Stylianopoulos, University of Cyprus.

Since Approximation Theory is already there... Bring Potential Theory to Operator Theory!

The purpose of the talk is to discuss, by presenting a number of concrete examples, the luck of the implementation of potential theory tools in particular, from the theory of subharmonic functions, to questions in Operator Theory.

Samis Trevezas, National and Kapodistrian University of Athens.

Asymptotic calculus with a functional analytic approach for estimation in Markov type models

Maximum Likelihood Estimation is a popular technique in Statistics for obtaining good estimators for unknown parameters in parametric statistical models. Asymptotic properties, such as strong consistency and asymptotic normality of the maximum likelihood estimator (MLE) have already been studied for a large number of models, covering several types of stochastic processes in discrete time as well.

Undoubtedly, discrete time Markov-type models have great applicability due to the simple dependence structure (Markov property) which is imposed on the sequence of random variables, but in Statistics the interest has been mainly focused on parametric models, where a finite dimensional parameter completely determines the Markov transition matrix. This is mainly due to their simplicity and the need for parsimonious models in applications.

In this talk, we concentrate on the nonparametric MLE for denumerable (infinite state space) homogeneous Markov models. In this setting the Markov transition matrix is infinite dimensional and completely unknown. For this reason appropriate sequence

spaces should be considered to host the evolution of the MLE of the transition matrix. Important related quantities, such as the stationary distribution or the fundamental matrix of an irreducible and positive recurrent MC can be expressed as Fréchet differentiable functionals of the Markov kernel. A similar situation arises in semi-Markov models, where a semi-Markov kernel (a generalization of the Markov kernel) drives the evolution of the semi-Markov chain. Even when the state space of a semi-Markov chain is finite, the nonparametric semi-Markov model involves the estimation of an infinite dimensional semi-Markov kernel.

The main contribution consists in the development of an asymptotic calculus for Markov-type models (including Markov and semi-Markov models) based on the functional delta method (first-order asymptotic theory) to replace probabilistic with pure analytical proofs so as to obtain the convergence in distribution of the MLE of characteristics of interest to a Gaussian process. An explicit form of the associated asymptotic covariance kernel is also available in many cases of interest. This work offers the tools for handling in a common framework asymptotic properties of estimators for these type of models and generalizes many results obtained already in the literature (see, e.g., [1] and [2]).

References

[1] Barbu, V. S., Limnios, N., *Semi-Markov chains and hidden semi-Markov models toward applications: their use in reliability and DNA analysis* (Vol. 191). Springer Science & Business Media. (2009)

[2] Trevezas, S., Limnios, N. (2011). Exact MLE and asymptotic properties for nonparametric semi-Markov models. *Journal of Nonparametric Statistics*, 23(3), 719–739.

Nikos Tsirivas, University of Ioannina.

Determination of a universal Taylor series

The known proofs for universal Taylor series are existential and do not determine a specific universal Taylor series. In the present talk, we isolate a specific universal Taylor series. Thus we determine all Taylor coefficients of a specific universal Taylor series on the disc or on a polygonal domain.

This talk concerns a work in collaboration with A. Mouze, V. Nestoridis and I. Papadoperakis.

Lyudmyla Turowska, Chalmers Institute of Technology.

Compact operator synthesis and reduced spectral synthesis in harmonic analysis

W. Arveson in his fundamental paper (Ann. Math 1974) discovered an interplay between invariant subspaces and operator algebras theory and spectral synthesis in harmonic analysis. The notion of operator synthesis was proposed. It provided a powerful tool to study different questions in harmonic analysis, operator theory, theory of multipliers and so on. In this talk we will discuss sets that are operator synthetic "modulo compact operators" or "modulo Schatten ideals". Analogs of such sets in harmonic analysis are subsets $E \subset \mathbb{T}$ ($\mathbb{T}$ is the circle group) such that any pseudofunction supported in E (any psedomeasure whose Fourier transform is in l^p and supported in E) annihilates functions in $A(\mathbb{T})$ vanishing on E.

We shall discuss different examples of such sets, an analog of Malliavin's theorem and applications to operator equations.

Vagia Vlachou, University of Patras.

20 years of Universal Taylor Series

In 1996, V. Nestoridis gave the definition of Universal Taylor Series in the unit disk and introduced a new era of research in the topic of universality. Although this definition was not appreciated enough at the beginning, the devotion, the hard work, the enthusiasm and the keenness of Vassili to interact with other researchers led to the growth of the subject. Our goal is to try to present the connection between Universal Taylor Series and other widely studied phenomena. We would also like to discuss new aspects of research which draw the attention of the researchers today, 20 years after Vassili's first article on Universality.

Ilias Zadik, Massachusetts Institute of Technology.

The Representability question in Mixed Integer Convex Programming

During the last decades one of the most basic NP-complete problems, Integer Programming, has been receiving growing attention both from the Computer Science community, because of its great use in modern applications and from the Mathematics community, because of its small and fragmented theoretical understanding. In this talk, we will talk about the case of Mixed Integer Convex Programming and specifically the mathematical question of which non-convex sets can be represented as the feasible regions of Mixed Integer Convex Programs. We will present the first known general negative results for this question, which are based on a simple geometric necessary condition for representability. This simple condition offers also a discrete way of quantifying the degree of non-convexity of an arbitrary subset of the Euclidean plane in n-dimensions, which could be of independent interest.

Joint work with Miles Lubin and Juan Pablo Vielma.

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