Book of Abstracts for the 3rd Conference of Settat on Operator Algebras and Applications, November 1–5, 2011

1. **Speaker**: Ahmed Al-Rawashdeh (United Arab Emirates University, Al Ain)
   Title: On Certain Projections of C*-Matrix Algebras
   Abstract: H. Dye defined the projections $P_{i,j}(a)$ of a C^*-matrix algebra by

$$\begin{aligned} P_{i,j}(a) &= (1+aa^*)^{-1} \otimes E_{i,i} + (1+aa^*)^{-1}a \otimes E_{i,j} \\ &+ a^*(1+aa^*)^{-1} \otimes E_{j,i} + a^*(1+aa^*)^{-1}a \otimes E_{j,j}, \end{aligned}$$

   and he used it to show that in the case of factors not of type I_{2n}, the unitary group determines the algebraic type of that factor. We study these projections and we show that in $\mathbb{M}_2(\mathbb{C})$, the set of such projections includes all the projections. For infinite C^*-algebra A, having a system of matrix units, including the Cuntz algebra $\mathcal{O}_n$, we have $A \simeq \mathbb{M}_n(A)$. M. Leen proved that in a simple, purely infinite C^*-algebra A, the $*$-symmetries generate $\mathcal{U}_0(A)$. We revise and modify Leen's proof to show that part of such $*$-isometry factors are of the form $1-2P_{i,j}(\omega)$, $\omega \in \mathcal{U}(A)$. In simple, unital purely infinite C^*-algebras having trivial K_1-group, we prove that all $P_{i,j}(\omega)$ have trivial K_0-class. In particular, if $u \in \mathcal{U}(\mathcal{O}_n)$, then u can be factorized as a product of $*$-symmetries, where eight of them are of the form $1-2P_{i,j}(\omega)$.

2. **Speaker**: Pere Ara (Universitat Autònoma de Barcelona, Spain)
   Title: (m,n)-dynamical systems and their C*-algebras
   Abstract: Given positive integers n and m, we consider dynamical systems in which n copies of a topological space is homeomorphic to m copies of that same space. The universal such system is shown to arise naturally from the study of a C*-algebra we denote by $\mathcal{O}_{m,n}$, which in turn is obtained as a quotient of the C*-algebra $L_{m,n}$ of a certain separated graph, a process meant to transform the generating set of partial isometries of $L_{m,n}$ into a tame set. Describing $\mathcal{O}_{m,n}$ as the crossed-product of the universal (m,n)-dynamical system by a partial action of the free group $\mathbb{F}_{m+n}$, we show that $\mathcal{O}_{m,n}$ is not exact when n and m are both greater than or equal to 2, but the corresponding reduced crossed-product, denoted $\mathcal{O}^r_{n,m}$, is shown to be exact and non-nuclear. Still under the assumption that $n,m \geq 2$, we prove that the partial action of $\mathbb{F}_{m,n}$ is topologically free and that $\mathcal{O}^r_{m,n}$ satisfies property (SP) (small projections). Joint work with R. Exel and T. Katsura

3. **Speaker**: Roseli Arbach (UNESP - Ilha Solteira, Brazil)
   Title: C*-algebra of Regulated Functions with values in $M_2(\mathbb{R})$
   Abstract: In this paper we deal with the notion of regulated functions with values in a C*-algebra $\mathcal{A}$, we prove some results and present examples using a special bi-dimensional C*-algebra of triangular matrices.

4. **Speaker**: Mashhour Bani Ata (Department of Mathematics-Aladeeliyah, Kuwait)
   Title: Non -Associative Central Division Algebras of order q^4,and Matrix Representations
   Abstract: The aim of this talk is to classify the non-associative division algebras of order q^4 with center Fq, admitting a Klein four group of automorphisms acting freely.

5. **Speaker**: Viacheslav Belavkin (University Nottingham, UK)
   Title: An Introduction into Modular Theory of Entanglement and Information
   Abstract: A noncommutative algebraic approach to unified classical and quantum information theory is given. An operational meaning of entanglement as specifically quantum encoding is disclosed. The general relative entropy as information divergence is introduced and three most important types of relative information, namely, Araki-Umegaki (A-type) and of Belavkin-Staszewski (B-type) and the thermodynamical (C-type) are shown. The true quantum entropy different from the von Neumann semiquantum entropy is introduced and the proper quantum conditional entropy is showen. The general quantum mutual information via entanglement is defined and the corresponding types of quantum channel capacities as the supremum via the generalized encodings are formulated. The additivity problem for quantum logarithmic capacities for the products of arbitrary quantum channels under the appropriate constraints on encodings is discussed. It is proved that the true quantum capacity, which is achieved on the standard entanglement as the optimal quantum encoding, reclaims the additivity property of the logarithmic quantum channel capacities via the entanglement on the products of quantum input states. This earlier obtained by V. P. B. result for quantum logarithmic information of A-type is extended to to any type of quantum information.

6. **Speaker**: Martin Bohata and Jan Hamhalter (Czech Technical University in Prague, Czech Republic)
   Title: Star order on operator algebras
   Abstract: A number of interesting orders have been studied for matrix algebras. Recently, one of them, called the star order, was investigated for infinite-dimensional Hilbert-space operators in [1]. The star order, $\leq_*$, is defined for bounded operators a and b acting on a Hilbert space as follows: $a \leq_* b$ if $a^*a = a^*b$ and $aa^* = ba^*$. We continue this line of the research by studying an interesting relationship between the structure of C^*-algebras and properties of the star order. In this respect we show, for example, that a unital C^*-algebra is infinite if, and only if, there is a partial isometry u_1 and coisometry u_2 such that $u_1 \leq_* u_2$, $u_1 \neq u_2$, and $u_1u_1^* = u_2^*u_2$ [2]. Then we contribute to the well known infimum problem by showing that two elements of abelian C^*-algebra A have always infimum in the star order provided that the spectrum of A is locally connected or extremely disconnected [2]. (This is a consequence of our analysis of the star order on more general function algebras of topological spaces.) Finally, we study nonlinear preserves of the star order for von Neumann algebras. Let φ be a continuous (not necessarily linear) bijection between normal parts of von Neumann algebras A and B, where A has no Type I_2 direct summand. Suppose that φ preserves the star order in both directions. Then we show that, under mild condition on the restriction of φ to the one-dimensional space generated by the unit of A, φ is of the form $\varphi(x) = z\psi(g(x))$, where z is a central invertible element of B, $\psi : A \to B$ is a $*$-Jordan isomorphism and $g : \mathbb{C} \to \mathbb{C}$ is a bijective continuous function. This result generalizes the description of nonlinear preservers of Gudder order on self-adjoint parts of Type I factors [3]. An important ingredient of the proof is an interesting application of the Dye's Theorem and Generalized Gleason's Theorem (see [4, Chapter 8]). We discuss various ramifications of these results and their generalizations to Jordan von Neumann algebras (JBW algebras).

References

[1] J. Antezana, C. Cano, I. Musconi, and D. Stojanoff: A note on the star order in Hilbert spaces, Lin. Multilin. Alg. **58** (2010), 1037-1051.

[2] M. Bohata: Star order on operator and function algebras, Publ. Math. Debrecen **79/1-2** (2011), 211-229.

[3] G. Dolinar and L. Molnár: Maps on quantum observables preserving the Gudder order, Rep. Math. Phys. **60** (2007), 159-166.

[4] J. Hamhalter: Quantum Measure Theory, Kluwer Academic Publishers, Dordrecht, 2003.

7. **Speaker**: Abdelhamid Boussejra (University Ibn Toufail, Morocco)
Title: The Hua operators on homogeneous line bundle on Bounded Symmetric Domains of Tube Type
Abstract: Let $\mathfrak{D}$ be a bounded symmetric domain of tube type. We show that the image of the Poisson transform on the degenerate principal series representation attached to the Shilov boundary of $\mathfrak{D}$ is characterized by a covariant differential operator on a homogeneous line bundle on $\mathfrak{D}$.

8. **Speaker**: Victor Bovdi (University of Debrecen, Hungary)
Title: Group rings whose group of units is hyperbolic
Abstract: Let (X, ρ) be a metric space with metric ρ. For any $a, b, c \in X$, the Gromov product $\langle b, c\rangle_a$ of b and c with respect to $a \in X$ is defined as

$$\langle b, c\rangle_a = \frac{1}{2}\Big(\rho(b, a) + \rho(c, a) - \rho(b, c)\Big).$$

The metric space is called δ-hyperbolic ($\delta \geq 0$) if

$$\langle a, b\rangle_d \geq \min\big\{\langle a, c\rangle_d, \langle b, c\rangle_d\big\} - \delta \qquad (a, b, c, d \in X).$$

Let G be a finitely generated group and let S be a finite set of generators of G. The Cayley graph $\mathfrak{C}(G, S)$ of the group G with respect to the set S is the metric graph whose vertices are in one-to-one correspondence with the elements of G. An edge (labeled by s) joins g to gs for some $g \in G$ and $s \in S$. The group G is called *hyperbolic* (according to M. Gromov) if its Cayley graph $\mathfrak{C}(G, S)$ is a δ-hyperbolic metric space for some $\delta \geq 0$. It is well known that this definition does not depend on the choice of the generating set S.

The following question can be posed: When is the group of units $U(KG)$ of the group ring KG of a group G over the commutative ring K with unity hyperbolic.

In certain papers of E. Iwaki, E. Jespers, O. Juriaans, A. Souza Filho, I.B. Passi and D. Prasad this problem was solved for several particular cases.

In my talk we give a general solution of this problem.

9. **Speaker**: Emmanuel Chetcuti and Jan Hamhalter (University of Malta, Malta)
Title: Convergence of non-commutative measures and absolute continuity
Abstract: The object of the present note is to give an overview of some recently obtained results related to the extension of classical convergence theorems to non-commutative set-up. We shall

mainly focus on the notion of absolute continuity of non-commutative measures and discuss the possible extensions of the Vitali-Hahn-Saks Theorem and the Brooks-Jewett Theorem to operator algebras. Our investigation is mainly based on the results obtained in [4, 5, 6, 7]. Let us mention that other significant contributions can be found also in [1, 2, 3, 8] where a stronger form of absolute continuity is considered. It will be seen that although some results extend without injury, others cannot have a non-commutative analogue. It will be shown, for example, that the Vitali-Hahn-Saks Theorem for von Neumann algebras is valid when one considers positive measures or when one assumes that the controlling measure is a faithful one. The transition to signed measures is not priceless however. In fact, it will be shown that the finite von Neumann algebras are the only algebras for which the Vitali-Hahn-Saks Theorem holds. In addition, we shall characterize those C^*-algebras for which the Brook-Jewett Theorem holds as follows: A C^*-algebra satisfies the Brooks-Jewett Theorem if, and only if, it is a Grothendieck space and each of it's irreducible representation is finite-dimensional.

References

[1] J. K. Brooks, K. Saitô and J. D. M. Wright, *When absolute continuity on C^*-algebras is automatically uniform*, Q. J. Math. **55** (2004), 31?-40.

[2] _____, *Operators on σ-complete C^*-algebras*, Q. J. Math. **56** (2005), 301?-310.

[3] J. K. Brooks and J. D. M. Wright, *Convergence in the dual of a σ-complete C^*-algebra*, J. Math. Anal. Appl. **294** (2004), 141?-146.

[4] E. Chetcuti and J. Hamhalter, *Vitali-Hahn-Saks theorem for vector measures on operator algebras*, Quart. J. Math. **57** (2006), 479–493.

[5] _____, *Noncommutative Vitali-Hahn-Saks Theorem holds precisely for finite W^*-algebras*, Quart. J. Math. **60** (2009), 45–51.

[6] _____, *A noncommutative Brooks-Jewett Theorem*, J. Math. Anal. Appl. **355** Issue 2 (2009), 839–845.

[7] J. Hamhalter, *Absolute continuity and non-commutative measure theory*, Int. J. Theor. Phys. **49** (2010), 3139–3145.

[8] K. Saitô and J. D. M. Wright, *Absolute continuity on C^*-algebras*, Q. J. Math. **61** (2010), 135?-140

10. **Speaker**: Jean Esterle (University of Bordeaux I, France)
Title Normability of algebras of power series, prime ideals, and discontinuous algebra norms on $\mathcal{C}(K)$
Abstract: The existence of discontinuous algebra norms on $\mathcal{C}(K)$, K infinite compact space, known as Kaplansky's problem, is not a decidable question. Such discontinuous norms do exist if the continuum hypothesis is assumed (this is related to the normability, in ZFC, of a "universal" algebra of power series). In the other direction there are models of set theory, including the axiom of choice and Martin's axiom, in which all algebra norms on $\mathcal{C}(K)$ are equivalent to the usual norm $f \to \|f\|_K := \max_{t\in K}|f(t)|$.
It is well-known that if p is a discontinuous algebra norm on $\mathcal{C}(K)$ then every p-closed ideal of $\mathcal{C}(K)$ is the intersection of the family of all p-closed **prime** ideals which contain it, and that every chain of p-closed ideals is well-ordered with respect to inclusion. For some infinite compact spaces, as the Alexandroff or the Stone-Cech compactification of $\mathbf{N}$, it is easy to see that the set of all minimal

p-closed ideals must be finite. So for these compact spaces the set of nonmaximal p-closed prime ideals is a finite union of well-ordered chains. Conversely, if the continuum hypothesis is assumed, it is possible for such a compact space K, given a finite union $\mathcal{U}$ of well-ordered nonmaximal prime ideals, to construct a discontinuous algebra norm on $\mathcal{C}(K)$ for which all elements of $\mathcal{U}$ are p-closed. Recent works by Hung Le Pham show that the situation is much more complicated in the general case and get close a complete answer to these questions. We will try to present here the state of the art, and describe how a "lifting problem," which can be formulated in ZFC, is the only remaining obstacle to a complete characterization of possible sets of p-closed nonmaximal prime ideals of with respect to discontinouous algebra norms on $\mathcal{C}([0,1])$. We will also discuss the open problem (in ZFC) of normability of a "big" algebra of power series described by Dales and Woodin in their monograph about hyper-real fields.

11. **Speaker**: David E. Evans (Cardiff University, UK)
Title: The search for the exotic - subfactors and conformal field theories
Abstract: Subfactor theory provides a framework for studying modular invariant partition functions in conformal field theory, and candidates for exotic modular tensor categories and almost Calabi-Yau algebras. I will describe some recent work which is also motivated by links with twisted equivariant K-theory through the K-theoretic realisation of Freed-Hopkins-Teleman of the Verlinde algebra of primary fields.

    This is joint work with Terry Gannon and Mathew Pugh.

12. **Speaker**: Luis Antônio Fernandes de Oliveira (UNESP - Ilha Solteira, Brazil)
Title: Dushnik Integrals on C*-algebra of Regulated Functions $G([a,b],X)$
Abstract: In this paper we consider the Dushnik integral for regulated functions and we construct some examples of linear integral functionals on the C*-algebra $G([a,b],\mathcal{A})$, where $\mathcal{A}=C([a,b],\mathbb{R})$.

13. **Speaker**: Sanjiv Kumar Gupta (Sultan Qaboos University, Oman)
Title: Asymmetry of Multipliers on Lie Groups
Abstract: De Leeuw's multiplier theorem relates the multiplier on the circle group T and the real line R in a spectacular way. This result has been generalised in many ways in the context of non-commutative harmonic analysis, most notably by Coifman and Weiss. Let G be a real rank one semi–simple Lie group and G=KAN be its Iwasawa decomposition and M be the centraliser of A in K. An analogue of De Leeuw's theorem was proved by Rice, Dooley and Gaudry for the pair (K/M,N) for G=SO(p,1). But the transference of multipliers from N to K/M part was not the exact converse of the transference from K/M to N. In De Leeuw' s original theorem, transference from R to T and from T to R are exact converse to each other. Ricci and Rubin proved the transference from K/M to N for G=SU(2,1) but N to K/M case remained open. In this talk, I will present an exact analogue of De Leeuw's theorem for G=SU(p,1). Our work resolves a conjecture of C. Herz. This is joint work with A. Dooley and F. Ricci.

14. **Speaker**: Haykel Gaaya (Unversité Claude Bernard Lyon I, France)
Title: On the higher rank numerical range of the shift operator
Abstract: For any n-by-n complex matrix T and any $1 \leqslant k \leqslant n$, let $\Lambda_k(T)$ the set of all $\lambda \in \mathbb{C}$ such that $PTP = \lambda P$ for some rank-k orthogonal projection P be its higher rank-k numerical range. It is shown that if S_n is the n-dimensional shift on $\mathbb{C}^n$ then its rank-k numerical range is the circular

disc centred in zero and with radius $\cos\dfrac{k\pi}{n+1}$ if $1 < k \leqslant \left[\frac{n+1}{2}\right]$ and the empty set if $\left[\frac{n+1}{2}\right] < k \leqslant n$, where $[x]$ denote the integer part of x. This extends and rafines previous results of U. Haagerup, P. de la Harpe [**?**] on the classical numerical range of the n-dimensional shift on $\mathbb{C}^n$. An interesting result for higher rank-k numerical range of nilpotent operator is also established.

15. **Speaker**: Messaoudene Hadia (University of Tebessa, Algeria)
Title: The class of Joêl Anderson
Abstract: The main objective of this work is to give more informations about the class of operators of Joel Anderson, noted by $\mathcal{JA}(\mathcal{H})$; which is the class of operators defined on the algebra of bounded linear operators on a complex and infinite separable Hilbert space, for which the distance of the identity operator and the derivation ranges is minimal, where the derivation range of the operator A is defined by:

$$\delta_A : \mathcal{L}(\mathcal{H}) \to \mathcal{L}(\mathcal{H})$$
$$X \mapsto AX - XA;\ A\ \in \mathcal{L}(\mathcal{H}).$$

Also to prove that the class $\mathcal{JA}(\mathcal{H})$ has no algebraic structure and to give a necessary and sufficient condition for a bounded linear operator A to be in $\mathcal{JA}(\mathcal{H})$ and to obtain some results concerning the form of operators in $\mathcal{JA}(\mathcal{H})$.

16. **Speaker**: Jan Hamhalter and Ekaterina Turilova (Czech Technical University in Prague, Czech Republic)
Title: Abelian and associative subalgebras determine the Jordan structure
Abstract: We present our recent results on the interplay between the Jordan structure of C^*-algebras (resp. Jordan algebras) and the ordered structure of their abelian C^*-subalgebras (resp. associative Jordan subalgebras). Our prototype result is as follows: Let $Abel(A)$ be a system of all unital abelian C^*-subalgebras of a unital C^*-algebra A ordered by set inclusion. Then any order isomorphism $\varphi : Abel(A) \to Abel(B)$, $dim A \geq 5$, is implemented by a unique partially linear Jordan $*$-isomorphism $\psi : A \to B$ in the sense that $\varphi(C) = \psi(C)$ for all $C \in Abel(A)$. (By a partially linear map we mean a map linear when restricted to abelian subalgebras.) A similar result holds for unital JB algebras and the corresponding structure of their unital associative JB-subalgebras. One of the consequences of our analysis says that poset of abelian unital C^*-subalgebras (resp. associative unital JB subalgebras) of a von Neumann algebra (resp. JBW algebra) without Type I_2 direct summand determines the Jordan structure completely. The results above do not hold in nonunital case. However, we show that Jordan structure can be recovered from order structure of associative (or abelian) subalgebras endowed with an additional natural orthogonality relation. We study also the question of what additional structure on $Abel(A)$ makes it complete C^*-invariant. The relation of our work to mathematical foundations of quantum theory (including topos approach) is discussed. Surprising aspect of investigation along this line seems to be the fact that discrete order structure of commutative subalgebras is sometimes enough to encode entirely functional analytic Jordan structure.

References

[1] J. Hamhalter: Isomorphisms of ordered structures of abelian C^*-subalgebras of C^*-algebras, Journal of Mathematical Analysis and Applications, 383, (2011), 391-399.

[2] J.Hamhalter and E.Turilova: *Structure of associative subalgebras of Jordan operator algebras*, to appear.

17. **Speaker**: Robin Harte (Trinity College Dublin), Dragan Djordjevic and Snežana Zivković-Zlatanović (University of Nis)
Title: Spectrale permanence
Abstract: Three kinds of generalized inverse bounce off one another in the proof of a technical observation about C* algebras.
See further details at: http://www.math.ist.utl.pt/∼elharti/3rd/ruston.pdf

18. **Speaker**: Alexander A. Katz (St. John's University, USA)
Title: On the notion of JB-bornological algebra
Abstract: We introduce JB-bornological algebras as bornological inductive limits of JB-subalgebras. Among other basic properties we establish that for each JB-bornological algebra there exists a unique universal enveloping C*-bornological algebra.

19. **Speaker**: Bartosz Kwasniewski (University of Bialystok, Poland)
Title: Uniqueness property for C*-algebras given by relations with circular symmetry
Abstract: The universal C^*-algebras $C^*(\mathcal{G},\mathcal{R})$ generated by a set of operators $\mathcal{G}$ subject to given relations $\mathcal{R}$ include the most important classical examples of C^*-algebras. We propose a method of dealing with the following issue:

> (*uniqueness problem*) Do there exist two representations of $(\mathcal{G},\mathcal{R})$ that generate non-isomorphic C^*-algebras?

The set of relations $\mathcal{R}$ that defines the classical algebras usually possess a natural circular symmetry, that yields a circle action γ on $C^*(\mathcal{G},\mathcal{R})$ such that $C^*(\mathcal{G},\mathcal{R})$ is generated by the fixed point algebra $\mathcal{B}_0$ and the first spectral subspace $\mathcal{B}_1$ for γ. The pair $(\mathcal{B}_0,\mathcal{B}_1)$ is naturally equipped with a structure of a Hilbert bimodule and one can recover $C^*(\mathcal{G},\mathcal{R})$ from $(\mathcal{B}_0,\mathcal{B}_1)$ by means of the crossed product introduced in [Exe07]. Thus the following scheme of investigation of $C^*(\mathcal{G},\mathcal{R})$ seems to be inevitable:

$$\underset{\text{relations, circle action}}{(\mathcal{G},\mathcal{R},\{\gamma_\lambda\}_{\lambda\in S^1})} \longrightarrow \underset{\text{Hilbert bimodule}}{(\mathcal{B}_0,\mathcal{B}_1)} \longrightarrow \underset{\text{universal } C^*\text{-algebra}}{C^*(\mathcal{G},\mathcal{R}) = C^*(\mathcal{B}_0,\mathcal{B}_1)}$$

In our approach we treat $(\mathcal{B}_0,\mathcal{B}_1)$ as a *non-commutative reversible dynamical system* attached to $(\mathcal{G},\mathcal{R})$ and we show that if this system is topologically free, then the pair $(\mathcal{G},\mathcal{R})$ possess *uniqueness property* (the answer to the uniqueness problem is "no"). When applied to specific examples this theorem leads to generalizations of isomorphism theorems for various crossed products, and is shown to be equivalent to classical Cuntz-Krieger uniqueness theorem [CK80]. On the latter occasion an intriguing realization of Cuntz-Krieger algebras as *crossed products by interactions* [Exe07] is discovered.

The presentation is based on [Kwa].

References

[AEE98] B. Abadie, S. Eilers, R. Exel, *Morita equivalence for crossed products by Hilbert C^*-bimodules*, Trans. Amer. Math. Soc., **350** (1998), No. 8, 3043-3054.

[CK80] J. Cuntz, W. Krieger, *A class of C^*-algebras and topological Markov chains*, Invetiones Math. **56** (1980), 256-268.

[Exe07] R. Exel, *Interactions* Funct. Analysis, 244 (2007), 26 - 62

[Kwa] B. K. Kwaśniewski *Cuntz-Krieger uniqueness theorem for crossed products by Hilbert bimodules* preprint arXiv:1010.0446

20. **Speaker**: Nuno Martins (IST lisbon, Portugal)
Title: Representations of C*-algebras from interval maps
Abstract: Given a family of interval maps, we construct partial isometries acting on Hilbert spaces associated to the orbit of each point. Then we prove that such partial isometries give rise to representations of certain C*-algebras. We study the irreducibility of these representations. Finally, we state the conditions to have unitarily equivalence between two such representations.

This talk is based on joint works with C. Correia Ramos, R. El Harti and P. Pinto.

21. **Speaker**: Sidi Mohamed Bahri (Universit Abdelhamid Ibn Badis Mostaganem, Algerie)
Title: On the quasi-selfadjoint extensions of a Carleman operator
Abstract: In the present work, using a formula describing all scalar spectral functions of a Carleman operator A of defect indices (1,1) in the Hilbert space $L^2(X)$ that we obtained in a previous paper, we derive certain results concerning the localization of the spectrum of quasi-selfadjoint extensions of the operator A.

22. **Speaker**: Mostafa Mbekhta (University of Lille I, France)
Title: Survey on preserver problems and generalized invertibility
Abstract: This survey is articulated around two major axis. The first one concerns the Kaplansky problem; the history of the problem and several results are presented. The second one concerns some new preserver problems (concern- ing the generalized inverse, Fredholm or semi-Fredholm operators...). The common point of these results is that they are interesting only in the infinite dimensional situation.

References

[1] B. Aupetit, Sur les transformations qui conservent le spectre, Banach Algebra'97 (Walter de Gruyter, Berlin), (1998), 55-78

[2] B. Aupetit, Spectrum-preserving linear mappings between Banach algebras or Jordan-Banach algebras, J. London Math. Soc. 62 (2000), 917-924.

[3] N. Boudi and M. Mbekhta Additive maps preserving strongly generalized inverses J. Operator Theory 64 (2010), 117-130.

[4] M. Mbekhta, L. Rodman, and P. Semrl, Linear maps preserving generalized invertibility, Int. Equ. Op. Th. 55 (2006), 93-109.

[5] M. Mbekhta, Linear maps preserving a set of Fredholm operators, Proc. Amer. Math. Soc. 135 (2007) 3613-3619.

[6] M. Mbekhta and P. Semrl, Linear maps preserving semi-Fredholm operators and generalized invertibility, Linear and Multilinear Algebra, 57 (2009), 55-65.

[7] A.R. Sourour, Invertibility preserving linear maps on $L(X)$, Trans. Amer. Math. Soc. 348 (1996), 13-30.

23. **Speaker**: Sergio Mendes (Lisbon University Institute, Portugal)
Title: A note on the reduced Iwahori-Hecke C^*-algebra of $GL(n)$
Abstract: According to the Baum-Connes conjecture for $G = GL(n)$, there is a canonical isomorphism

$$\mu : K_*^G(\underline{E}G) \to K_* C_r^* G$$

where $\underline{E}G$ is a universal example for the action of G. Quite specific, $\underline{E}G$ is the affine Bruhat-Tits building for G, also denoted βG. Let $C_r^*(G//I)$ denote the reduced Iwahori-Hecke C^*-algebra of $GL(n)$ and let Σ be a single apartment in βG. Then, $\Sigma = \underline{E}W$ is a model for the universal example $\underline{E}W$ of the the affine Weyl group W of G. Localized to the apartment Σ, the Baum-Connes conjecture modulo torsion is an isomorphism

$$K_j(C_r^*(G//I) \otimes_{\mathbb{Z}} \mathbb{C} \cong K_j^W(\Sigma) \otimes_{\mathbb{Z}} \mathbb{C}.$$

Let E/F be a finite Galois extension of local nonarchimedean fields. Base change lifts a representation of $GL(n, F)$ to a representation of $GL(n, E)$. This creates a map from the tempered dual of $GL(n, F)$ to the tempered dual of $GL(n, E)$. We use the Baum-Connes conjecture to relate functoriality of buildings with base change. We illustrate this relation with the reduced Iwahori-Hecke C^*-algebra of $GL(n, E)$ and $GL(n, F)$.

24. **Speaker**: Abdelaziz Mennouni (University of Bordj Bou-Arreridj, Algeria)
Title: Closed Form Expression for the Solution of Some Singular Integral Equations
Abstract: This paper investigates the exact solution of some singular integral equations of the first kind. We present a new technique in such a manner that Adomian's decomposition method can be applied. We obtain a closed form expression for the solution of this class. In the end, some numerical examples with closed-form solutions illustrate the theoretical results.

25. **Speaker**: Zouhair Mouayn (University Moulay Slimane, Morocco)
Title: Coherent states for Landau levels on two-dimensional surfaces and associated photon counting probability distributions
Abstract: Generalized coherent states attached to Landau levels on two-dimensional surfaces are constructed. The associated counting probability distributions are defined and their main statistical parameters are obtained. As application, we discuss the classicality/nonclassicality of the constructed states with respect to the location of their labeling points.

26. **Speaker**: Nobuaki Obata (Tohoku University, Japan)
Title: Spectral analysis of product graphs – A quantum probabilistic view point
Abstract: In recent years, quantum probability has been applied to spectral analysis of graphs,

in particular, to the study of spectral properties of the adjacency matrices of (large, growing, or random) graphs. In this talk we focus on the product structures of graphs (Cartesian, comb, star, free, etc). It is noted that product structures are related to various concepts of independence in quantum probability theory. From this aspect the spectral distribution is obtained from suitable convolution products of probability measures. We will review basic results and report some recent achievements on the Manhattan product of digraphs for future direction.
[1] A. Hora and N. Obata: Quantum Probability and Spectral Analysis of Graphs Springer, 2007.
[2] N. Obata: Lecture Notes (Tokyo, Sendai, Wroclaw, Cheongju, etc)
available at http://www.math.is.tohoku.ac.jp/ obata/

27. **Speaker**: Vladimir Peller (Michigan State University, USA)
Title: Operator moduli of continuity
Abstract: We study properties of operator moduli of continuity. For a continuous function f on a closed subset $\mathfrak{F}$ of the real line the operator modulus of continuity Ω_f is defined by

$$\Omega_f(\delta) = \sup \|f(A) - f(B)\|, \quad \delta > 0,$$

where the supremum is taken over all self-adjoint operators A and B with spectra in $\mathfrak{F}$ such that $\|A - B\| < \delta$.
I am going to speak about upper and lower estimates for the operator moduli of continuity. The talked is based on joint work with A.B. Aleksandrov.

28. **Speaker**: Paulo R. Pinto (IST Lisbon, Portugal)
Title: On the profinite completion of group-C*-algebras
Abstract: We investigate when a C*-algebra A can be given different structures of pro-C*-algebras, leading us to define the profinite completion of a C*-algebra (which is a pro-C*-algebra).
As an analog of the diagonal group morphism from a group into its profinite completion, we construct a natural homomorphism from the group C*-algebra of a locally compact group to the pro-C*-algebra of the profinite completion of the group. We prove that this homomorphism is indeed injective for amenable residually finite discrete groups. The talk is based on a joint work with R. El Harti and N.C. Phillips.

29. **Speaker**: Jean Renault (University d'Orléans, France)
Title: Groupoid cocycles and derivations
Abstract: There are a number of results which say that, under suitable hypotheses, cocycles which are bounded are necessarily coboundaries and that bounded derivations are inner. I shall review these results and give them some natural extensions in the framework of locally compact groupoids and Hilbert C*-modules. I will give examples and applications.

30. **Speaker**: Mohammed A. Salim (United Arab Emirates University)
Title: About Zassenhaus and Conjecture for Torsion Units in Integral Group Rings
Abstract: Using the Luthur-Passi method and results of Hertweck, we consider the famous Zassenhaus Conjecture for the normalized unit group of the integral group ring of the symmetric groups $S_n, n \leq 10$. As a consequence, we achieve the solution of the Kimmerle's conjecture about prime graphs for the group of units of these groups.

31. **Speaker**: Markus Seidel (Chemnitz University of Technology, Germany)
Title: Approximate projections, $\mathcal{P}$-strong convergence and the finite sections of quasi-diagonal operators
Abstract: The notions of compact operators, Fredholm operators and strong convergence as well as the interactions between them have played a crucial role and have been intensively exploited in the theory of projection methods for bounded linear operators. More precisely, for a given equation $Ax = b$ with the unknown x, one chooses a strongly converging sequence of compact projections $\mathcal{P} = (P_n)$ and one studies the sequence of equations $P_nAP_nx_n = P_nb$, $n \in \mathbb{N}$, in order to find approximate solutions for the initial problem.
We now turn the table, in a sense, and take a sequence $\mathcal{P} = (P_n)$, being a so-called approximate projection, as a starting point for the definition of the substitutes $\mathcal{P}$-compactness, $\mathcal{P}$-Fredholmness and $\mathcal{P}$-strong convergence. This adapted framework enables us to develop a theory that mimics the classical one, provides very similar results on the applicability of the projection method, the stability, and on the convergence of norms, condition numbers or pseudospectra, but extends them to much more general settings.
We demonstrate the approach for the finite section method applied to quasi-diagonal operators acting on certain Banach spaces, e.g. $l^p(\mathbb{Z})$ or $L^p(\mathbb{R})$ with $1 \leq p \leq \infty$.

32. **Speaker**: Janusz Wysoczañski (University of Wrocaw, Poland)
Title: Ortjogonal polynomials related to anyon statistics
Abstract: Let T be a locally compact Polish space (i.e. separable, completely metrizable topological space), with a non-atomic Radon measure σ. Let $D \subset T \times T$ be the diagonal:

$$D := \{(t,t) \in T^2 | t \in T\}$$

Let also $A \subset T \times T$ be symmetric subset, i.e. if $(s,t) \in A$ then $(t,s) \in A$, containing the diagonal $D \subset A$. We consider a hermitian kernel (on the complement of A):

$$Q : (T \times T \setminus A) \to S^1 := \{z \in \mathbb{C} : |z| = 1\}, \quad Q(s,t) = \overline{Q(t,s)}.$$

The basic example is the anyonic case: for $T = \mathbb{R}$ or $T = \mathbb{R}^+$ and $A = D$ and fixed $|q| = 1$ we put

$$Q(s,t) := \begin{cases} q & \text{if} \quad s < t \\ \overline{q} & \text{if} \quad t < s \end{cases}$$

This allows us to define the Q-deformed (i.e. Q-symmetric) Fock space (for $L^2(T,\sigma)$) and, for a given $h \in L^2(T,\sigma)$, the related Q-creation $a^\dagger(h)$, Q-annihilation $a(h)$ and Q-neutral $a^0(h)$ operators. Moreover, we give meaning to the Q-creation, Q-annihilation and Q-neutral operators at points:

$$a^\dagger(\delta_t) := \partial_t^\dagger, \quad a(\delta_t) := \partial_t, \quad a^0(\delta_t) := \partial_t^\dagger \partial_t,$$

and for these we obtain some deformed commutation relations:

$$\begin{aligned} \partial_s \partial_t^\dagger &= \delta(s,t) + Q(s,t)\partial_t^\dagger \partial_s \\ \partial_s \partial_t &= Q(t,s)\partial_t \partial_s \\ \partial_s^\dagger \partial_t^\dagger &= Q(t,s)\partial_t^\dagger \partial_s^\dagger \end{aligned}$$

For $\lambda > 0$ we put

$$\omega(t) := \partial_t^\dagger + \lambda \partial_t^\dagger \partial_t + \partial_t.$$

This defines the generalized Q-Gaussian process ($\lambda = 0$) and Q-Poisson (centered) process ($\lambda = 1$). Then we study the related Q-Hermite ($\lambda = 0$) and Q-Charlier ($\lambda = 0$) orthogonal polynomials. We obtain some recurrence relations for them and also study the associated Wick ordering. The description we obtain uses marked partitions.

The talk is based on the paper:
Bożejko, M., Lytvynov, E. Wysoczański, J. *"Non-commutative Lévy processes for generalized (particularly anyon) statistics "* (2011), to appear.