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# Résumés des Exposés

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**Hafedh Abdelli**

**Title:** Recurrence and almost periodicity on dendrites

**Abstract:** Let  $X$  be a dendrite. We say that  $X$  has the APR-property, provided that for each continuous self-mapping  $f$  of  $X$ ,  $\overline{AP(f)} = \overline{R(f)}$ , where  $AP(f)$  and  $R(f)$  are the sets of almost periodic and recurrent points respectively. In this talk, we prove that  $X$  has the APR-property if and only if its set of endpoints is countable. *This is a joint work with Habib Marzougui.*

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**Rim Abid**

**Title:** Composition operators on  $f$ -algebras

**Abstract:** By a composition operator between two  $f$ -algebras we mean a positive algebra homomorphism. This talk intends to give a systematic study of such operators. A particular attention is paid to their connection with separating regular operators as well as to their global behavior in the module of regular operators.

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**Haithem Abouda**

**Title:** On density of periodic points for dendrite maps and their induced maps

**Abstract:** Let  $X$  be a compact metric space and  $2^X$  be the hyperspace of all nonempty closed subsets of  $X$  endowed with the Hausdorff metric. It is well known that for each continuous map  $f : X \rightarrow X$ , the density of periodic points of  $f$  implies the density of periodic points of the induced map  $2^f : 2^X \rightarrow 2^X$ . Méndez conjectured in [Topology Proceeding, 35 (2010), 281-290] that the converse is true when the phase space  $X$  is a dendrite. In this talk we give a counterexample of a continuous maps  $F : X \rightarrow X$  where  $X$  is a dendrite such that  $2^F$  has a dense set of periodic points while  $F$  has exactly two periodic points.

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**Baghdadi Aloui**

**Title:** About a raising operator that preserves the orthogonality of Laguerre polynomials

**Abstract:** Let  $\mathbf{R}_{\mu,\lambda} := (x - \mu)\mathbb{I} + \lambda x D$  be a raising operator, where  $\mu$  and  $\lambda$  are arbitrary non-zero parameters and  $\mathbb{I}$  represents the identity on the linear space of polynomials with complex coefficients. In this paper, we show that the sequence of monic Laguerre polynomials  $\{L_n^{(\mu)}\}_{n \geq 0}$ , with  $\mu \in \mathbb{C} - (\mathbb{Z}_- \cup \{1\})$ , is only orthogonal sequence such that  $\{\mathbf{R}_{\mu,\lambda} L_n^{(\mu)}\}_{n \geq 0}$  is also orthogonal, based on some characterizations of Laguerre polynomial. As an illustration, we give some properties of the obtained polynomial sequence and we establish an integral relation between the Bernoulli and Laguerre polynomials. Finally, some other connection formulas are given.

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**Ghassen Askri**

**Title:** Li-Yorke chaos for dendrite maps with zero topological entropy and  $\omega$ -limit sets

**Abstract:** A *continuum* is a compact connected metric space. By a *dendrite*  $X$ , we mean a locally connected continuum containing no simple closed curve. Let  $X$  be a dendrite, a point  $x \in X$  is called an *endpoint* of  $X$  if  $X \setminus \{x\}$  is connected. We denote by  $E(X)$  the set of all endpoints of  $X$ . Let  $(X, d)$  be a compact metric space and  $f : X \rightarrow X$  be a continuous map. We denote by  $P(f)$  the set of *periodic points* of  $f$  i. e.  $P(f) = \{x \in X; \exists n > 0 : f^n(x) = x\}$ . Let  $x \in X$ . The set  $\omega_f(x) := \{y \in X : \exists \text{ a sequence of integers } (n_i) \nearrow^{+\infty} : \lim_{i \rightarrow +\infty} f^{n_i}(x) = y\}$  is called the  *$\omega$ -limit set* of  $x$ . Let  $X$  be a dendrite with metric  $d$  such that the set of endpoints  $E(X)$  is closed and let  $f : X \rightarrow X$  be a continuous map with zero topological entropy. We prove that if  $L$  is an infinite  $\omega$ -limit set of  $f$  then  $L \cap P(f) \subset E(X)'$ , where  $E(X)'$  is the set of all accumulations points of  $E(X)$ . Furthermore, if  $E(X)$  is countable and  $L$  is uncountable then  $L \cap P(f) = \emptyset$ . We also show that if  $E(X)'$  finite and  $L$  an uncountable  $\omega$ -limit set of  $f$  then there is a sequence of subdendrites  $(D_k)_{k \geq 1}$  of  $X$  and a sequence of integers  $n_k \geq 2$  satisfying the following properties. For all  $k \geq 1$ ,

1.  $f^{\alpha_k}(D_k) = D_k$  where  $\alpha_k = n_1 n_2 \dots n_k$ ,
2.  $\cup_{k=0}^{n_j-1} f^{k\alpha_j-1}(D_j) \subset D_{j-1}$  for all  $j \geq 2$ ,
3.  $L \subset \cup_{i=0}^{\alpha_k-1} f^i(D_k)$ ,
4.  $f(L \cap f^i(D_k)) = L \cap f^{i+1}(D_k)$  for any  $0 \leq i \leq \alpha_k - 1$ . In particular,  $L \cap f^i(D_k) \neq \emptyset$ ,
5.  $\forall 0 \leq i \neq j < \alpha_k$ ,  $f^i(D_k) \cap f^j(D_k)$  has empty interior.

As a consequence, if  $f : X \rightarrow X$  has a Li-Yorke pair  $(x, y)$  i. e.  $\liminf_{n \rightarrow +\infty} d(f^n(x), f^n(y)) = 0$  and  $\limsup_{n \rightarrow +\infty} d(f^n(x), f^n(y)) > 0$  then there is an uncountable set  $S$  in  $X$  such that any proper pair in  $S^2$  is a Li-Yorke pair.

## References

- [1] S. Ruelle, L. Snoha, *For graph maps, one scrambled pair implies Li-Yorke chaos*, Proc. Amer. Math. Soc. **142** (2014), 2087–2100.
- [2] J. Smital, *Chaotic functions with zero topological entropy*, Trans. Amer. Math. Soc. **297** (1986), 269–282.

### Miloud Assal

**Title:** New Ring of Ponderation Functions Connected with a Class of Integral Operators

**Abstract:** In this paper we introduce a new ring of ponderation functions which allowed us to describe and classify a large class of integral operators. Moreover we define a derivation operation over this ring and we give different applications associated with the class of integral operators.

### Hela Ayadi

**Title:** Spectre du Laplacien sur les formes sur les graphes infinis

**Abstract:** Dans le contexte de graphe infini, localement fini et pondéré, on s'intéresse à l'étude des propriétés spectrales de l'opérateur Laplacien sur les formes qui est déjà introduit dans le travail de Colette Anné et Nabila Turki-Hamza. Plus précisément, on donne la relation entre le spectre du Laplacien défini sur l'espace des fonctions sur les sommets et le spectre du Laplacien défini sur l'espace des fonctions sur les arêtes.

### Youssef Azouzi

**Title:** Some elementary and simple proofs in linear algebra

**Abstract:** Cet exposé s'adresse à un grand public. Je présente plusieurs résultats connus en algèbre linéaire avec des preuves simples très peu connues et d'autres originales. Je peux citer à titre d'exemple : la réduction Jordan; la détermination du commutant et du bicommutant d'une matrice; la décomposition de Dunford; le théorème de Birkhoff sur les matrices bistochastiques; le théorème de Cayley-Hamilton; le théorème de Perron-Frobenius, le théorème de Frobenius-Zolotarev.

### Yakine Bahri

**Title:** Stabilité asymptotique des solitons pour l'équation de Landau-Lifshitz

**Abstract:** L'équation de Landau-Lifshitz rend compte de l'évolution de la magnétisation dans un matériau ferromagnétique. En dimension un, l'équation admet des solutions spéciales de type solitons, qui jouent un rôle important dans la dynamique en temps long. Cet exposé présentera une confirmation de cette affirmation à travers la preuve de la stabilité asymptotique des solitons dans l'espace d'énergie.

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## Soumaya Belhaj Ali

**Title:** Elliptic operators with unbounded Diffusion coefficients and singular Potentials on domains with Dirichlet boundary conditions

**Abstract:** In this talk, we give an overview of some new results obtained in the study of the parabolic initial-boundary value problems  $D_t u = Lu$  associated with elliptic operators with unbounded diffusions coefficients and singular potentials. More precisely, we first prove that, under suitable assumptions on  $\alpha > 0$ , the operator

$$L_\alpha u = (1 + |x|^\alpha)\Delta u$$

admits a realization generating an analytic semigroup in  $L^p(\Omega, d\mu(x))$ ,  $1 < p < \infty$ , where  $d\mu(x) = \frac{1}{1+|x|^\alpha} dx$  and  $\Omega$  is an unbounded open domain of  $\mathbb{R}^N$  containing 0 and subject to Dirichlet Boundary conditions. We also explicitly characterize the domain of  $L_\alpha$ . Next, under suitable conditions on  $\alpha > 0$  and  $c \in \mathbb{R}$ , we show that the operator

$$L_{\alpha,c} u = (1 + |x|^\alpha)\Delta u + \frac{c}{|x|^2} u := L_\alpha u + \frac{c}{|x|^2} u,$$

with suitable domain generates a quasi-contractive and positivity preserving  $C_0$ -semigroup in  $L^p(\Omega, d\mu(x))$ ,  $1 < p < \infty$ . The proofs are based on some  $L^p$ -weighted Hardy's inequality and perturbation techniques. Finally, we prove heat kernel bounds for the operator  $L_{\alpha,c}$ , through weighted Sobolev inequalities and transference to weighted Lebesgue spaces.

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## Ahlem Ben Ali Essaleh

**Title:** \*-Automorphisme bilocale de  $B(H)$  satisfaisant la propriété 3-locale

**Abstract:** We prove that, for a complex Hilbert space  $H$  with dimension bigger or equal than three, every linear mapping  $T : B(H) \rightarrow B(H)$  satisfying the 3-local property is a \*-monomorphism, that is, every linear mapping  $T : B(H) \rightarrow B(H)$  satisfying that for every  $a$  in  $B(H)$  and every  $\xi, \eta$  in  $H$ , there exists a \*-automorphism  $\pi_{a,\xi,\eta} : B(H) \rightarrow B(H)$ , depending on  $a$ ,  $\xi$ , and  $\eta$ , such that

$$T(a)(\xi) = \pi_{a,\xi,\eta}(a)(\xi), \text{ and } T(a)(\eta) = \pi_{a,\xi,\eta}(a)(\eta),$$

is a \*-monomorphism. This solves a question posed by L. Molnr in [*Arch. Math.* **102**, 83-89 (2014)].

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## Bilel Kacem Ben Ammou

**Title:** Infinite degrees of freedom Weyl representation: characterizations and applications

**Abstract:** By means of infinite-dimensional nuclear spaces, we generalize important results on the representation of the Weyl commutation relations. To this end, we construct a new nuclear Lie group generalizing the groups introduced by Parthasarathy and Gelfand-Vilenkin. Then we offer an explicit construction of Weyl representations generated from the Non-Fock representation. As application, we characterize all these Weyl representations by using the QWN-derivatives and the QWN-conservation operator.

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## Meriem Bel Hadj Khelifa

**Title:** Sur l'estimation du Drift paramètre pour une équation différentielle stochastique incluant un mouvement brownien fractionnaire

**Abstract:**

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## Raja Ben Hajria

**Title:** Estimating and testing breaks in variance structures with smooth changes

**Abstract:** The problem of detecting variance breaks in the case of smooth time-varying variance structure is studied. It is highlighted that the tests based on (piecewise) constant specification of the variance are not able to distinguish between smooth non constant variance and the case where an abrupt change is present. Consequently, a new procedure for detecting variance breaks taking into account for smooth changes of the variance is proposed. The consistency of the break-points estimation is established.

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### Imen Ben Hassine

**Title:** Théorie de point fixe pour la somme de deux opérateurs

**Abstract:** Dans ce travail nous allons montrer quelques nouveaux théorèmes de point fixe pour la somme d'un opérateur  $(ws)$ -compact et d'un opérateur expansif dans un convexe fermé non-borné d'un espace de Banach. De plus, nous allons donner des théorèmes de point fixe de type Krasnosel'skii pour les opérateurs faiblement séquentiellement continus, qui s'étendent des résultats analogues obtenus par T. Xiang et R. Yuan en 2010. Les hypothèses de nos résultats sont formulées en termes de la topologie faible et une définition de la mesure de non faible compacité.

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### Sonia Ben Makhlouf

**Title:** Combined effects in a fractional semilinear Dirichlet problem in a bounded domain

**Abstract:** We establish an existence, uniqueness and asymptotic behavior of a positive continuous solution  $u$  for the following nonlinear fractional boundary value problem:

$$D^\alpha u(x) = a_1(x)u^{\sigma_1}(x) + a_2(x)u^{\sigma_2}, \quad x \in (0, 1] \text{ and } \lim_{x \rightarrow 0^+} x^{1-\alpha}u(x) = 0,$$

where  $0 < \alpha < 1$ ,  $\sigma_1, \sigma_2 \in (-1, 1)$  and  $a_1, a_2$  are positive measurable functions on  $(0, 1]$  satisfying appropriate assumptions related to Karamata regular variation theory.

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### Hanan Ben Omrane

**Title:** Résultat de positivité pour une équation biharmonique sous les conditions au bord de Dirichlet

**Abstract:** Dans ce travail, on montre un résultat de dichotomie donnant une propriété de préservation de la positivité pour une équation biharmonique sous les conditions au bord de Dirichlet. Cette équation apparaît dans les MEMS (Micro-Electro-Mechanical Systems).

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### Neila Ben Romdhane

**Title:** On the zeros of  $d$ -orthogonal Laguerre polynomials and their  $q$ -analogues

**Abstract:** In this talk, we give some properties of the zeros of special families of Brenke type polynomials. In particular, we consider an extension of Laguerre polynomials known as  $d$ -orthogonal Laguerre polynomials. For these polynomials, we prove that all the zeros are simple, positive and interlaced. A  $q$ -analogue is considered as well.

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### Meryam Ben Said

**Title:** Product Formula For The Generalized  $q$ -Bessel Function

**Abstract:** The aim of this paper is to establish a product formula for the generalized  $q$ -Bessel function which is a generalization of the known  $q$ -Bessel functions of kind 1,2,3 and the modified  $q$ -Bessel functions of kind 1,2,3, and 4.

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### Karem Bettaïeb

**Title:** Sur les représentations tempérées d'un groupe réductif  $p$ -adique non connexe

**Abstract:** Soit  $G$  l'ensemble des points rationnels d'un groupe algébrique réductif non connexe  $p$ -adique de caractéristique 0. Soit  $G^0$  la composante neutre de  $G$ . On suppose que  $G/G^0$  est commutatif et fini. Notre motivation pour cette note est de rejoindre le cas connexe d'un papier précédent. Autrement dit, de retrouver une analogie à notre classification des représentations irréductibles tempérées de  $G$ , lorsque  $G$  est connexe. C'est-à-dire que toute représentation irréductible tempérée de  $G$  est irréductiblement induite d'une limite de série discrète d'un sous-groupe de Lévi cuspidal de  $G$ .

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## Hassen Bourokba

**Title:** A relationship between the space of orthomorphisms and the center of a vector lattice

**Abstract:** Let  $E$  be a vector lattice. For all  $x, y \in E$  we say that  $x$  and  $y$  are disjoint if  $|x| \wedge |y| = 0$  and we write  $x \perp y$ . A linear operator  $T : E \rightarrow E$  will be called a disjointness preserving operator if  $Tx \perp y$  whenever  $x \perp y$ . A positive orthomorphism on  $E$  is a disjointness preserving operator  $T$  which is also positive ( $Tx \geq 0$  whenever  $x \geq 0$ ). An orthomorphism is the difference of two positive orthomorphisms. The center  $Z(E)$  of a vector lattice  $E$  consists of all linear operators on  $E$  which are bounded in order by some multiple of the identity. When are so happy in a vector lattice  $E$  that every orthomorphism on  $E$  turn out to be in the ideal center? In this talk we give a complete description of those vector lattices  $E$  with the property that every orthomorphism on  $E$  is a central operator.

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## Wael Brahim

**Title:** Multiplicative structure of biorthomorphisms and embedding of orthomorphisms

**Abstract:** Let  $\mathcal{X}$  be an Archimedean vector lattice. A biorthomorphism on  $\mathcal{X}$  is a bilinear map from  $\mathcal{X} \times \mathcal{X}$  into  $\mathcal{X}$  which is an orthomorphism on  $\mathcal{X}$  in each variable separately. The set of such biorthomorphisms is denoted by  $\text{Orth}(\mathcal{X}, \mathcal{X})$ . We prove that if  $\text{Orth}(\mathcal{X}, \mathcal{X})$  is not trivial then  $\text{Orth}(\mathcal{X}, \mathcal{X})$  is equipped with a structure of  $f$ -algebra, giving thus a complete answer to a question asked quite recently by Buskes, Page, and Yilmaz. On the other hand, we assume that  $\mathcal{X}$  is a semiprime  $f$ -algebra and we show that if  $\mathcal{X}$  is either Dedekind-complete or uniformly-complete with a weak order unit, then the set of all orthomorphisms on  $\mathcal{X}$  has an order ideal copy in  $\text{Orth}(\mathcal{X}, X)$ . Notice that the Dedekind-complete case has been obtained again by Buskes, Page, and Yilmaz in a completely different way.

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## Abdelwaheb Chrih

**Title:** Remarks on the Gromov hyperbolicity

**Abstract:** We prove that a bounded convex domain in  $\mathbb{C}^n$  that we remove a complex affine hyperplane is not Gromov hyperbolic with respect to the Kobayashi distance. Then, we study the Gromov (non)hyperbolicity of Hartogs domain in  $\mathbb{C}^n$ .

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## Anis Dhifaoui

**Title:** Stokes Equations with Navier boundary conditions in an exterior domain

**Abstract:** This work presents an attempt to study the stationary Stokes problem with Navier boundary conditions. We try to investigate some results of existence, uniqueness and regularity of solutions related to this problem in an exterior domain in Hilbert case.

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## Zied Douzi

**Title:** Analyse multifractale relative de projetées de mesures

**Abstract:** Dans mon exposé, je m'intéresse à étudier l'analyse multifractale de la projeté d'une mesure  $\mu$  sur un sous-espace vectoriel par rapport à une autre mesure  $\nu$ . Plus précisément, on va étudier le rapport liant les spectres multifractals de  $\mu$  et  $\nu$  à celles de ses projetées.

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## Hanen Ferchichi

**Title:** Formulation mixte non verrouillante d'une coque de Koiter à flexion dominante

**Abstract:** La modélisation numérique des problèmes de coques s'avère indispensable vu le champ large d'applications de ce type de structures en industrie, en biomécanique...

Cependant, les méthodes des éléments finis standards pour les coques minces sont affectées par le verrouillage numérique. Il se manifeste par une dégradation de l'erreur d'approximation lorsque l'épaisseur de la coque est faible et empêche une bonne représentation des différents modes des énergies [2][3]. Dans ce travail, on présente une formulation mixte non verrouillante pour une coque de Koiter suivant les idées de Arnold et Brezzi [1]. Pour

simuler numériquement une coque de Koiter à flexion dominante, on utilise pour chaque variable l'approximation la mieux adaptée à la régularité de la solution. La précision due à l'utilisation des éléments finis continument différentiables est nécessaire pour simuler numériquement le déplacement transversal des points de la surface moyenne d'une coque de Koiter. L'élément fini  $HCT$  permet de construire des interpolants de classe  $C^1$  et de réaliser une approximation  $H^2$  conforme de la composante transversale du déplacement des points de la surface moyenne et on choisit une approximation  $H^1$  conforme par des éléments finis de Lagrange enrichis par des bulles pour l'approximation des composantes tangentielles du déplacement. La vérification de la condition inf-sup discrète est réalisée sous des hypothèses très restrictives sur la géométrie de la coque. Des tests numériques illustrent et confirment le caractère non verrouillant de la méthode des éléments finis mixtes présentée.

## References

- [1] D.N. Arnold and F. Brezzi [1997], Locking free finite element methods for shells, Mathematics of Computation, volume 66, N°217, pp.1-14.
- [2] D. Chapelle [1995], Etude numérique du verrouillage de quelques méthodes d'éléments finis pour les coques, rapport de recherche INRIA, N°2740.
- [3] Jacqueline Sanchez-Hubert and Evariste Sanchez-Palencia, Coques élastiques minces propriétés asymptotiques, Masson, 1997.

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### Inès Gam

**Title:** On some operators varying the dimensional parameters of  $d$ -orthogonality

**Abstract:** In this talk, we solve a characterization problem which consists to find all  $d$ -orthogonal polynomial sets of Sheffer type. Then we consider its corresponding hierarchy problem. That allows us to obtain several couples  $(P, T)$  where  $P$  is a  $d$ -orthogonal polynomial set and  $T$  is an operator acting on polynomials for which  $TP$  is a  $d'$ -orthogonal polynomial set,  $d' \neq d$ . We express some of these operators as infinite order differential operators. Then, we state some of their properties.

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### Loubna Ghammam

**Title:** Courbes Elliptiques: de l'inutile à l'indispensable

**Abstract:** In this paper, we describe and improve efficient methods for computing the hard part of the final exponentiation of pairings on Barreto-Naehrig curves. Thanks to the variants of pairings which decrease the length of the Miller loop, the final exponentiation has become a significant component of the global computation. Here we exploit the structure of BN curves to improve this computation. We will first present the most famous methods in the literature that ensure the computing of the hard part of the final exponentiation. We are particularly interested in the memory resources necessary for the implementation of these methods. Indeed, this is an important constraint in restricted environments. More precisely, we are studying Devegili et al. method, Scott et al. addition chain method and Fuentes et al. method. After recalling these methods and their complexities, we determine the number of required registers to compute the final result, because this is not always given in the literature. Then, we will present new versions of these methods which require less memory resources (up to 37%). Moreover, some of these variants are providing algorithms which are also more efficient than the original ones.

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### Soumaya Ghnimi

**Title:** Optimisation par la méthode à région de confiance

**Abstract:** Les méthodes d'optimisation les plus courantes utilisent en général le gradient de la fonction objectif par rapport aux variables d'optimisation, noté  $\nabla f$ , afin de construire une direction de descente  $d$ . Une recherche linéaire est ensuite effectuée le long de cette direction pour déterminer un pas  $\alpha$  qui réduise la fonction  $f$ , de telle sorte que  $f(x + \alpha d) < f(x)$ .

Dans le cadre général de la résolution du problème d'optimisation non-linéaire suivant :

$$\min_{x \in \mathbb{R}^n} f(x)$$

Nous présentons dans ce papier la méthode à région de confiance qui consistent à remplacer le problème d'optimisation initial par une suite de sous-problèmes d'optimisation, plus simples à résoudre ou la fonction  $f : \mathfrak{R}^n \rightarrow \mathfrak{R}$  est supposée être suffisamment régulière.

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### Hamza Ghouda

**Title:** Hitting times statistics and extreme value laws for random dynamical systems

**Abstract:** Nous considérons un système dynamique aléatoire à temps discret et nous montrons le lien entre les "Hitting time statistic" (i.e la distribution asymptotique de la première temps d'entre dans un petite ensemble) et la loi de valeurs extrme (i.e les propriétés de distribution du maximum partielle de processus stochastique). Cette relation permet d'étudier le "Hitting time statistc" avec des outils de théorie de valeurs extrme et vice versa.

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### Souhir Gliouez

**Title:** The support projection of state and a quantum extension of the classical Levy-Austin-Ornstein theorem

**Abstract:** We characterize the support projection of a state evolving under the action of a quantum Markov semigroup with unbounded generator represented in the generalized GKSL form, and we derive a natural condition under which a quantum analogue of the classical Levy-Austin-Ornstein theorem holds. We finally illustrate the results obtained with examples.

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### Marwa Haddar

**Title:** From sequences to  $q$ - polynomials and back, via  $q$ -operator orderings

**Abstract:** . M. Bender and G. V. Dunne showed that linear combinations of words  $U_k V_n U_{n-k}$  where  $U$  and  $V$  are subject to the relation  $UV - VU = i$ , may be expressed as a polynomial in the symbol  $z = \frac{1}{2}(UV + VU)$ . Relations between such polynomials and linear combinations of the transformed coefficients are explored. In particular, examples yielding orthogonal polynomials are provided. In a recent work by TEWODROS AMDEBERHAN and All, relations between such polynomials and linear combinations of the transformed coefficients are explored. In particular, examples yielding orthogonal polynomials are provided. We extend their works to linear combinations of words in  $U$  and  $V$  subject to the relation  $UV - qVU = i$ . We showed that words  $U_k V_n U_{n-k}$ , are expressed as a polynomial in the symbol symbol  $z = \frac{1}{2}(UV + qVU)$ . Relations between such polynomials and linear combinations of the transformed coefficients are explored. In particular, examples yielding  $q$ -orthogonal polynomials are provided.

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### Sana Hadj Amor

**Title:** Positive solutions for some boundary value problems via a new fixed point theorem

**Abstract:** We establish some new fixed point theorems of mixed monotone operator with a perturbation. Moreover, we prove the existence and the uniqueness of positive solutions of a second order Neumann boundary value problem, a second order Sturm Liouville boudary value problem and a nonlinear elliptic boundary value problem for the Lane-Emden-Fowler equation.

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### Ahmed Hamed

**Title:** Modules and rings satisfying the property S-ACCR

**Abstract:** Let  $R$  be a commutative ring with unity,  $S$  a multiplicative subset of  $R$  and  $M$  an  $R$ -module. We define  $S$ -accr modules: an  $R$ -module  $M$  is said to satisfy  $S$ -accr if any ascending chain of residuals of the form  $(N : B) \subseteq (N : B^2) \subseteq (N : B^3) \subseteq \dots$  is  $S$ -stationary where  $N$  is a submodule of  $M$  and  $B$  is a finitely generated ideal of  $R$ . We investigate the class of such modules  $M$  and we generalize some known results of P. C. LU [1], [2].

## References

- [1] C. P. LU. Modules satisfying ACC on a certain type of colons. Pacific J of Math. 131 (2) (1988), 303 – 318.

### Manel Hleili

**Title:** On Nash and Carlson’s Inequalities for Symmetric  $q$ -Integral Transforms

**Abstract:** The main objective of this work is to prove new uncertainty principles for the generalized  $q$ -Bessel Fourier transform. To do so we prove a Nash-type inequality and a Carlson-type inequality for this transformation. From this we deduce a variation on Heisenberg’s uncertainty inequality and Faris’s local uncertainty principle. Our results can be applied to a wide variety of symmetric  $q$ -integral operators, including the  $q$ -Fourier-cosine,  $q$ -Fourier-sine and  $q$ -Dunkl transforms.

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### Abdelwaheb Ifa

**Title:** Règles de quantification de Bohr-Sommerfeld et applications

**Abstract:** La règle de quantification de Bohr-Sommerfeld (BS) permet de résoudre le problème aux valeurs propres pour un Hamiltonien semi-classique associé à une orbite périodique  $\gamma_E$ . Le cas standard est celui de l’opérateur de Schrödinger  $P = -\hbar^2 \Delta + V(x)$ , où  $\gamma_E$  est une composante compacte de la surface d’énergie  $\xi^2 + V(x) = E$  pour  $E$  près de  $E_0$ , valeur régulière de l’énergie. Elle est donnée, au premier ordre en  $\hbar$ , par la formule

$$\frac{1}{2\pi\hbar} \oint_{\gamma_E} \xi dx = n + \frac{1}{2}$$

BS exprime que l’action classique le long de  $\gamma_E$  est un multiple entier plus  $1/2$  (dite correction de Maslov) de la ”constante de Planck”  $\hbar$ . En inversant cette formule par le théorème des fonctions implicites, on trouve alors la suite spectrale  $E_n(\hbar)$  au voisinage de  $E_0$ , dont les termes consécutifs sont à une distance de l’ordre de  $\hbar$ . La règle BS admet diverses généralisations, par exemple lorsque  $P$  est le quantifié de Weyl d’un Hamiltonien qui admet des couches d’énergie compactes, ou encore pour un système.

On se propose d’abord ici de retrouver la règle BS, en se basant sur le formalisme algébrique et microlocal développé par B.Helffer et J.Sjöstrand, dit de l’*opérateur de Grushin*. La méthode ainsi élaborée se généralise au cas d’un système présentant des croisements de modes pour lequel on ne connaît pas d’autre alternative.

Elle consiste à construire, pour une énergie donnée  $E$ , des sections locales du fibré vectoriel  $K_\hbar(E)$  des solutions de l’équation de Schrödinger au-dessus de l’orbite  $\gamma_E$ . Ce fibré est muni d’une structure canonique Hermitienne (ou parfois Lorenzienne) et d’un groupe de jauge. La condition de quantification exprime que  $K_\hbar(E)$  est trivialisé, ce qui revient aussi à annuler le déterminant de la matrice de Gram (pour la structure Hermitienne) des sections locales dans une base du co-noyau de  $P$ . Ce déterminant s’identifie ainsi avec la fonction de Jost du problème aux valeurs propres.

Dans une première partie, on retrouve à l’aide de cette méthode les conditions de BS à différents ordres en  $\hbar$  pour des opérateurs scalaires, par exemple l’opérateur de Schrödinger.

On l’applique ensuite au Hamiltonien semi-classique de Bogoliubov-de Gennes (BdG); ce Hamiltonien matriciel, qui s’apparente à l’opérateur de Dirac, décrit une jonction SNS dans le cadre de la supra-conductivité, mettant en jeu les courants d’Andreev liés à une paire de quasi-particules (électron/trou). Pour ce Hamiltonien, on obtient en fait deux règles de quantification, l’une pour l’électron (avec  $n$  pair), et l’autre pour le trou (avec  $n$  impair). Le fibré  $K_\hbar(E)$  est Lorenzien et le groupe de jauge associé  $U(1, 1)$ .

Ce problème, qui s’apparente à celui du scattering au-dessus d’une barrière de potentiel, est un problème de résonances plutôt que d’états liés, si bien que les règles de quantification s’appliquent en fait à leur partie réelle. Le calcul de la partie imaginaire n’est pas considéré dans cette Thèse, mais entre dans le formalisme de l’opérateur de Grushin, généralisant des techniques élaborées par Michel ROULEUX pour l’étude des croisements évités dans l’approximation de Born-Oppenheimer.

Enfin, on établit une règle de quantification pour le pseudo-spectre d’un opérateur scalaire vérifiant la symétrie PT, et dont le symbole principal est réel. Les opérateurs à symétrie PT sont parfois considérés en Physique comme une généralisation des opérateurs auto-adjoints, au sens où leur spectre, symétrique par rapport à l’axe réel, est en fait bien souvent réel. Il a montré en particulier ici que la suite pseudo-spectrale considérée est réelle jusqu’à l’ordre  $\mathcal{O}(\hbar^4)$ .

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### Abdessami Jalled

**Title:** Hyperbolicité au sens de Kobayashi dans les variétés complexes et presque complexes

**Abstract:** Generalization of Julien Duval's work: hyperbolicity of the complement of five lines in general position in the almost complex projective plane  $(CP^2, J)$ , where  $J$  is an almost complex structure. We seek in this work to study the hyperbolicity of the complementary of  $2n + 1$  hyperplanes in general position in the almost complex projective space  $(CP^n, J_1)$ , where  $J_1$  is another almost complex structure.

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### Achref Jallouli

**Title:** Asymptotic Expansion of Solutions of Linear Differential Systems near Singularities and Applications

**Abstract:** The goal of this talk is to present our recent results on differential equations and systems with singularities. This results will allow us to deduce some information about the behaviour of the solutions of differential equations/systems near such singularities. Physicists use, generally, numerical methods to solve differential systems but near a singularity, we can't rely on this methods. This motivates us to solve this systems using formal method.

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### Rim Jday

**Title:** Uncertainty principles in Clifford analysis

**Abstract:** In harmonic analysis, the classical Fourier transform is defined by

$$\mathcal{F}(f)(x) = (2\pi)^{-\frac{m}{2}} \int_{\mathbb{R}^m} f(y)e^{-ixy} dy.$$

In 2005, Sommen and Brackx investigate a generalization of the classical Fourier transform in the setting of Clifford analysis which own an integral expression given by:

$$\mathcal{F}_{\pm}(f)(y) = (2\pi)^{-\frac{m}{2}} \int_{\mathbb{R}^m} K_{\pm}(x, y)f(x)dx,$$

where  $K_{\pm}(x, y) = e^{\mp i \frac{\pi}{2} \Gamma y} e^{-i \langle x, y \rangle}$ . For this Fourier transform, De Bie and Xu establish several properties. In this talk, using results of De Bie and Xu we study uncertainty principles in Clifford analysis. Obviously, we provide an analogue of Hardy's theorem and an analogue of Miyachi's theorem for the Clifford-Fourier transform.

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### Riadh Jalloul

**Title:** Problèmes relatifs aux grassmanniennes complexes

**Abstract:** Nous montrons l'existence d'une enveloppe inférieure des fonctions admissibles pour la métrique d'Einstein-Kähler sur les grassmanniennes complexes et ceci dans un cas non torique en utilisant un groupe d'automorphismes adéquat. La fonction obtenue est une fonction à 8 variables complexes, holomorphe et invariante par ce groupe d'automorphisme choisi. Le résultat prolonge celui dans le cas de l'espace projectif complexe qui est une variété torique et enrichi les invariances dans le cas non torique.

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### Sonia Jerbi

**Title:** Fixed points, spectral theory and surjectivity for  $(ws)$ -compact operators

**Abstract:** We prove some fixed point theorems for  $(ws)$ -compact, weakly condensing and strictly  $B$ -quasi bounded operators defined on an unbounded closed convex subset of a Banach space. Further, we apply our results to establish existence of positive eigenvalues and surjectivity of  $B$ -quasi bounded operators in similar situations. Also, we establish new fixed point results for some nonlinear weakly nonexpansive operators by imposing a demi-weakly compact condition on the operators. Our analysis uses the concept of measures of weak noncompactness and weakly topology.

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### Rym Jrad

**Title:** Scattering for a critical nonlinear wave equation outside a 2D-domains

**Abstract:** We prove scattering for a wave equation with critical exponential nonlinearity in an exterior 2D bounded domain. We assume that the initial data are smooth-compactly supported. Our proof adapts Sack and Struwe for the case of the whole space and where conformal inversion is the key element.

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### Afef Khalleck

**Title:** Topological sensitivity analysis method to solve evolutionary equation

**Abstract:** In this work we discuss the theoretical aspects of the topological sensitivity analysis method. A topological asymptotic expansion is derived for the heat equation with respect to the presence of a small hole in the domain with Neumann conditions on the geometric perturbation boundary. As application, we propose a one-shot reconstruction algorithm. The efficiency and accuracy of the proposed algorithm are illustrated by some numerical results.

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### Khaled Khachnaoui

**Title:** Existence and Multiplicity of Periodic solutions for a class of second order non-autonomous systems

**Abstract:** We study the existence and multiplicity of periodic solutions for second order time-dependent differential systems of type

$$\ddot{u}(t) + A\dot{u}(t) + V'(t, u(t)) = 0,$$

where  $A$  is a skew-symmetric constant matrix,  $t \in \mathbb{R}$ ,  $u \in \mathbb{R}^N$  and  $V \in C^1(\mathbb{R} \times \mathbb{R}^N, \mathbb{R})$  is  $T$ -periodic in  $t$ , with  $T > 0$ . By using the minimax methods in critical point theory, we prove some existence results which generalize and improve some existing results in the literature.

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### Saima Khenissy

**Title:** Equations Biharmoniques avec conditions de Dirichlet au bord et une non-linarité sur critique

**Abstract:** On montre des résultats de non-existence et des résultats d'unicité pour des équations biharmoniques avec les conditions au bord de Dirichlet sur un domaine borné régulier. Nous définissons une classe de domaines Dirichlet h-toiles et nous construisons des exemples de ces domaines ayant une géométrie ou une topologie riche, où nos résultats s'appliquent.

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### Bilel Krichen

**Title:** Linear and Nonlinear Relative Demicompactness Concept

**Abstract:** In a first part of this work, we present some results on Fredholm and upper semi-Fredholm operators involving relative demicompact operators. Our results generalize many known ones in the literature, in particular those obtained by Petryshyn in 1972. They are used to establish a fine description of the Schechter essential spectrum of closed densely defined operators, and to investigate the relative essential spectrum of the sum of two bounded linear operators defined on a Banach space by means of the relative essential spectrum of each of the two operators. In a second part, we discuss some topological properties of the set

$$\mathcal{F}(S_0, T, z) := \{x \in X : S_0x \in Tx + z\},$$

where  $T$  is a nonlinear multi-valued mappings and  $S_0$  is a single-valued mappings acting on a Banach space  $X$ . This study is based on a new concept, the so called weakly relative demicompactness for nonlinear operators.

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### Jihene Lagha

**Title:** Small Perturbations of an Interface for Elastostatic Problems

**Abstract:** We consider solutions to the Lamé system in two dimensions. By using systematic way, based on layer potential techniques and the field expansion (FE) method (formal derivation), we establish a rigorous

asymptotic expansion for the perturbations of the displacement field caused by small perturbations of the shape of an elastic inclusion with  $\mathcal{C}^2$ -boundary. We extend these techniques to determine a relationship between traction-displacement measurements and the shape of the object and derive an asymptotic expansion of the perturbations of elastic moments tensors (EMTs).

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### Mohamed Mabrouk

**Title:** Les coefficients d'inversion et de Connexion des polynômes hypergéométriques

**Abstract:** Soit  $\mathbf{P}$  l'espace vectoriel des polynômes à coefficients dans  $\mathbb{C}$ , le problème de connexion consiste à déterminer les coefficients  $C_m(n)$  dans l'expression:

$$Q_n(x) = \sum_{m=0}^n C_m(n)P_m(x),$$

avec  $P_n$  et  $Q_n$  sont deux suites des polynômes. Pour  $Q_n(x) = x^n$  le problème de connexion est appelé problème d'inversion associé à  $\{P_n(x)\}_{n \geq 0}$ . On s'intéresse aux polynômes hypergéométriques formant le tableau d'Askey.

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### Akram Makni

**Title:** The first eigenvalue for the Dirichlet problem in the Heisenberg group

**Abstract:** This talk contain two parts. In the first part, by using the technique of the harmonic transplantation and an isoperimetric inequality in the Heisenberg group, will give an upper bound of the first eigenvalue for the following Dirichlet problem:

$$(P_\Omega) \begin{cases} -\Delta_{\mathbb{H}^1} u & = \lambda u & \text{in } \Omega \\ u & = 0 & \text{on } \partial\Omega, \end{cases}$$

where  $\Omega$  is a regular bounded domain of  $\mathbb{H}^1$  and  $\Delta_{\mathbb{H}^1}$  is the Kohn-Laplace operator. So we obtain :

$$\lambda_1(\Omega) \leq C_\Omega \frac{l_{11}^2}{\max_{\xi \in \Omega} r_\Omega^2(\xi)},$$

where  $l_{11}$  is the first strictly positive zero of the Bessel function of first kind and order 1,  $C_\Omega$  is a constant depending of  $\Omega$  and  $r_\Omega(\xi)$  is the harmonic radius of  $\Omega$  at  $\xi$ . In the second part of this talk we will introduce the notion of the capacity in the Heisenberg group for the condenser  $(\Omega, K)$  denoted by  $Cap_\Omega(K)$ , where  $K$  is a compact set with smooth boundary included in  $\Omega$ . Then we will give a lower bound of  $Cap_\Omega(K)$ , which depend of the volume of  $\Omega$  and  $K$ . In the end we will construct some links between capacity and Green function.

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### Nizar Mannai

**Title:** Stochastic behavior of two-unit paralleled redundant systems under a perfect repair

**Abstract:** We investigates in this paper the stochastic behavior of two-unit paralleled redundant systems with repair maintenance under the assumptions that the failure time distribution is exponential and the repair time distribution is arbitrary. Of our interest is the following:

- (i) The first-passage time distribution from state  $i$  to state  $j$  ( $i = 0, 1$  ;  $j = 0, 1, 2$ ), respectively
- (ii) What is the mean first-passage time to a certain state  $j$  ?

The quantities above are of great importance in reliability applications, where state  $j$  ( $j = 0, 1, 2$ ) corresponds to the numbers of units under repair.

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### Sabeur Mansouri

**Title:** Exponential stability of some wave coupled systems

**Abstract:** Dans cet exposé, nous nous intéressons aux problèmes de décroissance de l'énergie des solutions de deux modèles des équations couplées. Le premier s'agit d'étudier un système gouverné par deux équations des

ondes couplées:

$$\begin{cases} u_{tt}(x, t) - \partial_x^2 u(x, t) + \gamma \partial_{xt}^2 v(x, t) = 0, & (0, 1) \times \mathbb{R}_+, \\ v_{tt}(x, t) - \partial_x^2 v(x, t) + \gamma \partial_{xt}^2 u(x, t) = 0, & (0, 1) \times \mathbb{R}_+, \\ u(x, 0) = u^0, u_t(x, 0) = u^1, v(x, 0) = v^0, v_t(x, 0) = v^1, & x \in (0, 1). \end{cases}$$

Nous allons montrer la stabilisation indirecte de ce système par deux types de dissipations. La première dissipation est interne donnée par un feedback borné et la deuxième est frontière donnée par un feedback non borné.

Pour le cas du feedback borné, Nous discuterons des hypothèses pour l'opérateur qui engendre l'évolution et pour ce feedback pour stabiliser exponentiellement le système associé.

Pour le second système, le feedback est un opérateur non borné. Alors nous allons montrer que la fonction de transfert associée à ce système est bornée sur un axe parallèle à l'axe des ordonnées. Notre étude sera basée, alors, sur l'obtention d'une inégalité d'observabilité du problème conservatif associé. Il consiste à n'observer qu'une composante du vecteur d'état et à déduire une estimation de la solution totale. Cette estimation est prouvée en développant les solutions du problème conservatif en série de Fourier et en utilisant l'ingalité d'Ingham. Le deuxième modèle consiste à étudier le problème de deux équations des plaques couplées suivant:

$$\begin{cases} u_{tt} + \Delta^2 u + \alpha y = 0, & \Omega \times (0, +\infty) \\ y_{tt} + \Delta^2 y + \alpha u = 0, & \Omega \times (0, +\infty) \\ u(x, 0) = u^0, u_t(x, 0) = u^1, y(x, 0) = y^0, y_t(x, 0) = y^1, & \Omega. \end{cases}$$

A l'aide d'un étude fréquentielle, nous montrerons que ce problème est polynomialement stable où on estime particulièrement la résolvante associée à l'opérateur qui engendre l'évolution de ce système sur l'axe imaginaire. Cette estimation donne le taux de décroissance de l'énergie via un résultat de Borichev-Tomilov.

## Khadija Mbarki

**Title:** Sur un problème ouvert d'Ivić

**Abstract:** Soit  $f$  une forme primitive de poids pair  $k \geq 2$  sur le groupe modulaire  $SL_2(\mathbb{Z})$  et soit  $\lambda_f(n)$  le  $n$ ème coefficient de Fourier normalisé dans la série de Fourier associée à  $f$ . On pose  $A_f(x) := \sum_{n \leq x} \lambda_f(n)$ . Durant

la conférence de l'ELAZ 2014 à Hildesheim (Allemagne), Kong Kar Lun (Université of Hong Kong, 2014) a présenté son résultat, prouvé dans son mémoire de Mastère, que

$$\int_2^X \Delta^2(t) \Delta(\alpha t) dt = C(\alpha) X^{7/4} + O_\varepsilon \left( X^{7/4 - \delta} \right),$$

pour une certaine constante explicite  $\delta > 0$ ,  $C(\alpha)$ , où  $\alpha > 0$  est fixé et  $\Delta(x)$  est le terme d'erreur dans le problème de diviseur de Dirichlet. Le problème posé par le Professeur Ivić dans cette conférence est d'obtenir une formule analogue à la formule précédente pour la somme  $A_f(x)$  et un intérêt spécial est de discuter le signe de  $C(\alpha)$  dans les nouvelles situations. Dans cet exposé, nous allons résoudre le problème d'Ivić et on montrera, en premier lieu, que pour tout  $\varepsilon > 0$ , on a

$$\int_2^X A_f^2(t) A_f(\alpha t) dt = C_f(\alpha) X^{7/4} + O_{\alpha, \varepsilon} \left( X^{\frac{41}{24} + \varepsilon} \right),$$

pour une certaine constante  $C_f(\alpha)$  dépendant uniquement de  $f$ ,  $\alpha$  et définie par

$$C_f(\alpha) := \frac{\alpha^{1/4}}{28\pi^3} \sum_{(i_0, i_1) \in \{0, 1\}^2} \sum_{\substack{n, m, l=1 \\ \sqrt{n} + (-1)^{i_0} \sqrt{m} + (-1)^{i_1} \sqrt{\alpha l}}}^{+\infty} \frac{\lambda_f(n) \lambda_f(m) \lambda_f(l)}{(nml)^{3/4}},$$

avec  $\alpha$  est un réel strictement positif appartenant à  $\mathbb{Q}[\sqrt{N}]$  et  $N$  est un entier positif sans facteurs carrés. En second lieu, on discutera les signes du terme  $C_f(\alpha)$ .

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## Lobna Merghni

**Title:** Estimates of Generalized Nevanlinna counting function and applications to composition operators

**Abstract:** Let  $\varphi$  be a holomorphic self-map of the unit disc. We study the relationship between the generalized Nevanlinna counting function associated with  $\varphi$  and the norms of  $\varphi^n$  in the Dirichlet spaces. We give examples of Hilbert-Schmidt composition operators on the Dirichlet spaces.

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## Imen Metoui

**Title:** Generalized Ornstein-Uhlenbeck operators perturbed by singular potential in  $L^p$ -spaces

**Abstract:** Generation of analytic semigroups by generalized Ornstein-Uhlenbeck operators "with singular potentials"

$$A_{\Phi, G, W}u = \Delta u - \nabla \Phi \cdot \nabla u + G \cdot \nabla u - Wu$$

in the weighted space  $L^p(\mathbb{R}^N, e^{-\Phi(x)} dx)$ ,  $1 < p < \infty$ , is shown. The results extend and improve recent generation theorems established by Metafunne-Prüss-Rhandi-Schnaubelt (2005) [2] ( $W \equiv 0$ ) and Kojima-Yokota (2010) [1] ( $W \not\equiv 0$  and  $W$  is regular). The proofs of those are based on a generation result acting on the unweighted space  $L^p(\mathbb{R}^N)$  [2, Theorem 3.4], while ours is carried out by an application of  $L^p$ -theory for second-order elliptic operators [3, Theorem 3.1] obtained by Sobajima (2012), an  $L^p$ -weighted Hardy's inequality and perturbation techniques. Consequently, some additional conditions assumed in both [1, 2] are completely removed.

## References

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- [2] G. Metafunne, J. Prüss, A. Rhandi, R. Schnaubelt,  $L^p$ -regularity for elliptic operators with unbounded coefficients, *Adv. Differential Equations* 10 (2005) 11311164.
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## Ahlem Mougaida

**Title:** Extended Rational Fejér Quadrature Rules based on Chebyshev Orthogonal Rational Functions

**Abstract:** We present a numerical procedure to approximate integrals of the form  $\int_a^b f(x)dx$ , where  $f$  is a function with singularities close to, but outside the interval  $[a, b]$ , with  $-\infty \leq a < b \leq +\infty$ . The algorithm is based on rational interpolatory Fejér quadrature rules, together with a sequence of real and/or complex conjugate poles that are given in advance. Since for  $n$  fixed in advance, the accuracy of the computed nodes and weights in the  $n$ -point rational quadrature formula strongly depends on the given sequence of poles, we propose a small number of iterations over the number of points in the rational quadrature rule, limited by the value  $n$ , (instead of fixing the number of points in advance) in order to obtain the best approximation among the first  $n$ . The proposed algorithm is implemented as a MATLAB program.

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## Samir Moulahi

**Title:** Invariants réels d'un pinceau en courbes de genre 2

**Abstract:** Un pinceau en courbes de genre 2 est la donnée d'une application holomorphe surjective et propre  $\pi: X \rightarrow D$  d'une surface complexe non singulière vers un disque  $D \subset \mathbb{C}$  dont la fibre générale est une courbe non singulière de genre 2. Un tel pinceau est réel si  $X$  est munie d'une involution anti-holomorphe  $\sigma$  telle que  $\forall P \in X, \pi \circ \sigma(P) = \overline{\pi(P)}$ . Deux pinceaux réels en courbes de genre 2 sont dans la même classe réelle s'il existe un isomorphisme réel qui envoie l'un sur l'autre. L'objectif de ce travail est de donner les invariants réels, déterminant d'une manière unique la classe réelle de tel pinceau.

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### Taoufik Moulahi

**Title:** Spectral analysis of thermoelastic systems under nonclassical thermal models

**Abstract:** We study some spectral properties of the solutions to generalized thermoelastic systems under Lord-Shulman, Green-Lindsay and Green-Naghdi of type II models. Firstly, we prove that the linear operator of each model has compact resolvent and generates a  $C_0$ -semigroup in an appropriate Hilbert space. We also show that there is a sequence of generalized eigenfunctions of the linear operator that forms a Riesz basis. By a detailed spectral analysis, we obtain the expressions of the spectrum and we deduce that the spectrum determined growth condition holds. Therefore if the imaginary axis is not an asymptote of the spectrum, we prove that the energy of each model decays exponentially to a rate determined explicitly by the physical constants. Finally, some simulations are given for each model to support our results.

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### Omar Naifar

**Title:** Practical and exponential stabilization of a class of nonlinear time-varying system under unknown time-varying delay

**Abstract:** In this work, the problem of stabilization of a specific class of nonlinear dynamical system with unknown, bounded, time-varying delay is considered. A new stabilizing control law guarantees the practical stability of the system. A modified extended control law leads to the exponential stability. A Lyapunov function is chosen, and sufficient assumptions are provided in order to prove the stability of the proposed feedback system. Simulation results are addressed to show the effectiveness of the suggested control design method.

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### Ikbel Nasraoui

**Title:** Classification and Decomposition of Generic Quantum Markov Semigroups :The Fock Case

**Abstract:** We study the invariant state of generic quantum Markov semigroups in the Fock case, on the algebra of all bounded operators on a Hilbert space  $h$  and we deduce the classification of this state. We prove the convergence towards the ground  $\omega_\infty$  which depends on the arbitrary initial state and the generalized susceptivities constants. We also estimate the speed of convergence of these semigroups which depends in general to the off diagonal elements which is typically of the type  $e^{-tg/2}$  and the initial state. We compute or estimate the exponential rate in some examples. This class arising from the stochastic limit of a discrete system with generic Hamiltonian  $H_S$ , acting on  $h$ , interacting with a Gaussian, gauge invariant, reservoir.

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### Selma Negzaoui

**Title:** Uncertainty Principles for Orthonormal Sequences related to Laguerre Hypergroup

**Abstract:** We deal with Laguerre hypergroup  $\mathbb{K} = [0, +\infty) \times \mathbb{R}$ . We show an analogous of a time-frequency localization theorem for orthonormal sequences in  $L^2(\mathbb{K})$ . As consequence we obtain an analogous of Shapiro's Umbrella theorem. Also, we provide a mean dispersion inequality. Finally, we get a strong version of uncertainty inequality for orthonormal bases of  $L^2(\mathbb{K})$ .

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### Atef Rahmouni

**Title:** Paley type inequality on the Hardy type space in the setting of Heisenberg group

**Abstract:** The main purpose of this paper is to extend Paley-type inequality with respect to the Fourier transform for the Hardy space on the Heisenberg group. In this new setting, the Euclidean norm  $|\cdot|$  is generalized by a quasinorm  $\mathcal{N}(\lambda, n)$  with respect to the measure  $d\gamma_n(\lambda) = |\lambda|^n d\lambda$ . In particular, we deduce the following version of Hardy inequality when  $p = 1$ . Applying an interpolation method to the theorem, we obtain an analogue of the Hardy-Littlewood theorem was extended (range of  $p$ ) to  $L^p(\mathbb{H}^n)$ ,  $1 < p \leq 2$ , that is a Pitt-type inequality for the Fourier transform on  $\mathbb{H}^n$ .

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### Tarek Rejeiba

**Title:** Link between dependence and independence in extreme value theory for random dynamical systems

**Abstract:** Sous certaines conditions sur la structure de dépendance on peut lier la distribution asymptotique de la valeur maximale partielle d'un processus stochastique avec un maximum d'une suite de variables aléatoires indépendantes associées à la même fonction de répartition.

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### Mohamed Rhaima

**Title:** Jacobi sequences of square random variable

**Abstract:** In this work, we deal with a real valued random variable  $X$ , with probability distribution  $\mu$ . We suppose that  $\mu$  has moments of any order and denote  $(\Phi_{X,n})_n$  its monic orthogonal polynomials ( $\Phi_{X,0} \equiv 1$  –the constant function equal to 1), and  $(\omega_{X,n})$  (resp.  $(\alpha_{X,n})$ ) its principal (resp. secondary) Jacobi sequence. We study the following problem: *given  $k \in \mathbb{N}$  is it possible to express the Jacobi sequences of  $X^k$  and the associated orthogonal polynomials as functions of those of  $X$ ?* Joint work with **Luigi Accardi** and **Abdessatar Barhoumi**.

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### Sana Saadouli

**Title:** On some sets with even partition functions

**Abstract:** Let  $P \in \mathbb{F}_2[z]$  with  $P(0) = 1$  and  $\mathcal{A} = \mathcal{A}(P)$  be the unique subset of  $\mathbb{N}$  such that  $\sum_{n=0}^{\infty} p(\mathcal{A}, n)z^n \equiv P(z) \pmod{2}$ , where  $p(\mathcal{A}, n)$  is the number of partitions of  $n$  with parts in  $\mathcal{A}$ . The elements of the set  $\mathcal{A}_0 = \mathcal{A}(P^{(0)})$ , where  $P^{(0)} = 1 + z + z^3 + z^4 + z^5$ , are determined and an asymptotic to the counting function of this set is given. In  $\mathbb{F}_2[z]$ , one has  $\frac{1-z^{31}}{1-z} = \prod_{i=0}^5 P^{(i)}$ , where the  $P^{(i)}$ 's are all irreducible of degree 5 and order 31. In this paper, we'll make general the results for all  $\mathcal{A}_i$ 's =  $\mathcal{A}(P^{(i)})$ 's,  $0 \leq i \leq 5$ .

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### Bilel Selmi

**Title:** Multifractal variation for projections of measures

**Abstract:** The aim of this work is to provide the relationship between the relative multifractal spectra of orthogonal projections a measure in Euclidean space and the measure's original relative multifractal spectrum. As an application we study the relative multifractal analysis of the projections of a measure.

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### Sihem Smach

**Title:** Les idéaux  $n$ -absorbants dans l'anneau des séries formelles

**Abstract:** Soit  $R$  un anneau commutatif unitaire. Rappelons qu'un idéal propre  $P$  de  $R$  est dit premier si pour tous  $a, b \in R$  tels que  $ab \in P$  on a,  $a \in P$  ou  $b \in P$ . En 2007, A. Badawi a introduit la notion d'idéal 2-absorbant de la manière suivante: un idéal  $I$  est dit 2-absorbant lorsque pour tous  $a, b$  et  $c \in R$ , si  $abc \in I$  alors  $ab \in I$  ou  $bc \in I$  ou  $ac \in I$ . Il est clair que tout idéal premier est 2-absorbant. En 2011, D.D Anderson et A. Badawi généralisent cette notion en introduisant la notion d'idéal  $n$ -absorbant. Dans ce travail, on s'intéresse à l'étude des idéaux 2-absorbants dans l'anneau des séries formelles et on caractérise les idéaux  $n$ -absorbants dans les  $U$ -anneaux.

[1] D.F. Anderson, A. Badawi. On  $n$ -absorbing ideals of commutative rings. Comm. Algebra. 39, (2011) 1646 – 1672.

[2] A. Badawi. On 2-absorbing ideals of commutative rings. Bull. Austral. Math. Soc. 75, (2007) 417 – 429.

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### Samir Smiti

**Title:** Lifting components in clean vector lattices and approximation by step functions

**Abstract:** Let  $E$  be a vector lattice with a strong order unit  $u > 0$ . We call  $E$   $u$ -clean after Hager, Kimber, and McGovern if every element of  $E$  can be written as a sum of a strong order unit of  $E$  and a  $u$ -component of  $E$ .

We shall prove that, among other facts, that  $E$  is  $u$ -clean if and only if  $u$ -components of  $E$  can be lifted modulo any order ideal of  $E$ . Also, we will show that  $E$  is  $u$ -clean if and only if the space of all  $u$ -step functions of  $E$  is  $u$ -uniformly dense in  $E$ . As applications, we will generalize a result by Banaschewski on maximal order ideals of an archimedean bounded  $f$ -algebras to the non-archimedean case. We shall also extend a result by Miers on polynomially ideal  $C(X)$ -type algebras to to more general setting of bounded  $f$ -algebras.

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### Abdessatar Souissi

**Title:** A new class of quantum Markov fields on graphs

**Abstract:** One of the basic open problem in quantum probability is the construction of a theory of quantum Markov fields, that's a theory of Markov process with multi-dimensional index set. We give a partial answer (for tensor case) by giving a new construction of a quantum Markov chain over arbitrary graph, namely we illustrate it by an Ising type model.

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### Anouer Tlili

**Title:** Critical fixed point theorems in Banach algebras under weak topology features

**Abstract:** In this paper, we establish some new critical fixed point theorems for the sum  $AB + C$  in a Banach algebra relative to the weak topology, where  $\frac{I-C}{A}$  allows to be noninvertible. In addition, a special class of Banach algebras will be considered.

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### Amel Toiti

**Title:** Fixed point theory for the sum of two operators

**Abstract:** The main purpose of this paper is to establish a new fixed point results for the sum of two operators  $A$  and  $B$ , where the operator  $A$  is assumed to be weakly compact and (ws)-compact, while  $B$  is a weakly condensing and expansive operator defined on unbounded domains under different boundary conditions as well as other additional assumptions. In addition, we introduce the new concept of an asymptotically  $\Phi$ -nonexpansive operator and we prove some new variants of Krasnoselskii, Leray-Schauder and Furi-Pera types fixed point theorems for the sum of two (ws)-compact mappings. Also, we present a collection of new fixed point theorems and existence theorems for the nonlinear operators equation  $F(x) = \alpha x (\alpha \geq 1)$  for so-called 1-set weakly contractive (weakly nonexpansive) operators.

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### Manar El Islam Toumi

**Title:** Caractérisations des sous-anneaux maximaux non-ACCP

**Abstract:** En poursuivant les travaux effectués sur les sous-anneaux maximaux non- $\mathcal{P}$ , où  $\mathcal{P}$  est une propriété algébrique, nous nous intéressons au cas où  $\mathcal{P} := \text{ACCP}$ , (*Ascending Chain Condition on Principal ideals*). Pour une extension d'anneaux  $R \subset S$ , nous rappelons qu'un anneau  $R$  est dit un sous-anneau maximal non-ACCP de  $S$  si  $R$  ne satisfait pas ACCP et tout anneau dans  $\mathcal{C} = \{T \mid R \subset T \subseteq S\}$  satisfait ACCP. Nous examinons d'une part le cas où  $(R, S)$  est un couple résiduellement algébrique tel que  $R$  est semi-local, et d'autre part un cas remarquable dans l'algèbre commutative; c'est le cas où  $R := D + I$  et  $S := K[y_1, \dots, y_t]$ . En fait, en supposant que  $R$  est un sous-anneau maximal non-ACCP de  $S$ , nous donnons des conditions nécessaires et suffisantes qui, d'une part assurent que  $(R, S)$  est un couple résiduellement algébrique, et d'autre part elles nous empêchent de dire que  $R$  est semi-local.

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### Maryem Trabelsi

**Title:** Analysis of the energy decay of a viscoelasticity type equation

**Abstract:** Let  $\Omega \subset \mathbb{R}^d$  be a regular bounded open domain in  $\mathbb{R}^d$ . We are interested in the evolution of the energy density of a sequence of solutions of a problem related to a viscoelasticity model where the viscosity term



is a pseudo-differential operator of order  $2\alpha$  with  $\alpha \in (0, 1)$ . We consider the equation of viscoelasticity given by

$$\left\{ \begin{array}{l} \partial_t^2 u - \nabla \cdot (C(x) \nabla u) + q(x, D)^* q(x, D) \partial_t u = 0, \quad (t, x) \in \mathbb{R}_+ \times \Omega, \\ u|_{t=0} = u_0, \\ \partial_t u|_{t=0} = u_1, \\ u|_{\partial\Omega} = 0, \end{array} \right.$$

where  $\Omega$  is an open subset of  $\mathbb{R}^d$ ,  $u$  a scalar real-valued function,  $C(x)$  is a symmetric positive matrix and is supposed to depend smoothly on the variable  $x \in \Omega$ . Moreover we suppose that there exists  $C_1, C_2 > 0$  such that

$$\forall x \in \Omega, \forall \xi \in \mathbb{R}^d, \quad C_1 |\xi|^2 \leq C(x) \xi \cdot \xi \leq C_2 |\xi|^2, \quad C_1, C_2 > 0,$$

$q(x, D)$  is a pseudo-differential operator defined by

$$q(x, D)f(x) = \int_{\Omega \times \mathbb{R}^d} q(x, \xi) e^{i\xi \cdot (x-y)} f(y) dy d\xi, \quad \forall f \in \mathcal{S}(\Omega)$$

such as his symbol  $q(x, \xi)$  is a classical symbol of order  $\alpha$ , with  $\alpha \in (0, 1)$  and  $q(x, D)^*$  his adjoint operator. We calculate the weak limit of the energy density in terms of microlocal defect measures and under special assumption we prove that the viscosity term prevents propagation of concentration and oscillation effects contrary to what happens in the wave equation.

### Mejdi Trabelsi

**Title:**  $L^p(T)$  spaces in vector lattice and applications

**Abstract:** The spaces  $L^p(T)$  are treated in my presentation, where  $T$  is conditional expectation acting on a Dedekind complete Riesz space  $E$  with weak order unit and  $p \in [1, \infty)$ . After some preliminaries, a general idea about the construction of this kind of spaces are given. Next, we illustrate the talk with some inequalities which are known in the real valued case and generalized on the Riesz space.

### Hajer Zaway

**Title:** Perturbation et propriétés dynamiques de  $A$ - $m$ -isométries

**Abstract:** Soient  $T, A \in \mathcal{B}(\mathcal{X})$  et  $p > 0$ ,  $T$  est dit un opérateur  $A(m, p)$ -isométrie si

$$\sum_{k=0}^m (-1)^{m-k} \binom{m}{k} \|T^k x\|_A^p = 0 \quad \forall x \in \mathcal{X}.$$

Si  $p = 2$ , alors  $A(m, p)$ -isométrie est une  $A$ - $m$ -isométrie. On utilise une perturbation par un opérateur  $K$ -nilpotent  $Q \in \mathcal{B}(\mathcal{X})$  vérifiant  $Q(\ker(K)) \subseteq \ker(K)$ , pour montrer que tout  $A(m, p)$ -isométrie  $S$ , tel que  $SQ = QS$ , alors  $S + Q$  est ni supercyclique ni faiblement hypercyclique.

### Mouna Zitouni

**Title:** Asymptotic properties of the estimator for a finite mixture of exponential dispersion models

**Abstract:** We propose a new hybrid algorithm called Expectation-Maximization and Method of moments algorithm (EMM) obtained by the combination of both the EM (Expectation-Maximization) algorithm and the method of moments. The proposed EMM algorithm is specified to estimate the parameters of the mixture of exponential dispersion distributions. Under mild regularity, several convergence results of the EMM algorithm are obtained. Through simulation studies, the robustness of the EMM is proved and the strong consistency of the EMM sequence appears when the data set size and the number of iterations tend to infinity.