

**4th CONFERENCE OF SETTAT ON OPERATOR ALGEBRAS AND
APPLICATIONS,**

27 - 30 January 2015, Marrakech, Morocco

List of Talks

1. Rakočević's Property for generalized derivations

Mohamed Amouch (Chouaib Doukkali University, Eljadida, Morocco)

Abstract : Given Banach spaces \mathcal{X} and \mathcal{Y} and Banach space operators $A \in L(\mathcal{X})$ and $B \in L(\mathcal{Y})$. The generalized derivation $\delta \in L(L(\mathcal{Y}, \mathcal{X}))$ is defined by $\delta(X) = AX - XB$. In this article necessary and sufficient conditions ensuring that Rakočević's property (w), on the one hand and its generalization (gw), on the other hand transfer from A and B to δ .

2. Holomorphic representation and Ornstein-Uhlenbeck operator on the Siegel domain

$\Im(z_1) > |z_2|^2$

Helene Airault (University of Picardie, Picardie, France)

Abstract : We construct the holomorphic infinitesimal representation for the group G of automorphisms of the Siegel domain $\mathcal{D} = \{z_1 \in \mathbb{C} \mid \Im(z_1) > |z_2|^2\}$ from the affine group representation. We calculate the Kähler Laplacian Δ^K on \mathcal{D} with the Bergman metric. We give an expression of Δ^K and of the OU operator on \mathcal{D} in terms of the infinitesimal representation for the group G . This continues the study started in [?] and in [?] for unitary representations of the affine group of upper triangular matrices and it extends to the Siegel domain some of the results obtained for the Poincaré disk and the n -dimensional complex ball in [1].

3. Carleman Operators As Multiplication Operators

Sidi Mohamed Bahri (Abdelhamid Ben Badis university, Mostaganem, Algeria)

Abstract : we introduce a multiplication operation that allows us to give to the Carleman integral operator of second class the form of a multiplication operator.

4. On the range of elementary operators

Youssef Bouhafsi (University Mohammed V, Rabat, Morocco)

Abstract : Let $L(H)$ denote the algebra of operators on a complex infinite dimensional Hilbert space H . For $A, B \in L(H)$, the generalized derivation $\delta_{A,B}$ and the elementary operator $\Delta_{A,B}$ are defined by $\delta_{A,B}(X) = AX - XB$ and $\Delta_{A,B}(X) = AXB - X$ for all $X \in L(H)$. In this talk, we exhibit pairs (A, B) of operators such that the range-kernel orthogonality of $\delta_{A,B}$ holds for the usual operator norm. We generalize some recent results. We also establish some theorems on the orthogonality of the range and the kernel of $\Delta_{A,B}$ with respect to the wider class of unitarily invariant norms on $L(H)$.

5. Weighted shifts on directed trees, subnormality and reflexivity

Piotr Budzynski (University of Agriculture, Krakow, Poland)

Abstract : Weighted shifts on directed trees form an important class of operators introduced recently in [?]. This class is a natural and substantial generalization of the class of classical (unilateral or bilateral) weighted shifts on ℓ^2 spaces. It is also related to a class of composition operators in L^2 -spaces.

Weighted shifts on directed trees have proven to have very interesting features (see [?, ?, ?]). The underlying relatively simple graph structure gives a rise to a subtle and complex structure of the operators, which turn out to have properties not known before in other classes of operators, and makes them ideal for testing hypotheses and constructing examples. We will outline recent results concerning these operators with main emphasis on subnormality and reflexivity.

The talk is based on a joint work with Z.J. Jabłoński, I.B. Jung and J. Stochel, and M. Ptak.

6. The Banach algebra associated with a topological dynamical system

Marcel de Jeu (Leiden University, Leiden, Netherlands)

Abstract : If X is a compact Hausdorff space and σ is a homeomorphism of X , then a Banach algebra $\ell^1(\Sigma)$ of crossed product type is naturally associated with the topological dynamical system $\Sigma = (X, \sigma)$. It is a Banach algebra with isometric involution that is not a C^* -algebra. If X consists of one point, then $\ell^1(\Sigma)$ is the group algebra of the integers. The structure of this algebra, which depends on the dynamical properties of Σ , is more intricate than that of its well-investigated C^* -envelope. Its study has been taken up in joint work with Svensson and Tomiyama. In this talk, we will survey the known results about its ideal structure, its algebraically irreducible representations in Banach spaces and the primitive ideal space in the hull-kernel topology.

7. On planar mixed automorphic forms

Allal Ghanmi (University Mohammed V, Rabat, Morocco)

Abstract : We discuss some analytical properties of the functional space of planar mixed automorphic functions with respect to an equivariant pair and given discrete subgroup of the additive group $(\mathbb{C}, +)$.

8. Support projection of state and a quantum Lévy-Austin-Ornstein theorem

Skander Hachicha (University of Tunis-El Manar, Tunis, Tunisia)

Abstract : We prove two characterizations of the support projection of a state evolving under the action of a quantum Markov semigroup and a quantum analogue of the Lévy-Austin-Ornstein theorem. We discuss applications to open quantum systems.

9. On weighted Bergman-Dirichlet spaces in 2-complex variables

Ahmed Intissar (University Mohammed V, Rabat, Morocco)

Abstract : We introduce a class of weighted Bergman-Dirichlet spaces in the unit ball of the 2-dimensional complex space. We give explicit formulae of their reproducing kernels in terms of the hypergeometric function. Namely, it is given by

$$K_{\alpha,m}(z, w) = \frac{\Gamma(\alpha + 3)}{\pi^2 \Gamma(\alpha + 1)} \left(\sum_{l < m} (\alpha + 3)_l \frac{\langle z, w \rangle^l}{l!} + \frac{\langle z, w \rangle^m}{(m!)^2} {}_3F_2 \left(\begin{matrix} \alpha + 3, 1, 1 \\ 2, 2 \end{matrix} \middle| \langle z, w \rangle \right) \right).$$

For the particular case of the parameter $m = 0$, we recover the reproducing kernel of the weighted Bergman spaces and the weighted Dirichlet spaces.

10. New extended Browder-Weyl type theorems and perturbations

Mohammed Kachad (University Mohammed I, Oujda, Morocco)

Abstract : In this note, we introduce and study the new properties $(W\Pi)$ and $(UW\Pi_a)$, the stronger version of generalized Browder's theorem and of generalized a-Browder's theorem respectively. We proved for a bounded linear operator defined on a Banach space several sufficient and necessary conditions for which property $(W\Pi)$ (resp. $(UW\Pi_a)$) and we also show the stability of property $(W\Pi)$ (resp. $(UW\Pi_a)$) under commuting nilpotent, quasi-nilpotent, power finite rank or Riesz perturbations.

11. On algebraic and analytic core

Mohammed Karmouni (University Sidi Mohamed Ben Abdellah, Fès, Morocco)

Abstract : Let $\mathcal{B}(X)$ the Banach algebra of all bounded operators on a Banach space X and let $T \in \mathcal{B}(X)$. In this paper we introduce and study a new class of operators acting in on infinite dimensional complex Banch space X , $\mathcal{R}_{alc}(X) = \{T \in \mathcal{B}(X) : C(T) \neq \{0\}\}$ and $\mathcal{R}_{ac}(X) = \{T \in \mathcal{B}(X) : K(T) \neq \{0\}\}$ where $C(T)$ and $K(T)$ are respectively the algebraic core and the analytic core. Precisely, we show that $\mathcal{R}_{alc}(X)$ and $\mathcal{R}_{al}(X)$ are a regularities in Kordula-Müller's sense . Denote by $\sigma_{alc}(T) = \{\lambda \in \mathbb{C} : C(\lambda I - T) = \{0\}\}$ and $\sigma_{ac}(T) = \{\lambda \in \mathbb{C} : K(\lambda I - T) = \{0\}\}$ respectively, the spectrums of T corresponding to the regularities $\mathcal{R}_{alc}(X)$ and $\mathcal{R}_{ac}(X)$. We prove that $\sigma_{alc}(\cdot)$ and $\sigma_{ac}(\cdot)$ can be empty which do satisfy the spectral mapping theorem .

12. Boundary conformal field theory and subfactors

Yasuyuki Kawahigashi (University of Tokyo, Tokyo, Japan)

Abstract : We present the operator algebraic approach to chiral conformal field theory and emphasize representation theoretic aspects using tensor categories. We classify boundary conditions in terms of Q-systems in a tensor category. We also treat phase boundaries in this framework.

13. Classification of invariant subspaces of C^* -algebra generated by mapping

A.Yu. Kuznetsova (Kazan Federal University, Russia)

Abstract : This talk will concern operator algebra generated by mapping. The starting point is a mapping of a countable set into itself which gives rise to a family of partial isometries being the generators of operator algebra. We discuss the main structure properties of the algebra ([1]-[3]). Also we present a criterion of irreducibility of the algebra on the underlying Hilbert space. This criterion makes it possible to give the full classification of invariant subspaces for an operator algebra generated by mapping, which is not irreducible.

14. **Positivity of multi-linear maps and applications to quantum information theory**

Seung-Hyeok Kye (Seoul National University , Seoul, Korea)

Abstract : We consider positivity and complete positivity for multi-linear maps between matrix algebras, as entanglement witnesses for multi-partite states. Linearization of a positive map retains the property with respect to maximal tensor product as functions systems, and linearization of complete positive maps are completely positive with respect to maximal tensor product as operator systems. There are other notions of positivity with which we may detect tri-partite bi-separable states. After we will briefly review the duality between positive linear maps and bi-partite separable states for motivation, we consider various notions of positivity for multi-linear maps and give examples of three qubit entanglement witnesses detecting nontrivial body of PPT entanglement.

15. **Generalized derivation and some local spectral properties**

Farida Lombarkia (University of Batna, Batna, Algeria)

Abstract : Let X be an infinite complex Banach space and consider two bounded linear operators $A, B \in L(X)$. Let $L_A \in L(L(X))$ and $R_B \in L(L(X))$ be the left and the right multiplication operators, respectively. The generalized derivation $\delta_{A,B} \in L(L(X))$ is defined by $\delta_{A,B}(X) = (L_A - R_B)(X) = AX - XB$. This talk is concerned with the problem of the transference of some local spectral properties from operators A and B^* to the generalized derivation $\delta_{A,B}$. Some applications are given.

16. **Mixed linear boundary value problems with right invertible operators**

Benharrat Mohammed (University National Polytechnic School of Oran, Algeria)

Abstract : The main subject of this talk is the study of a general mixed linear boundary value problems with right invertible operators and corresponding initial boundary operators. The obtained results are used to describe the boundary controllability and the approximate boundary controllability of general linear systems described by right invertible operators in abstract operator-theoretic setting.

17. **Bornes supérieures d'une famille d'opérateurs auto-adjoints pour l'ordre de lowner**
Ould Ali Mohand (University of Mostaganem, Mostaganem,Algérie)

Abstract : On étudie La structure et les propriétés de la fermeture pour la topologie faible de $B(H)$ de l'ensemble des majorants, pour l'ordre de Lowner ; d'une famille finie d'opérateurs auto-adjoints. Dans un premier temps nous montrerons l'existence de bornes superieures satisfaisant des contraintes additionnelles. Dans un deuxième temps nous donnerons deux caractérisations des bornes supérieures minimales. Dans la dernière partie nous fournirons une description complète des paires d'opérateurs positifs pour lesquelles la somme est une borne supérieure minimale. Nous donnerons également des applications.

18. **Coherent states transforms, quantization and formulae for Berezin transforms**
Zouhair Mouen (University of Sultan Moulay Slimane, Bni Mellal, Morocco)

Abstract : We are concerned with bound states spaces of the Schrodinger operator with magnetic field in \mathbb{C}^n and in the unit ball B^n . We construct for each of these spaces a set of coherent states with the corresponding coherent states transforms. By applying a coherent states quantization method we recover the Berezin transforms attached to these spaces. In each case, we give formulae representing these transforms as functions of the Laplace-Beltrami operator.

19. **Functions of noncommuting self-adjoint operators under perturbation**
Vladimir Peller (Michigan State University, Michigan, USA)

Abstract : I am gong to speak about a functional calculus $f \mapsto f(A, B)$ for noncommuting self-adjoint operators A and B and the behaviour of such functions under prturbations of the pair (A, B) .

20. **Baumslag-Solitar group C*-representations and beyond**

Paulo Pinto (IST Univ. Lisboa, Portugal)

Abstract : We consider the C*-algebra $\mathcal{A}_{\rho,n}$ generated by (unitary) operators U and V acting on a Hilbert space and obeying

$$UV = \rho VU^n, \quad \text{with } |\rho| = 1 \text{ and } n \in \mathbb{N}. \quad (*)$$

If $n = 1$, $\mathcal{A}_{\rho,n}$ is just a representation of the rotation algebra, while in the case $\rho = 1$, $\mathcal{A}_{\rho,n}$ is a representation of the group C*-algebra of the Baumslag-Solitar group $BS(1, n)$.

For $n \neq 1$, we prove that the phase ρ can be removed whilst retaining the isomorphism class of the C*-algebra $\mathcal{A}_{\rho,n}$.

We find swarms of these algebras $\mathcal{A}_{\rho,n}$ when we consider the family of interval maps $f(x) = nx + \alpha \pmod{1}$ for $x \in [0, 1]$. In the periodic cases every orbit of f encodes not only a Cuntz-Krieger algebra representation, but also non unitary operators U and V satisfying $(*)$ where $\rho = e^{2\pi i \alpha}$. However we can simultaneously unitarise U and V by gluing pairs of orbits. Using P. Jorgensen et al. work, these reps are likely to be a useful tool for wavelet analysts. (Joint work with C. Correia Ramos, R. El Harti and N. Martins).

21. **Convex-transitive Banach algebras via ideals (Categories :Property preserving mappings and Banach algebras)**

Jarno Talponen (University of Eastern Finland, Finland)

Abstract : We demonstrate a 'Calkinification' method for constructing Banach algebras admitting a rich group of isometries. Here the richness means that the space is convex-transitive, which is a relaxed Banach space version of almost transitive group action involving isometric isomorphisms acting on the unit sphere. This topic is related to Mazur's rotation problem.

22. **On M-Hypercyclic Semigroup**

Ahmed Toukmati (University Mohamed ben abdelah, Fes, Morocco)

Abstract : In this work we introduce and study the M -Hypercyclicity of C_0 -semigroup $\mathcal{T} = (T_t)_{t \geq 0}$ on a infinite-dimensional separable complex Banach space X . We give sufficient conditions on the semigroup to be M -hypercyclic. Some proprieties and the analogous result for the notion M -Transitive are also obtained.

23. **The harmonic oscillator with the Dirac operator And Applications**

Mohamed Vall Ould Moustapha (University of Sciences Technology and Medical, Mauritanie)

Abstract : In this article a generalized Weierstrass transform which intertwines the harmonic oscillator with the Euler operator (a first order differential operator) is constructed. As an applications explicit solutions for the heat and Laplace equations associated to the harmonic oscillator are constructed from the solutions of the corresponding equations associated to the Euler operator.

24. **Truncation approximations and spectral invariant subalgebras in uniform Roe algebras of discrete groups**

Qin Wang (East China Normal University, Shanghai, China)

Abstract : We study band truncation approximations for operators in uniform Roe algebras of countable discrete groups, which is a noncommutative analogue of uniform convergence of the Fourier series of a continuous function on the unit circle. Under conditions of certain growth rates for discrete groups, we find large classes of dense subspaces of uniform Roe algebras whose elements can be approximated in operator norm by their band truncations. We apply these results to construct a nested family of spectral invariant Banach algebras on discrete groups. For a group with polynomial growth, the intersection of these Banach algebras is a spectral invariant dense subalgebra of the uniform Roe algebra. For a group with subexponential growth, we show that the Wiener algebra of the group is a spectral invariant dense subalgebra of the uniform Roe algebra.

25. **A non m-convex semisimple B_0 -algebra on which all entire functions operates**

Abdelali Zine Alabedine (University Mohammed V, Rabat, Morocco)

Abstract : In 1994 W. Żelazko gave an example of a non m-convex B_0 -algebra A on which all entire functions operate. Such example is a radical algebra. The aim of this paper is to construct a semisimple one.