Journées du GDR "Analyse Fonctionnelle, Harmonique et Probabilités"

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Abstracts

Alex Amenta. *Interpolation and embeddings of weighted tent spaces*

We consider a scale of function spaces, which we call weighted tent spaces, associated to certain metric measure spaces. This scale of function spaces is a modification of the classical tent spaces scale. We identify some real and complex interpolation spaces associated to this scale. There are no surprises with complex interpolation. However, real interpolation yields function spaces which are not weighted tent spaces, but which do appear in the study of elliptic boundary value problems with complex L^∞ coefficients and with boundary data in Besov spaces. We also prove some Hardy-Littlewood-Sobolev-type embeddings between weighted tent spaces.

Cédric Arhancet. *Semi-groupes d'opérateurs et OK-convexité*

Dans les années 80, G. Pisier a introduit une conjecture sur les semi-groupes d'opérateurs analytiques agissant sur les espaces L^p en lien avec la K-convexité des espaces de Banach. On présente de nouveaux résultats concernant la version non commutative de ce problème. Cet exposé est la suite de celui de l'année dernière mais reste indépendant.

Marwa Banna. *Universalité de la distribution spectrale limite de matrices aléatoires à entrées corrélées*

L'étude des matrices aléatoires est un sujet important qui trouve des applications dans plusieurs domaines comme la mécanique quantique, le traitement de signal appliqué aux télécommunications, la finance, etc. Dans cet exposé, je ferai une petite introduction à la théorie des matrices aléatoires et plus précisément à l'étude du comportement asymptotique global du spectre de ces matrices. Puis, je présenterai un résultat d'universalité de la distribution spectrale limite pour des matrices dont les entrées sont des fonctions de variables aléatoires indépendantes.
Travail en collaboration avec Florence Merlevède et Magda Peligrad.

Anton Baranov. *A short proof of the Gap Theorem for separated sequences*

For a closed set E on the real line, its gap characteristic is defined as supremum of those $a \geq 0$ for which there exists a finite complex measure μ supported by E whose Fourier transform $\hat{\mu}$ vanishes on $[-a, a]$. The long-standing problem to find an effective formula for the gap characteristic was solved in 2009 by Alexei Poltoratski. Previously, a special case when E is a separated sequence was considered by Poltoratski and Mishko Mitkovski who showed that in this case the gap characteristics coincides with the lower Beurling–Malliavin density.
Recall that the upper Beurling–Malliavin density of a discrete sequence Λ is equal to the radius of completeness of the system of complex exponentials $\{e^{i\lambda t}\}_{\lambda\in\Lambda}$. The original proof of Mitkovski and Poltoratski is based on the Toeplitz kernel approach to the Beurling–Malliavin theory developed by Makarov and Poltoratski. In this talk we will show that the result of Mitkovski and Poltoratski can be deduced from the classical Beurling–Malliavin theorem about the radius of completeness. Our proof is direct and very short.
This is a joint work with Yurii Belov and Alexander Ulanovskii.

Laurent Baratchart. *Rational approximation to functions with polar singular set*
We shall give an introductory account to the theory of n-th root rates in rational approximation to holomorphic functions, in particular the Gonchar conjecture on the upper bound of the liminf and its solution by O. Parfenov in 1986. We shall also present a recent result (joint work with M. Yattselev and H. Stahl) which gives a more or less complete description of the n-th root rate and the behaviour of best approximants for functions which can be continued analytically except over a set of capacity zero. The proof rests on potential-theoretic techniques and on the Adamjan-Arov-Krein theory.

Aline Bonami. *Fourier mulipliers of the homogeneous Sobolev space $\dot{W}^{1,1}$*
Fourier multipliers of the space $\dot{W}^{1,1}(\mathbb{R}^d)$ are bounded functions m such that the convolution by $\mathcal{F}^{-1}m$ extends into a bounded operator on the homogeneous space $\dot{W}^{1,1}(\mathbb{R}^d)$. In dimension one they coincide with Fourier multipliers of $L^1(\mathbb{R}^d)$, but it was proved by Poornima that for $d > 1$ there exist such Fourier multipliers that are not Fourier transforms of bounded measures. Her counter-examples are based on celebrated non inequalities of Ornstein. Conversely, the continuity of such Fourier multipliers has been recently proved by Kazaniecki and Wojciechowski.We will give new examples of Fourier multipliers of $\dot{W}^{1,1}(\mathbb{R}^d)$ and state the analogue in this context of De Leeuw Theorems for Fourier multipliers of L^p.

Alexander I. Bufetov. *Quasi-Symmetries of Determinantal Point Processes*
The classical De Finetti Theorem (1937) states that an exchangeable collection of random variables is a mixture of Bernoulli sequences. For general Gibbs measures, quasi-invariance holds instead of invariance.
The first result of the talk is that determinantal point processes on $\mathbb{Z}$ induced by integrable kernels are quasi-invariant under the action of the infinite symmetric group. The Radon-Nikodym derivative is a regularized multiplicative functional on the space of configurations. A key example is the discrete sine-process of Borodin, Okounkov and Olshanski.
The second result is a continuous counterpart of the first : namely, it is proved that determinantal point processes with integrable kernels on $\mathbb{R}$, a class that includes processes arising in random matrix theory such as Dyson's sine-process, or the processes with the Bessel kernel or the Airy kernel studied by Tracy and Widom, are quasi-invariant under the action of the group of diffeomorphisms of the line with compact support.
While no analogues of these results in higher dimensions are known, in joint work with Yanqi Qiu it is shown that for determinantal point processes corresponding to Hilbert spaces of holomorphic functions on the complex plane $\mathbb{C}$ or on the unit disk $\mathbb{D}$, the quasi-invariance under the action of the group of diffeomorphisms with compact support also holds.

Clément Coine. *Application des multiplicateurs de Schur à un problème de perturbation*
Dans cet exposé, je parlerai de la réponse négative apportée au problème de Peller, dont l'énoncé est le suivant : si $f \in \mathcal{C}^2(\mathbb{R})$ a une dérivée seconde bornée, si A est un opérateur autoadjoint sur un espace de Hilbert H et si $B \in \mathcal{S}^2(H)$ est autoadjoint, a-t-on

$$f(A+B) - f(A) - \frac{d}{dt}(f(A+tB))\big|_{t=0} \in \mathcal{S}^1(H) \ ?$$

Je donnerai les principaux éléments de la construction d'un contre-exemple, en expliquant notamment le lien entre ce problème et celui de l'étude de certains multiplicateurs de Schur linéaires et bilinéaires, et comment utiliser un contre-exemple dû à E.B. Davies sur la norme d'un multiplicateur de Schur linéaire afin d'obtenir une réponse à ce problème.

Ce travail a été réalisé en collaboration avec Christian Le Merdy, Denis Potapov, Fedor Sukochev et Anna Tomskova.

Dario Cordero-Erausquin. *Is it possible to do complex interpolation of real Banach spaces ?*

Inspired by the theory of the homogeneous complex Monge-Ampère equation and of the polynomial hulls à la Alexander-Wermer-Slodkowski, we introduce curves between ("real") norms $\mathbb{R}^{2n} = \mathbb{C}^n$ that enjoy some of the properties of complex interpolation ; they coincide with complex interpolation in the case of "complex" norms. In particular, we will show that the construction commutes with the Legendre transform, leading to an "exact" duality theory.
This is a joint work with B. Berndtsson, B. Klartag, and Y. Rubinstein.

Aude Dalet. *Sur les espaces libres*

Soit M un espace métrique pointé et $\mathrm{Lip}_0(M)$ l'espace des fonctions lipschitziennes sur M qui s'annulent en 0. Muni de la norme définie par la constante de Lipschitz, cet espace est un espace de Banach. Pour $x \in M$, on définit $\delta_x \in \mathrm{Lip}_0(M)^*$ l'évaluation au point x. Alors l'espace Lipschitz-libre sur M, noté $\mathcal{F}(M)$, est l'espace vectoriel fermé engendré par les δ_x, $x \in M$.
Après avoir introduit les espaces Lipschitz-libres, nous nous intéresserons plus particulièrement aux espaces ultramétriques. Nous montrerons que l'espace Lipschitz-libre sur un espace ultramétrique compact est un espace dual, isomorphe à ℓ^1 et admet un prédual isomorphe à c_0. Nous verrons cependant que l'espace Lipschitz-libre sur un espace ultramétrique n'est jamais isométrique à un espace ℓ^1.

Michal Doucha. *Some results on the structure of Lipschitz-free spaces*

Lipschitz-free Banach spaces are certain natural preduals of spaces of real-valued Lipschitz functions on metric spaces and they recently have become an active field of study. We present several results concerning their structure. We show that every infinite-dimensional Lipschitz-free space contains a complemented copy of ℓ_1 ; then we show that Lipschitz-free spaces over subsets of finite-dimensional Euclidean spaces are weakly sequentially complete. We also give an example of a metric space consisting of a single convergent sequence such that the Lipschitz-free space over it does not embed isomorphically into L_1.
This is a joint work with M. Cuth and P. Wojtaszczyk.

Evgenii Dubtsov. *Tropical power series and holomorphic approximation on the complex plane*

Let w be a radial weight on the complex plane. Using tropical power series, we study the following approximation problem : find a finite collection of entire functions such that the sum of their moduli is equivalent to w. We give several characterizations of those w for which the problem is solvable. Also, we discuss explicit examples and relations between the problem under consideration and similar approximation properties on the unit disk and on the complex unit ball.
This is joint work with Evgeny Abakumov.

Konstantin Dyakonov. *Bloch-type spaces on the ball and the moduli of their members*

We give a new characterization of certain Lipschitz and Bloch type spaces on the ball in terms of the functions' moduli.

Romuald Ernst. *Hypercyclic scalar sets*

A well-known result of F. León Saavedra and V. Müller states that if an operator T is hypercyclic then all unimodular multiples of T are hypercyclic too. This result follows easily from the fact that a vector x is hypercyclic for T if and only if the set $\mathbb{T}x$ has dense orbit under T where $\mathbb{T}$ denotes the unit circle in $\mathbb{C}$. The proof uses the group-structure of the set $\mathbb{T}$ and even if this fact is crucial in the proof of León and Müller, it is not clear whether it is really important or not. In this talk, I will be interested in giving a characterization of the scalar sets $\Gamma \subset \mathbb{C}$ satisfying the following property :
For every bounded operator $T : X \to X$, for every $x \in X$, $\overline{\mathrm{Orb}(\Gamma x; T)} = X$ if and only if x is hypercyclic for T.
This is a joint work with S. Charpentier (Marseille) and Q. Menet (Mons).

Jean Esterle. *Cosine families close to bounded scalar cosine families*

Let G be an abelian group and let A be a commutative unital Banach algebra. A G-cosine family is a family $(C(g))_{g\in G}$ of elements of A satisfying the so-called d'Alembert equation

$$C(0) = 1_A, C(s+t) + C(s-t) = 2C(s)C(t) \quad s, t \in G.$$

The purpose of the talk is to present recent results proved by Chojnacki, Bobrowski, Gregoriewicz, Schwenninger, Zwart and the author, which follow a recent paper by Chojnacki and Bobrowski describing cosine families close to bounded scalar ones. We will present in particular

- A first zero-two law : if a cosine function $(C(t))_{t\in\mathbb{R}}$ satisfies $\limsup_{t\to 0^+}\|1_A - C(t)\| < 2$, then $\limsup_{t\to 0}\|1_A - C(t)\| = 0$.
- A second zero-two law : if a cosine function $(C(t))_{t\in\mathbb{R}}$ satisfies $\sup_{t\in\mathbb{R}}\|C(t) - \cos(at)1_A\| < 2$ for fome $a \in \mathbb{R}$, then the closed algebra generated by $(C(t))_{t\in\mathbb{R}}$ is finite dimensional. A similar result holds for cosine sequences $C(n)_{n\in\mathbb{Z}}$, but not for cosine families over general groups.
- A zero-$\frac{8}{3\sqrt{3}}$ law : if a cosine function $(C(t))_{t\in\mathbb{R}}$ satisfies $\sup_{t\in\mathbb{R}}\|C(t) - \cos(at)1_A\| < \frac{8}{3\sqrt{3}}$, then $C(t) = \cos(at).1_A$ for $t \in \mathbb{R}$.
- A zero-$\frac{\sqrt{5}}{2}$ law : if a cosine family $(C(g))_{g\in G}$ satisfies $\sup_{g\in G}\|C(g) - c(g)1_A\| < \frac{\sqrt{5}}{2}$, for some bounded scalar cosine family $(c(g))_{g\in G}$, then $C(g) = c(g)1_A$ for $g \in G$.

The constants above are optimal. The author's methods involve the theory of commutative radical Banach algebras, and elementary but nontrivial considerations about scalar bounded cosine sequences or functions.

Konstantin Fedorovskiy. *Approximative properties of polyanalytic polynomial moduli*

In the talk we discuss the problem of density of polynomial moduli

$$\{p_0 + \overline{z}^{k_1}p_1 + \cdots + \overline{z}^{k_m}p_m\},$$

where $p_0, \ldots, p_m$ are polynomials in the complex variable and $k_1, \ldots, k_m$ are different positive integers in the spaces of continuous and integrable functions on compact subsets of the complex plane. This problem goes back to 1980-s, when various approximation problems for polynomial and rational moduli were studied by A. G. O'Farrell, J. Verdera, J. Carmona and others. Recently it turned out that this problem has interesting and deep connections with certain topics in the theory of model spaces.
The talk is based on recent joint works with Anton Baranov (St. Petersburg State University) and Joan Carmona (Universitat Autònoma de Barcelona).

Karl Grosse-Erdmann. *Upper frequent hypercyclicity, and related notions*

Bayart and Ruzsa have recently shown that the set of upper frequently hypercyclic vectors is either empty or residual, which is in striking contrast to the behaviour of frequent hypercyclicity. We investigate in greater detail why this is so. Our results have consequences, among other things, for the notion of reiterative hypercyclicity that was recently introduced by Bès, Menet, Peris and Puig.
This is joint work with Antonio Bonilla.

Andreas Hartmann. *Multiple sampling and interpolation in Fock spaces*

We consider multiple interpolation and sampling in the usual Fock space of entire functions f for which $\int_{\mathbb{C}} |f|^2 e^{-|z|^2} dm$ is finite. Seip, and Seip-Wallstén characterized classical sampling and interpolating sequences for this space in the beginning of the 90's in terms of density conditions. The natural question of interpolation and sampling with uniformly bounded multiplicities (in the sense of Hermite interpolation) was solved by Brekke and Seip in 1993. Again the conditions were expressed in terms of densities. In the present work, we consider the case when the multiplicities are unbounded. In this situation it is not clear how to reasonably define a density. Our conditions are given in terms of covering of the complex plane or separation by disks centered at the interpolation/sampling points the whose radii which depend in a natural way on the corresponding multiplicities. In the light of our results, we discuss a question raised in Brekke and Seip's paper concerning the existence of Riesz bases in the situation of unbounded multiplicities.
This is joint work with Alexander Borichev, Karim Kellay and Xavier Massaneda.

Jean-Pierre Kahane. *Séries trigonométriques lacunaires, extrapolation minimale dans une algèbre de Wiener et échantillonnage parcimonieux*

Si f est une fonction somme d'une séries trigonométrique lacunaire, elle est bien définie quand on donne sa restriction à un petit intervalle. Mais comment l'obtenir à partir de cette restriction ? C'est possible par un procédé d'analyse convexe, à savoir le prolongement minimal dans l'algèbre de Wiener. Ce prolongement minimal est la clé de l'échantillonnage parcimonieux (compressed sensing) exposé par Emmanuel Candès dans l'ICM de Zurich 2006 et dans un article de Candès, Romberg et Tao de la même année ; je donnerai un aperçu de variantes dans les méthodes et les résultats que j'ai publiés en 2013 dans les Annales de l'Institut Fourier.

Hubert Klaja. *Non-commutativity of the exponential spectrum*

In a unital complex Banach algebra, the spectrum satisfies $\sigma(ab) \setminus \{0\} = \sigma(ba) \setminus \{0\}$ for each pair of elements a, b. In this talk, we will show that this is no longer true for the exponential spectrum, thereby solving a question of Murphy. Our proof depends on the following result of algebraic topology : the homotopy group $\pi_4(\mathrm{GL}_2(\mathbb{C}))$ is non trivial.
This is a joint work with Thomas Ransford.

Christoph Kriegler. *Decomposable Schur multipliers and non-commutative Fourier multipliers*

A linear operator $T : L^p(\Omega) \to L^p(\Omega)$ is called decomposable if it is a linear combination of positive operators T_k ($T_k f \geq 0$ for any $f \geq 0$). Decomposable operators allow tensor extensions $T \otimes S$ on $L^p(\Omega; X)$ for any bounded $S : X \to X$. In this talk, we extend this notion to operators

acting on non-commutative L^p spaces and show some properties of decomposable Schur multipliers $S^p \to S^p$, $[x_{ij}] \mapsto [\phi_{ij} x_{ij}]$ and decomposable non-commutative Fourier multipliers acting on group von Neumann algebras. We will also show structure properties of (in)decomposable Fourier multipliers on commutative L^p spaces. This generalises work of W. Arendt and J. Voigt from 1991.
The talk is based on joint work with Cédric Arhancet (Université de Franche-Comté).

Stanislas Kupin. *Recent advances on the distribution of the discrete spectrum of non-selfadjoint perturbations of certain operators from mathematical physics*
In 1975, Lieb-Thirring proved inequalities characterizing the distribution of the discrete spectrum of a *self-adjoint* Schrödinger operator. Since the beginning of 2000's, one witnesses the rise of the interest to the study of the distribution of discrete spectra for *non-selfadjoint* perturbations of certain model operators, see Abramov-Aslanyan-Davies [2001] and Frank-Laptev et al. [2006].
In this talk, we give a survey of recent advances in this direction. The starting point is a general method suggested in Borichev-Golinskii-Kupin [2009] and then refined by Borichev-Dubuisson-Golinskii-Kupin [preprint]. Its applications to non-selfadjoint Schrödinger, fractional Schrödinger, magnetic Schrödinger and Dirac operators are discussed. The latter part of the talk is based on results by Demuth-Hansmann-Katriel [2009], Sambou [2014] and Dubuisson [2014, 2015].

Pascal Lefèvre. *Absolutely summing composition operators on Hardy spaces*
The topic of this talk is composition operators $f \longmapsto f \circ \varphi$, where the symbol is an analytic function from the unit disk of the complex plane to itself. We shall focus on the classical Hardy spaces H^p and pay a special attention to their possible membership of the class of r-summing operators : the case $r = p \geq 2$, is known for a long time (Shapiro-Taylor 1973) and coincide with order boundedness. We shall present some characterizations of r-summing composition operators on H^p.
This is a joint work with L. Rodrıguez-Piazza.

Eugenia Malinnikova. *Uncertainty principles for discrete Schrödinger evolutions*
We consider solutions of the semi-discrete Schrödinger equation (where time is continuous and spacial variable is discrete), $\partial_t u = i(\Delta_d u + Vu)$, where Δ_d is the standard discrete Laplacian on $\mathbb{Z}^n$ and $u : [0, 1] \times \mathbb{Z}^d \to \mathbb{C}$. Uncertainty principle states that a non-trivial solution of the free equation (without potential) cannot be sharply localized at two distinct times. We discuss different extensions of this result to equations with bounded potentials. The continuous case was studied in a series of articles by L. Escauriaza, C. E. Kenig, G. Ponce, and L. Vega.
The talk is mainly based on joint work with Ph. Jaming, Yu. Lyubarskii, and K.-M. Perfekt.

Vassili Nestoridis. *Universal series*
We shall give a short review on some selected topics in the theory of universal series. Roughly speaking a universal series - or a universal function - is a formal series, whose partial sums approach any *polynomial* in some relevant Fréchet space.
The story of universal series began in 1914 when Fekete proved the existence of a formal Taylor series whose partial sums approach any continuous functions on $[-1, 1]$ vanishing at 0. Seleznev (resp. Luh, Chui, Parnes) proved in 1951 (resp. 1971) the existence of formal Taylor series (resp. Taylor series convergent in the open unit disc $\mathbb{D}$) approaching uniformly on any compact sets $K \subset \mathbb{C} \setminus \{0\}$ (resp. $K \subset \mathbb{C} \setminus \overline{\mathbb{D}}$), with connected complement, any continuous function on K which is analytic in $\mathrm{int}(K)$.

When we allow the compact set K to meet the boundary of $\mathbb{D}$, the universal functions have wild properties, while if K is disjoint from $\overline{\mathbb{D}}$, then the universal functions can be smooth up to the boundary. In order to establish various properties of the universal functions one uses not only usual complex analysis but also some potential theory. Similar examples lead to other universalities and an abstract theory was developed. Finally universal functions are related to the phenomena of genericity (lineability, spaceability), as well as frequent universality, a notion taken from the connected theory of hypercyclicity.

Nikolai Nikolski. *Victor Havin Tribute : 50 years with Hardy spaces. What next... ?*
Starting with a personal tribute to Victor Havin (1933-2015), I discuss a dozen achievements of Great Havin's Analysis Seminar, as well as some challenging still unsolved problems.

El Maati Ouhabaz. *Spectral multipliers for abstract self-adjoint operators : a review of some recent results*
We consider general non-negative self-adjoint operators L on an L^2 space and functions $F : [0, \infty) \to \mathbb{C}$. The operator $F(L)$ is bounded on L^2. We seek for minimal condition on F which allow to extend $F(L)$ as a bounded operator on L^p for all or some $p \neq 2$. The condition we have in mind is the same as in the Hörmander-Mikhlin Fourier multiplier theorem in the Euclidean space. We discuss some recent results in this direction.
The talk is mainly based on joint works with F. Bernicot, P. Chen, A. Sikora and L. Yan.

Gilles Pisier. *On the non-commutative Khintchine inequalities*
This is joint work with Éric Ricard. We give a proof of the Khintchine inequalities in non-commutative L_p-spaces for all $0 < p < 1$. This case remained open since the first proof given by Françoise Lust-Piquard in 1986 for $1 < p < \infty$. These inequalities are valid for the Rademacher functions or Gaussian random variables, but also for more general sequences, e.g. for lacunary Fourier series or the analogues of Gaussian variables in free probability.
The Khintchine inequalities for non-commutative L_p-spaces play an important rôle in the recent developments in non-commutative Functional Analysis, and in particular in Operator Space Theory. Just like their commutative counterpart for ordinary L_p-spaces, they are a crucial tool to understand the behavior of unconditionally convergent series of random variables, or random vectors, in non-commutative L_p. The commutative version for $p = 1$ is closely related to Grothendieck's Theorem. In the most classical setting, the non-commutative Khintchine inequalities deal with Rademacher series of the form

$$S = \sum\nolimits_k r_k(t) x_k$$

where (r_k) are the Rademacher functions on the Lebesgue interval where the coefficients x_k are in the Schatten q-class or in a non-commutative L_q-space associated to a semifinite trace τ. Let us denote simply by $\|.\|_q$ the norm (or quasi-norm) in the latter Banach (or quasi-Banach) space, that we will denote by $L_q(\tau)$. When τ is the usual trace on $B(\ell_2)$, we recover the Schatten q-class. By Kahane's well known results, S converges almost surely in norm iff it converges in $L_q(dt; L_q(\tau))$. Thus to characterize the almost sure norm-convergence for series such as S, it suffices to produce a two sided equivalent of $\|S\|_{L_q(dt;L_q(\tau))}$ when S is a finite sum, and this is precisely what the non-commutative Khintchine inequalities provide :
For any $0 < q < \infty$ there are positive constants α_q, β_q such that for any finite set $(x_1, \ldots, x_n)$ in $L_q(\tau)$ we have

$$(\beta_q)^{-1} |||(x_k)|||_q \leq \left(\int \|S(t)\|_q^q dt \right)^{1/q} \leq \alpha_q |||(x_k)|||_q$$

where $|||(x_k)|||_q$ is defined as follows :
If $2 \le q < \infty$

$$|||(x_k)|||_q \stackrel{\text{def}}{=} \max\left\{ \left\| \left(\sum x_k^* x_k\right)^{\frac{1}{2}} \right\|_q , \left\| \left(\sum x_k x_k^*\right)^{\frac{1}{2}} \right\|_q \right\} \tag{1}$$

and if $0 < q \le 2$:

$$|||x|||_q \stackrel{\text{def}}{=} \inf_{x_k = a_k + b_k} \left\{ \left\| \left(\sum a_k^* a_k\right)^{\frac{1}{2}} \right\|_q + \left\| \left(\sum b_k b_k^*\right)^{\frac{1}{2}} \right\|_q \right\}. \tag{2}$$

Note that $\beta_q = 1$ if $q \ge 2$, while $\alpha_q = 1$ if $q \le 2$ and the corresponding one sided bounds are easy. The difficulty is to verify the other side.

Sandra Pott. *Matrix weights : On the way to the linear bound*

In recent years, the attempt to prove sharp bounds for Calderon-Zygmund operators on weighted L^p spaces in terms of the A_p or A_∞ characteristic of the weight has been an important driving force in Harmonic Analysis. After the work of many authors, this culminated with the proof of the conjectured linear bound for $p = 2$ for all Calderon-Zygmund operators by Tuomas Hytönen in 2010.
Recently, the question of the validity of the linear bound for all Calderon-Zygmund operators in the matrix-weighted setting has attracted some interest. In the talk, I want to present the reduction of this question to the case of Haar multipliers and dyadic paraproducts. I also want to talk about the remaining obstacles, some of which have very recently been resolved, and discuss some consequences of the conjectured linear bound for weighted commutators in the scalar setting.
This is joint work with Andrei Stoica.

Antonin Procházka. *Szlenk indices of convex hulls*

Szlenk index and convex Szlenk index are ordinal indices that are assigned in a geometric way to all Asplund spaces in order to quantify the notion of Asplundness. One usually thinks of a Banach space as less Asplund if it has large (convex) Szlenk index. In this talk we will show that Szlenk index and the convex Szlenk index of a separable Banach space are always equal. We also give, for any countable ordinal α, a characterization of the Banach spaces with Szlenk index bounded by $\omega^{\alpha+1}$ in terms of the existence of an equivalent renorming. This extends a result by Knaust, Odell and Schlumprecht on Banach spaces with Szlenk index equal to ω.
Joint work with G. Lancien (Besancon) and M. Raja (Murcia).

Alexander Pushnitski. *Rational approximation of functions with logarithmic singularities*

I will report on the results of my recent work with Dmitri Yafaev (Rennes I). We consider functions ω on the unit circle with a finite number of logarithmic singularities. We study the approximation of ω by rational functions in the BMO norm. We find the leading term of the asymptotics of the distance in the BMO norm between ω and the set of rational functions of degree n as n goes to infinity. Our approach relies on the Adamyan-Arov-Krein theorem and on the study of the asymptotic behaviour of singular values of Hankel operators. In particular, we make use of the localisation principle, which allows us to combine the contributions of several singularities in one asymptotic formula.

Stéphane Rigat. *Une application des méthodes de Fokas aux potentiels à symétrie axiale*
Dans cet exposé, nous donnerons une introduction aux techniques de Fokas pour résoudre explicitement certaines équations aux dérivées partielles. Nous donnerons par la suite une application de ces techniques à l'étude des potentiels à symétrie axiale, en donnant notamment la solution de problèmes de Riemann-Hilbert singuliers sur des surfaces de Riemann. Enfin nous verrons comment, dans certains cas, les techniques de Fokas permettent d'obtenir un lien entre les données de Dirichlet et de Neumann sur le bord d'un domaine régulier pour les solutions de certaines équations elliptiques.
Il s'agit d'un travail en collaboration avec Slah Chaabi et Franck Wielonsky.

Rishika Rupam. *Inner Functions & Inverse Spectral Theory*
When does the spectrum of an operator determine the operator uniquely ? This question and its many versions have been studied extensively in the field of inverse spectral theory for differential operators. Several notable mathematicians have worked in this area. Recent results have further fueled these studies by relating the completeness problems of families of functions to the inverse spectral problems of the Schrödinger operator. In this talk, we will discuss the role played by the Toeplitz kernel approach in answering some of these questions, as described by Makarov and Poltoratski. We will also describe some new results using this approach.
This is joint work with Mishko Mitkovski.

Valentin Samoyeau. *Inégalités de dispersion via le semi-groupe de la chaleur*
Les inégalités de dispersion jouent un rôle clé dans l'obtention d'estimations de Strichartz et sont donc un outil crucial pour étudier des EDP comme l'équation de Schrödinger ou l'équation des ondes. Le but de cet exposé est de présenter comment obtenir de telles inégalités dans un cadre très général.

Elizabeth Strouse. *Mixed BMO and Hankel operators*
The classical relationship between bounded Hankel operators or Hilbert transforms and BMO functions is related to the Nehari theorem and the deep results of Chang and Fefferman. This has been extended in several (complex) ways to functions of several variables. Some of the most important results were obtained by Coifman-Rochberg, Cotlar-Sadosky, Sadosky-Ferguson, Lacey-Ferguson, and Lacey-Petermichl-Pipher-Wick. My recent work with Stefanie Petermichl and Yumeng Ou concerns a new case - where the symbols are uniformly in BMO in a certain number of variables - and extends these results to a much more general case of commutators of multiplication by a symbol function and paraproduct-free Journé operators. I will try to give the basic ideas about how and why this works.
Bibliography : Y. Ou, S. Petermichl, E. Strouse, Higher order Journe commutators and characterizations of multi-parameter BMO, preprint.

Yuri Tomilov. *On functions of power bounded operators and related matters*
Recall that a bounded linear operator T on a Banach space is called Ritt if the spectrum of T belongs to the closed unit disc and

$$\sup_{|\lambda|>1} \|(\lambda - 1)(\lambda - T)^{-1}\| < \infty.$$

The class of Ritt operators became quite popular over the last years manly due to its rich structure and relations to the asymptotics of powers of T. For instance, recall that T is Ritt

if and only if T is power bounded and $\sup_{n\in\mathbb{N}} \|n(T^n - T^{n+1})\| < \infty$. Moreover, Ritt operators can be considered as discrete counterparts of generators of (sectorially) bounded holomorphic C_0-semigroups which makes these operators useful in applications.
The talk addresses the following two problems :

(i) describe the class of functions f such that for any Ritt T the operator $f(T)$ is Ritt ("permanence property"),

(ii) describe the class of functions f such that for any power bounded T the operator $f(T)$ is Ritt ("improving property").

The problems arise e.g. in probability (and ergodic) theory in the context of so-called discrete subordination.
We present several partial solutions of (i) and (ii). In particular, towards answering (i), we prove that an (infinite) convex combination of powers of a Ritt operator T is Ritt. Moreover, we show that such a convex combination preserves important spectral properties of T. Considering (ii), we give sufficient conditions for $f(T)$ to be Ritt whenever T is power bounded in terms of geometry of the range of f. In a sense, our results are optimal.
If time permits, we will explain how Besicovitch, Erdös, and Littlewood enter the picture.
This is joint work with A. Gomilko (Toruń).

Simeng Wang. *Séries de Fourier lacunaires pour les groupes quantiques compacts*

Cet exposé est consacré à l'étude de l'ensemble de Sidon et les objets relatifs pour les groupes quantiques compacts. On introduit quelques généralisations de la notion de l'ensemble de Sidon pour les groupes quantiques compacts, et démontre que tout ensemble de Sidon est un ensemble $\Lambda(p)$. On démontre aussi l'existence d'ensembles $\Lambda(p)$ pour les systèmes orthogonaux pour les espaces L^p non commutatifs, et on en déduit les propriétés correspondantes pour les groupes quantiques compacts. On discute enfin les propriétés élémentaires des ensembles de Sidon centrales ainsi que quelques exemples.

Runlian Xia. *L'espace de Hardy local à valeurs opératorielles*

Cet exposé présentera un analogue non commutatif de l'espace de Hardy local défini par des noyaux plus généraux. Au cours de l'exposé, on parlera de la continuité de l'opérateur pseudo-différentiel sur cet espace.

Quanhua Xu. *Function spaces on quantum tori*

We will present some results about function spaces on quantum tori. The spaces in consideration include Sobolev, Besov, and Triebel-Lizorkin spaces. We will discuss their embedding and characterizations by the Poisson semigroup and differences.
The talk is based on a joint work with Xiao Xiong and Zhi Yin.

Pierre Youssef. *Bernstein inequality : non-commutative setting and dependence*

The classical Bernstein inequality estimates the probability that the sum of independent bounded random variables deviates from its mean. In the non-commutative setting, we are interested in the largest eigenvalue of a sum of random matrices with bounded operator norm. Tropp studied this matrix extension when the matrices are independent. In this talk, we relax the independence condition by establishing the non-commutative Bernstein's inequality for a class of dependent random matrices.
This is a joint work with Marwa Banna and Florence Merlevède.