COSA 2026

4th Conference on Ordered Structures and their Applications

With a Special Focus on Applications to Finance,
Actuarial Science and Mathematical Finance

September 14–18, 2026

CIRM – Centre International de Rencontres Mathématiques
Luminy, Marseille, France

Conference Programme and Abstracts

Working language: English

Monday, September 14

Scientific Programme

Chair: **Amal Omrani**

09:00–09:15 **Opening welcome speech**

Emmanuel Lepinette, Amine Ben Amor and Amal Omrani

Welcome and opening of COSA 2026.

09:20–10:00 **Emmanuel Lepinette**

Paris-Dauphine PSL University, France

Fundamental concepts in financial mathematics: from traditional approaches to recent advances.

10:05–10:20 Coffee Break

10:25–11:25 **Mathieu Rosembaum**

Paris-Dauphine PSL University, France

A unified theory of order flow, market impact and volatility.

11:35–12:10 **Vladimir Troitsky**

University of Alberta, Edmonton, Canada

Linear operators: continuity vs boundedness.

12:30–13:30 Lunch

Chair: **Dorsaf Cherif**

14:00–14:40 **Yuri Kabanov**

Université Marie et Louis Pasteur, Besançon, France, and Lomonosov MSU, Russia

On exit probabilities for generalized Ornstein–Uhlenbeck processes.

14:50–15:20 **Benrjab Asma**

Tunis El Manar University, Tunis, Tunisia

Order properties of Free Banach Lattices.

15:30–16:00 **Eugene Bilokopytov**

ICMAT (Instituto de Ciencias Matemáticas), Madrid, Spain

Semicontinuity properties of Banach lattices.

16:05–16:20 Coffee Break

16:25–17:10 **Anke Kalauch**

Faculty of Mathematics, TU Dresden, Germany

Pre-Riesz Spaces: what we know, what we don't know.

17:20–17:50 **Janko Stennder**

TU Dresden University, Dresden, Germany

A Nakano-type theorem in pervasive pre-Riesz spaces.

18:00–18:30 **Timur Oikhberg**

University of Illinois at Urbana-Champaign, USA

Free Banach lattices and associated function spaces.

19:30–20:30 Dinner

Tuesday, September 15

Scientific Programme

Chair: **Laurence Carassus**

09:00–09:40 **Pedro Tradacete**

instituto de Ciencias Matemáticas - CSIC, Spain

Recent progress in Banach lattices.

09:50–10:20 **Gonzalo Martínez Fernández**

UCM University, Madrid, Spain

Free products of Banach lattices.

10:25–10:40 Coffee Break

10:45–11:25 **Crista Cuchiero**

University of Vienna, Austria

Dynamic universal approximation and optimal control for path-dependent systems via signature SDEs.

11:35–12:15 **Johannes Langner**

MICS, CentraleSupélec, Université Paris-Saclay, France

P-Sensitive Functions and Localizations.

12:30–13:30 Lunch

Chair: **Emma Hubert**

14:00–14:40 **Luciano Campi**

University of Milan, Italy

Optimal Mean Field CCEs; Optimal Coarse Correlated Equilibria in Mean Field Games: Linear Programming and No-Regret Learning.

14:50–15:20 **Amal Omrani**

Paris-Dauphine PSL University, France

Explicit Characterization and Backward Construction of Superhedging Prices with Transaction Costs.

15:30–16:00 **Ahsen Sena Yurtoğlu**

Bursa Technical University, Department of Mathematics, Bursa, Turkey

Quasi KB Operators and Their Demi Versions.

16:05–16:20 Coffee Break

16:25–16:55 **Samuel Tiersma**

Leiden University, Netherlands

A generalization of Kadison's antilattice theorem.

17:00–17:30 **Sezer Bolat**

Hacettepe University, Department of Mathematics, Ankara, Turkey

Extending the (bo)-Fragment Theory to the Complex Setting.

17:40–18:10 **Hamza Hafsi**

University of Tunis, Tunisia

Transfer Results for AL-, AM-, and KB-Properties in Truncated Normed Riesz Spaces.

18:20–18:50 **Elroy Zeekoei**

North-West University, South Africa

On weak p-consistence.

19:30–20:30 Dinner

Wednesday, September 16

Scientific Programme

Chair: **Emmanuel Lepinette**

09:00–09:30 **Youssef Azouzi**

Tunis El Manar University

On Komlós' Theorem in Banach lattices, part 1.

09:40–10:10 **Wassim Dhifaoui**

Tunis El Manar University

On Komlós Theorem in Banach lattices, part 2.

10:15–10:30 Coffee Break

10:35–11:00 **Michèle Vanmaele**

Ghent University, Ghent, Belgium

Numerical Valuation of European Options under Two-Asset Infinite-Activity Exponential Lévy Models.

11:10–11:50 **Tahir Choulli**

University of Alberta, Edmonton, Canada

Novel Esscher Concepts for various Risks in Finance and Insurance: Theory and empirical studies.

12:00–13:00 Lunch

13:15 **Departure for the excursion by bus**

Thursday, September 17

Scientific Programme

Chair: **Amine Ben Amor**

09:00–09:40 **Jawad H'Michane**

Ibn Tofail University, Kénitra, Moroco

About L-weakly compact sets and limited sets.

09:50–10:20 **Kawtar Ramdane**

Ibn Tofail University, Moroco

Concentration Inequalities in Riesz Spaces.

10:25–10:40 Coffee Break

10:45–11:25 **Emma Hubert**

Paris-Dauphine University, Paris, France

Revisiting contract theory with volatility control.

11:35–12:15 **Duc Thinh Vu**

Ghent University, Ghent, Belgium

Optimal Additional Voluntary Contributions in the Presence of Jumps.

12:30–13:30 Lunch

Chair: **Amal Omrani**

14:00–14:35 **Laurence Carassus**

CentraleSupélec, Paris-Saclay University

On the existence of personal equilibria in multistep incomplete financial markets.

14:45–15:20 **Mihail Zervos**

LSE, London, England

Long-run portfolio optimisation in the presence of proportional transaction costs: equivalent risk sensitive and robust formulations.

15:25–15:40 Coffee Break

15:45–16:15 **Roman Drnovšek**

Faculty of Mathematics and Physics, University of Ljubljana, Slovenia

Positive Commutators on Banach lattices.

16:25–16:55 **David Munoz Lahoz**

ICMAT-UAM University, Madrid, Spain

Wickstead's conjecture on positive projections and non-representable Banach lattice algebras.

17:05–17:35 **Jamel Jaber**

University of Carthage, Tunisia

Extreme points of convex sets of positive operators.

17:45–18:15 **Ezgi Han Eryüksel**

University of Ankara, Turkey

Different Types of bo-Convergences in Lattice Scaled Spaces.

19:30–20:30 Dinner

Friday, September 18

Scientific Programme

Chair: **Amine Ben Amor**

09:00–09:40 **Bruce Watson**

Witz University, South of Africa

Riesz spaces, stochastics and ergodic theory.

09:50–10:20 **Luan Naude**

University of Pretoria, South of Africa

Locally band preserving functions and Riemann integration.

10:25–10:40 Coffee Break

10:45–11:15 **Florian Boisen**

TU Dresden University, Dresden, Germany

Finitely additive measures and the T-strong dual of $L^{\infty}(T)$.

11:25–12:10 **Paolo Guasoni**

DCU University, Dublin, Ireland

Holding Stocks, Trading Bonds.

12:15–12:25 **Closing speech**

12:30–13:30 Lunch

Abstracts

COSA 2026 – September 14–18, 2026
CIRM, Marseille, France

Youssef Azouzi

Tunis El Manar University

On Komlós' Theorem in Banach lattices

In this talk, I present several results related to the celebrated theorem of Komlós, which states that every bounded sequence in $L^1(P)$ admits a subsequence such that the Cesàro means of every further subsequence converge almost surely to the same limit. We begin by reviewing the classical theorem, together with some of its variants and extensions in the literature, and discuss several different approaches to its proof. We seek to identify the "best" proof. In particular, we point out that some proofs in the literature contain significant gaps. Recently, an important extension of the Komlós' theorem has been developed in a measure-free setting, benefiting from the generalization of almost-everywhere convergence to unbounded order convergence in vector lattices. In the second part, we explain the advantages of this generalization, due essentially to Gao, Xanthos, and Troitsky, and present new results in this direction. In particular, we answer several open questions raised by these authors. In our approach to answering one of these questions, we strengthen a result of Erdős and Magidor and show that it can be formulated in a much more general setting.
The talk is based on joint work with Wassim Dhifaoui, who will present the second part of the project, which addresses an important open question concerning the converse of Komlós' theorem. The result holds in a remarkably general setting, and its elegant proof highlights the power of the machinery developed in the abstract theory of Banach lattices.

Benrjab Asma

Tunis El Manar University, Tunis, Tunisia

Order properties of Free Banach Lattices

Free Banach lattices allow us to construct a Banach lattice from a set, a Banach space, or a lattice, through suitable extension properties. In this talk, we first introduce these constructions and their universal properties. We then study order properties of free Banach lattices, focusing on the strong Nakano property and its behavior for free Banach lattices generated by Banach spaces. Finally, we turn to the free Banach lattice $FBL\langle L\rangle$ generated by a lattice L. Several properties of this construction have already been studied; we continue this investigation by studying further structural properties, including strong units, density character, order density, projection bands and quasi-interior points.

Sezer Bolat

Hacettepe University, Department of Mathematics, Ankara, Turkey

Extending the (bo)-Fragment Theory to the Complex Setting

The complexification of vector lattices is a well-established and fundamental concept in the theory of Riesz spaces [1]. Recently, the study of complexification has been extended to the framework of fragments and lateral orders in complex vector lattices [2]. Motivated by these developments, the aim of this work is to investigate the complexification of lattice-normed vector lattices (LNVLs) and develop the associated fragment and lateral order structures within this new setting.

We introduce the concept of complex (bo)-fragments, building upon the real (bo)-fragment theory recently developed in [3]. Our main results establishes that the complexification of an LNVL preserves decomposability if and only if the original space is decomposable. Furthermore, we establish that the Boolean algebra of fragments of a complex element is isomorphic to the Boolean algebra of fragments of its modulus. As a central result, we prove that the collection of complex (bo)-fragments of a given element inherently forms a Boolean algebra, demonstrating complete structural consistency with the real case. The results presented in this paper are founded on the work in [4].

Keywords: Complex lattice-normed vector lattice, (bo)-fragment, Boolean algebra, Lateral order, Decomposability.

Eugene Bilokopytov

University of Alberta, Edmonton, Canada

Order Semicontinuity and Fatou Properties in Normed Lattices: New Characterizations and Embedding Theorems

We consider various properties of a normed lattice, which are similar to the order semicontinuity (a.k.a.) the Fatou property. In particular, a normed lattice F is order continuous iff every renorming of F is semicontinuous. A normed lattice embeds as a regular sublattice of a monotonically complete Banach lattice iff it is weakly Fatou. While the classical Kakutani theorem states that AM-spaces are precisely the closed sublattices of $C(K)$-spaces, we show that the semicontinuous AM-spaces are precisely the closed regular sublattices of $C(K)$-spaces. Finally, we prove that for a normed space E, the AM-space of positively homogeneous weak* continuous functions on B_{E^*} has the Fatou property iff it is a regular sublattice of $C(B_{E^*}, w^*)$ iff $\dim E < \infty$.

Florian Boisen

Faculty of Mathematics, TU Dresden, Germany

Finitely additive measures and the T-strong dual of $L^\infty(T)$

The norm dual of the space $L^\infty(P)$ for a probability space (Ω, A, P) can be described as the

space of all finitely-additive measures on A that are absolutely continuous with respect to P. In this talk, we give a similar representation for the T-strong dual of $L^\infty(T)$, where T is a conditional expectation operator on a Dedekind complete Riesz space. To this end, we introduce finitely additive measures on the set of all components of weak order units with values in the range of T and develop a corresponding integration theory.
This talk is based on joint work with Anke Kalauch, Wen-Chi Kuo, Janko Stennder, and Bruce A. Watson.

Luciano Campi

University of Milan

Optimal Mean Field CCEs; Optimal Coarse Correlated Equilibria in Mean Field Games: Linear Programming and No-Regret Learning

We introduce optimal coarse correlated equilibria for continuous-time mean field games. A coarse correlated equilibrium is a randomized recommendation scheme from which no player can gain by ignoring the recommendation and switching to an alternative strategy. The problem is as follows: a moderator selects, among all mean-field coarse correlated equilibria, one that optimizes a prescribed performance criterion, which may differ from the representative player's objective. After formulating the problem, we develop a linear programming (LP) formulation, prove the existence of optimal LP coarse correlated equilibria, and relate the LP characterization to the original probabilistic setting. Building on this characterization, we design a no-regret primal-dual algorithm, based on an equivalent Lagrangian formulation of the external-regret constraint, for learning such equilibria. We provide explicit convergence rates for the learning algorithm, and numerical examples illustrate the method. This talk is based on a joint paper with F. Cannerozzi and I. Tzouanas (Bielefeld University).

Laurence Carassus

Université Paris-Saclay, CentraleSupélec, France

On the existence of personal equilibria in multistep incomplete financial markets

We consider an investor who, while maximizing his/her expected utility, also compares the outcome to a reference entity. A personal equilibrium is a strategy that is optimal when its own independent copy is used as the reference point. We show that, in a multistep, generically incomplete financial market model, such an equilibrium indeed exists, under appropriate technical assumptions. We also prove, for any exogenous reference point, existence and uniqueness of the corresponding optimal strategy; this exogenous-reference result is an independent ingredient of the analysis.

Tahir Choulli

University of Alberta, Edmonton, Canada

Novel Esscher Concepts for various Risks in Finance and Insurance: Theory and empirical studies

Our principal leitmotif herein lies in pricing various claims within an informational setting that covers both life insurance and finance. This framework is represented by the triplet $(S, \mathcal{F}, \tau)$. Herein $\mathcal{F}$ is the "public" flow of information which is available overtime to all agents, S is the discounted price process of d-tradable assets, and τ is an arbitrary random time whose occurrence might not be observable via $\mathcal{F}$. This framework covers the credit risk theory setting where τ represents the default time of a firm/client, the life insurance setting where τ models the death time of an insured, and other areas of finance to cite a few.
For the resulting stopped model $(S_\tau, \mathcal{G})$, where $\mathcal{G}$ is the flow that contains $\mathcal{F}$ and makes τ an observable random time when it occurs, we address the pricing problem using Esscher concept. Given that τ brings various informational risks, certainly these risks cannot be priced by the classical Esscher pricing method even if τ is subject to assumptions such as immersion. Besides the informational risks generated by the randomness of τ, there are risks intrinsic to the stocks' jumps caused by the shock of τ. Again, the classical Esscher fails somehow to deal with these latter risks even without any information discrepancy at all. This led us to rethought radically the concept of Esscher pricing, and introduce the second-order Esscher pricing notion for general continuous-time models to deal with the risks coming from assets' jumps. Then we introduce a novel Esscher notion to quantify the informational risks afterwards. The second-order Esscher extends the classical notion of Esscher that is used in finance and actuarial sciences.
Besides this novel notion, our contributions herein is multifold. We characterize its second-order Esscher densities via pointwise equations using the statistical parametrization of the model under consideration. We show that the bounds of the Esscher stochastic pricing interval, $]Y_{\text{inf}}, Y_{\text{up}}[$, are solutions to two constrained reflected linear backward stochastic differential equations, or equivalently reflected BSDEs with singular non-Lipschitz generator. Besides applying this second-order Esscher to risk management and show how the second order catch features that the classical Esscher fails to achieve, we show that the second-order allows us to quantify markets's fear/stress more accurately. Our informational Esscher pricing concept allows us to obtain explicit pricing formulas for several vulnerable complex claims, and quantify the prices for various informational risks.
This talk is based on the following joint works with Alla Elazkany (University of Alberta) and/or Michele Vanmaele (Ghent University, Belgium):
[1] Choulli/Elazkany (2026): Novel Esscher (2026): Novel Esscher for informational risk and valuation of vulnerable claims. Preprint.
[2] Choulli/Elazkany/Vanmale (2025): The second-order Esscher with applications: Risk management and fear quantification. Preprint.
[3] Choulli/Elazkany/Vanmale (2025): The second-order Esscher martingale densities for continuous-time market models: Frontiers of Mathematical Finance, Vol. 6, 2025, pp. 16–66.

Crista Cuchiero

University of Vienna, Austria

Dynamic universal approximation and optimal control for path-dependent systems via signature SDEs

Many applications in generative time series modeling, particularly in finance, require stochastic dynamics that are genuinely path-dependent and non-Markovian. From a numerical perspective, the most natural route is to lift path dependence to an enlarged state space, thereby obtaining a Markovian approximation of the original dynamics. Among such lifts, signature SDEs provide a canonical and model-agnostic choice, building on the strong algebraic and approximation-theoretic properties of path signatures, which form a universal and non-parametric feature set for paths. We explain how this leads to dynamic universal approximation results for generic non-Markovian SDEs. We also show how the resulting finite-dimensional signature SDEs can be used in optimal control problems with path-dependent dynamics and objectives, reducing, for instance, the infinite-dimensional Hamilton-Jacobi-Bellman PDE to a computationally much simpler Riccati ODE.

Wassim Dhifaoui

Tunis El Manar University

On Komlós Theorem in Banach lattices

This talk is a continuation of Youssef Azouzi's talk. We first study Komlós sets in Banach lattices and investigate their structural properties. Moreover, we answer affirmatively a question posed by Gao, Troitsky, and Xanthos, and provide a simplified proof of a result from [7]. We also develop a general construction method for producing Banach lattices with the Komlós property. Finally, we turn our attention to the Komlós and pre-Komlós properties in $C(K)$. When K is a compact metric space, we provide full characterizations of these properties in terms of the topology of K, thereby identifying the precise topological conditions on K under which they hold. These results provide new structural insights into the interplay between Komlós-type properties and the underlying lattice structure.

Roman Drnovšek

Faculty of Mathematics and Physics, University of Ljubljana, Slovenia

Positive Commutators on Banach lattices

We will present several results on positive commutators of positive operators on Banach lattices. We will start with the following finite-dimensional theorem. Let A and B be nonnegative matrices such that the commutator $C = AB - BA$ is nonnegative as well. Then, up to similarity with a permutation matrix, C is a strictly upper triangular matrix, and so it is nilpotent.

We will continue with the following infinite-dimensional analogue. Let A and B be bounded

operators on a Banach lattice E such that the commutator $C = AB - BA$ and the product BA are positive operators. If the product AB is a power-compact operator, then C is a quasi-nilpotent operator having a triangularizing chain of closed ideals of E.
We will then consider the question which nonnegative matrices are commutators of nonnegative square-zero matrices. We will also treat infinite-dimensional analogues of these results.

Ezgi Han Eryükesel

University of Ankara, Turkey

Different Types of bo-Convergences in Lattice Scaled Spaces

Lattice scaled spaces (see [3]) generalize the notion of ultrametric spaces to the settings of Garrett Birkhoff's lattice theory in such a way that most of the lattice theoretical notions can be studied in lattice scaled spaces. Following the approach of [3], we investigate how distinct lattice order convergences induce corresponding convergence structures on these spaces.
Classical order convergence plays a central role in measure theory and various areas of analysis. Recently, in [1], various versions of order convergences and their applications were studied. The study focuses on clarifying the implications and structural differences between o_1-, o_2-, and o_3-convergences in the lattice setting.
In the present talk, bo_1-, bo_2-, and bo_3-convergences in lattice scaled spaces will be introduced, and their properties will be investigated. We explore the relationships among these induced convergences, with special attention given to their behavior with relative sublattices. Most of the properties and equivalences are derived under the hypothesis of infinite distributivity on the underlying lattice. The results presented in this talk are based on the joint work [2].
Keywords: Lattice scaled space, distributive lattice, order convergence, stability.

Paolo Guasoni

DCU University, Dublin, Ireland

Holding Stocks, Trading Bonds

Why do rational investors actively trade long-term bonds? This paper solves a continuous-time exchange economy with heterogeneous CARA agents, common information, stochastic dividend growth, personal income, a stock, short-term lending, and long-term fixed-income securities.
The economy is constructed to make trade difficult: in the constant-growth benchmark, heterogeneous agents do not rebalance after the initial allocation. With stochastic growth, however, shocks to expected dividends move interest rates and change the value of heterogeneous consumption plans and income hedges. In equilibrium agents hold stock positions that are constant after the initial allocation, while they trade long-term bonds dynamically. Bonds are the clean hedge because their deterministic coupons isolate discount-rate and growth-risk exposure from direct dividend cash-flow risk. The paper also develops an inaction-band implementation of frictionless bond targets, so that quadratic variation determines leading-order

trading volume, and extends the mechanism to multiple stocks, multiple growth factors, and sinking funds.

Hamza Hafsi

University of Tunis, Tunisia

Transfer Results for AL-, AM-, and KB-Properties in Truncated Normed Riesz Spaces

In this talk, we continue the study of the transfer of structural properties between a truncated Riesz space E and its canonical unitization $E \oplus \mathbb{R}$. While previous work focuses on order-theoretic and completeness properties, the present contribution investigates the transfer of three fundamental norm properties of Banach lattices: the AL, AM, and Kantorovich–Banach (KB) properties.

We establish characterizations of these properties in the unitization setting and describe the possible lattice norm extensions from E to $E \oplus \mathbb{R}$. In particular, we show that AL- and AM-norm extensions are characterized by two natural one-parameter families of lattice norms. The non-unital case, as well as the transfer of the KB property, is also investigated. Several examples are provided to illustrate the results and their limitations.

Emma Hubert

Paris-Dauphine University, Paris, France

Revisiting contract theory with volatility control

In this talk, we revisit the resolution of continuous-time principal–agent problems with drift and volatility control, originally addressed by Cvitanić, Possamaï, and Touzi (2018) through dynamic programming and second-order backward stochastic differential equations (2BSDEs), and develop new results in this framework.

We begin by introducing an alternative problem in which the principal is allowed to directly control the quadratic variation of the output process. On the one hand, the resolution of this contractible-volatility problem follows the classical methodology of Sannikov (2008), thus relying on standard (first-order) BSDEs only. On the other hand, we introduce a new form of contracts allowing the principal to achieve her contractible-volatility value, thereby ensuring both the optimality of this contract form and the equivalence between the original and the alternative problems.

At the same time, this alternative approach reveals that the optimality of the contract form introduced by Cvitanić, Possamaï, and Touzi (2018) implicitly relies on an additional duality assumption, which was not identified before. This observation motivates the construction of new families of contracts that remain optimal even when the duality assumption fails. Altogether, this line of work both simplifies and strengthens the existing theory of continuous-time principal–agent problems with volatility control and opens new directions for further extensions and applications in economics and finance.

Talk based on joint works with Alessandro Chiusolo, Dylan Possamaï, and Nizar Touzi.

Jawad H'Michane

Ibn Tofail University, Kénitra, Morocco

About L-weakly compact sets and limited sets

The paper is devoted to study the relationship between limited (resp. (L)) sets and L-weakly compact sets, it rests essentially on two parts. In the first one, we introduce and study the operators which send L-weakly compact sets to limited sets and conversely limited sets to L-weakly compact sets. As consequences, we will give some interesting results. In the second part, we look at the dual counterpart on which we give our results about the relationship between (L) sets and L-weakly compact sets.

Jamel Jaber

University of Carthage, Tunisia

Extreme points of convex sets of positive operators

We study the relationship between extremality and algebraic or lattice structure for positive operators. Classical results show that, in several settings, extreme positive operators are necessarily algebra homomorphisms.

We first consider positive operators between Archimedean semiprime f-algebras. Using the representation of a semiprime f-algebra by orthomorphisms, we obtain an extremal characterization for a natural convex set of positive operators. In particular, we show that extremality is equivalent to being an algebra homomorphism, and to a corresponding lattice-homomorphism property together with an idempotency condition.

We also investigate extreme positive operators acting between Banach lattices with quasi-order units. In this setting, we obtain a lattice-theoretic characterization of the extreme points, which provides a different perspective on the relationship between convexity and order structure.

These results extend several classical extremal results and illustrate how extremality can impose strong algebraic or lattice properties on positive operators.

Yuri Kabanov

Université Marie et Louis Pasteur, Besançon, France, and Lomonosov MSU, Russia

On exit probabilities for generalized Ornstein–Uhlenbeck processes

Nowadays, insurance companies place their capital reserves in stock markets to obtain additional gain. The collective risk theory assuming absence of risky investment became obsolete. To replace it, a new theory emerged. In 1993 J. Paulsen suggested to describe the

reserve evolution by a generalized Ornstein–Uhlenbeck process and the development was concentrated around this model.
The problem is how to explain the results to master students: the existing studies are based on advanced mathematical tools and cumbersome estimates. In the recent notes [1], [2] it was developed a new approach how to get and solve IDE for the ruin probabilities and obtain their asymptotic behavior in the case where risky asset follows gBm and the business process has one-sided jumps (downward for the non-life insurance and upward for the annuity payments. The approach is based on the analysis of IDE and a verification theorem identifying its solution with the ruin probability as a function of the initial capital.
In the current study it was extended a still special case of the OU process where the business process is a Lévy process of bounded variation with one-side jumps.

Anke Kalauch

Faculty of Mathematics, TU Dresden, Germany

Pre-Riesz Spaces: what we know, what we don't know

Pre-Riesz spaces were invented 1993 in Nijmegen as those ordered vector spaces that can be order densely embedded into Riesz spaces. A next wave of investigation startet 2006, where substructures of pre-Riesz spaces were studied systematically. In the recent years, the interest has grown up to structure preserving operators in pre-Riesz spaces, applications and links to other fields of functional analysis.
Since the Dutch-German collaboration on pre-Riesz spaces reaches the age of 20, the time seems right to evaluate the degree of maturity of the project. We survey some achievements and related problems that remained either unsolved or even untouched, so far. For instance, we discuss bands and orthomorphisms, disjointness preserving operators and C_0-semigroups, Ogasawara-type theorems, were the Riesz space theory is well-understood, but the pre-Riesz space theory needs broader care in its coming of age.

David Munoz Lahoz

ICMAT-UAM University, Madrid, Spain

Wickstead's conjecture on positive projections and non-representable Banach lattice algebras

Consider a projection matrix with nonnegative entries and constant diagonal entries, all equal to α. Wickstead showed that, in this setting, α can only be 0 or $1/n$ for some natural number n. He also conjectured that an analogous result should hold not only for projections on $\mathbb{R}^d$, but also for positive projections $P : X \to X$ on an arbitrary Dedekind complete Banach lattice X. More precisely, he asked: if P can be written as $P = \alpha id_X + T$, with T disjoint from id_X, which values can α take?
This question arises in the broader context of Banach lattice algebras. One of the central problems in this area is the representation problem: whether every Banach lattice algebra can

be faithfully represented as an algebra and a lattice of regular operators on some Dedekind complete vector lattice.
Wickstead showed that, if α above did not take all values in $[0, 1/2]$, then there existed Banach lattice algebras that are not unitarily representable.
In this talk, we prove that Wickstead's conjecture is true: α can only be 0 or $1/n$ for some natural number n. As a consequence, we obtain a negative answer to the representation problem: there exist Banach lattice algebras that are not representable, whether unital or not.

Johannes Langner

MICS, CentraleSupélec, Université Paris-Saclay, France

P-Sensitive Functions and Localizations

This paper assumes a robust stochastic model where a set P of probability measures replaces the single probability measure of dominated models. We introduce and study P-sensitive functions defined on robust function spaces of random variables. We show that P-sensitive functions are precisely those that admit a representation via so-called functional localization. The theory is applied to solving robust optimization problems, to convex risk measures, and to the study of no arbitrage in robust one-period financial models.
Keywords: robustness, non-dominated set of probabilities, P-sensitivity, functional localization, convex risk measures, superhedging functional.

Gonzalo Martínez Fernández

UCM University, Madrid, Spain

Free products of Banach lattices

We introduce free products, that is, coproducts, in the category of Banach lattices and contractive lattice homomorphisms. We give a concrete construction of the free product of an arbitrary family of Banach lattices as a quotient of a free Banach lattice. For compact Hausdorff spaces K_1 and K_2 we identify $C(K_1)*C(K_2)$ lattice isomorphically with $C(K_1*K_2)$, where $K_1 * K_2$ denotes join of topological spaces.
We further discuss free factors of free Banach lattices, and exploit the existence of non-trivial homology spheres to show that a free Banach lattice can have free factors which are not isomorphic to free Banach lattices. This is a joint work with Pedro Tradacete Pérez.

Luan Naude

University of Pretoria, South Africa

Locally band preserving functions and Riemann integration

Roelands and Schwanke recently developed a theory of differentiation on Φ-algebras in (1). We have shown that a super order differentiable function f defined on an order interval has the following property: whenever $P(x) = P(y)$ for $x, y \in \mathrm{dom}(f)$ and a band projection P, we have that $P(f(x)) = P(f(y))$. Functions with this property are called locally band preserving, and we study this property to continue the work started in (1).
We discuss how many classical results, such as the extreme value theorem and mean value theorem, can be recovered for these functions in Dedekind complete unital f-algebras and construct a Riemann integral for locally band preserving functions defined on an order interval. This talk is based on joint work with Eder Kikianty, Mark Roelands, and Christopher Schwanke.

Timur Oikhberg

University of Illinois at Urbana-Champaign, USA

Free Banach lattices and associated function spaces

It is well known that a free Banach lattice (in this talk, the free p-convex lattice $FBL^{(p)}[E]$ over a Banach space E) can be represented as a space of functions on E, and this gives rise to several related function spaces. We examine properties of "natural" embeddings between these spaces, as well their "order" (Fatou-like) properties, which turn out to be related to the geometry of the underlying Banach space E.

Amal Omrani

Paris-Dauphine University

Explicit Characterization and Backward Construction of Superhedging Prices with Transaction Costs

Under proportional transaction costs, the super-hedging price is classically a supremum over consistent price systems — complete in theory, but rarely computable. We make it explicit in discrete time by replacing the conditional law of returns with their conditional support: the worst-case constraint reduces to a supremum over a calibrated return band, attained by convexity at its two endpoints.
This yields a closed-form one-step price — the larger of a pure-price bound and a strategy-driven bound — and the exact interval of feasible strategies. On a payoff class stable under this step (and capturing the inventory dependence frictions induce), a single backward recursion reconstructs prices and hedges, finite precisely under Absence of Immediate Profit. Illustrated out-of-sample on SPY.

Kawtar Ramdane

Ibn Tofail University, Morocco

Concentration Inequalities in Riesz Spaces

We develop measure-free analogues of the Efron–Stein and Hoeffding–Azuma inequalities in Riesz spaces. Using conditional expectation operators, we formulate notions of conditional variance and independence adapted to ordered structures, and derive bounds for the fluctuations of Riesz-space-valued random variables. This provides a unified framework for concentration phenomena without relying on an underlying probability measure.

Mathieu Rosembaum

Paris-Dauphine PSL University, France

A unified theory of order flow, market impact and volatility

We propose a microstructural model for the order flow in financial markets that distinguishes between core orders and reaction flow, both modeled as Hawkes processes. This model has a natural scaling limit that reconciles a number of salient empirical properties: persistent signed order flow, rough trading volume and volatility, and power-law market impact.
In our framework, all these quantities are pinned down by a single statistic H_0, which measures the persistence of the core flow. Specifically, the signed flow converges to the sum of a fractional process with Hurst index H_0 and a martingale, while the limiting traded volume is a rough process with Hurst index $H_0 - \frac{1}{2}$. No-arbitrage constraints imply that volatility is rough, with Hurst parameter $2H_0 - \frac{3}{2}$, and that the price impact of trades follows a power law with exponent $2 - 2H_0$.
The analysis of signed order flow data yields an estimate H_0 close to $3/4$. This is not only consistent with the square-root law of market impact, but also turns out to match estimates for the roughness of traded volumes and volatilities remarkably well.

Janko Stennder

TU Dresden University, Dresden, Germany

A Nakano-type theorem in pervasive pre-Riesz spaces

The classical Nakano theorem characterizes the disjointness of order continuous functionals on Archimedean vector lattices in terms of their null ideals and carriers. We introduce generalizations of the notions of null ideal and carrier to ordered vector spaces and show that, on pervasive pre-Riesz spaces, the same characterization as in Nakano's theorem holds for positive order continuous functionals.
These results contribute to the recent developments in the theory of disjointness of operators beyond the setting of vector lattices, which we will briefly review before presenting the main results.

Samuel Tiersma

Leiden University, Netherlands

A generalization of Kadison's antilattice theorem

An ordered vector space is called an anti-lattice if no pair of incomparable elements has an infimum. This concept was introduced by Kadison, who proved that for von Neumann algebras, the anti-lattices are precisely the factors. Archbold showed that a C^*-algebra is an anti-lattice if and only if it is prime.
This talk, based on a joint work with Mark Roelands, features a computation-free proof of Archbold's result which leverages the theory of pre-Riesz spaces, and generalizes it in several directions.
First, the result is extended to JB-algebras, which generalize the self-adjoint part of a C^*-algebra. Second, the anti-lattice property is strengthened to finite sets of more than two elements: a finite subset of a prime JB-algebra has an infimum only if it has a least element. Finally, using the notion of disjointness and bands in pre-Riesz spaces introduced by Kalauch and van Gaans, we establish that disjointness in a JB-algebra is governed by its spectrum. Consequently, the poset of bands in a JB-algebra is isomorphic to the Boolean algebra of regular closed subsets of its spectrum, generalizing a well-known result for $C(K)$-spaces.

Pedro Tradacete

instituto de Ciencias Matemáticas - CSIC, Spain

Recent progress in Banach lattices

We will survey recent results in the theory Banach lattices, focussing mainly on the interactions with Banach space theory and descriptive set theory.

Vladimir Troitsky

University of Alberta, Edmonton, Canada

Linear operators: continuity vs boundedness

It is a standard fact that a linear operator between normed is bounded iff it is continuous. This fact, and many other facts, are special cases of a general principle that a linear operator is continuous (in a certain sense) iff it is bounded (again, in a certain sense). To formulate this principle, we will use convergence structures to define a continuous operator; we will use bornologies to define bounded operators. We will discuss several applications to vector and Banach lattices.

Michèle Vanmaele

Ghent University, Belgium

Numerical Valuation of European Options under Two-Asset Infinite-Activity Exponential Lévy Models

We propose a numerical method for the valuation of European-style options under two-asset infinite-activity exponential Lévy models. Our method extends the effective approach developed by Wang, Wan and Forsyth [Robust numerical valuation of European and American options under the CGMY process. Journal of Computational Finance, 2007, 10(4):31–69] for the 1-dimensional case to the 2-dimensional setting and is applicable for general Lévy measures under mild assumptions.
A tailored discretization of the non-local integral term is developed, which can be efficiently evaluated by means of the fast Fourier transform. For the temporal discretization, the semi-Lagrangian θ-method is employed in a convenient splitting fashion, where the diffusion term is treated implicitly and the integral term is handled explicitly by a fixed-point iteration. Numerical experiments for put-on-the-average options under Normal Tempered Stable dynamics reveal a favourable convergence behaviour of our method whenever the exponential Lévy process has finite-variation. In addition, a relevant theoretical convergence result for the discretization of the integral term is proved.
Based on the paper: M. Moda, K. J. in 't Hout, M. Vanmaele and F. E. Benth. Numerical Valuation of European Options under Two-Asset Infinite-Activity Exponential Lévy Models. Applied Mathematical Finance, 2006, to appear, DOI:10.1080/1350486X.2026.2715128.

Duc Thinh Vu

Ghent University, Belgium

Optimal Additional Voluntary Contributions in the Presence of Jumps

Additional voluntary contributions (AVCs) have recently emerged as an important feature of pension fund design in the context of increasing life expectancy. Beyond mandatory employer contributions, pension plan members are encouraged to make additional contributions in order to secure adequate retirement income.
In this research, we study an optimal AVC problem in a financial market subject to jumps. The model is formulated within a linear–quadratic stochastic control framework. Our main findings indicate that, when the wealth process is positive, the presence of jumps leads to more conservative investment behaviour compared to the no-jump case: pension members tend to allocate less wealth to the risky asset and increase their AVC rates.
Moreover, in contrast to the diffusion-only setting, the jump model exhibits the feature that the dollar amount invested in the risky asset may become negative once wealth exceeds a certain threshold. This naturally motivates the consideration of trading constraints, in particular the no-short-selling constraint.
We tackle the constrained problem by introducing an appropriate ansatz for the value function, which allows us to derive closed-form solutions for the optimal controls. The key tool is a verification argument based on viscosity solution theory. We provide several numerical examples to illustrate the results.
This research is joint work with Tahir Choulli (University of Alberta, Edmonton) and Michèle Vanmaele (Ghent University, Belgium).

Ahsen Sena Yurtoğlu

Bursa Technical University, Department of Mathematics, Bursa, Turkey

Quasi KB Operators and Their Demi Versions

In this work, we study quasi KB operators and their demi versions on locally solid vector lattices. We investigate the fundamental properties of quasi KB operators and extend the analysis to the more general setting of locally solid vector lattices.
In particular, the demi versions of quasi KB operators on Banach lattices are extended to locally solid vector lattices through the notion of demi quasi KB operators. We examine their basic properties and investigate their relationship with quasi KB operators.
Furthermore, we define the notions of p-quasi KB and p-demi quasi KB operators on lattice-normed vector lattices and study some of their fundamental properties. These results provide a broader framework for understanding quasi KB-type operators and their demi versions in different lattice structures.

Bruce Watson

Witz University, South Africa

Riesz spaces, stochastics and ergodic theory

This talk presents an overview of the evolution of stochastic and ergodic theory in Riesz spaces. It is a survey of the developments in the area over the past 25 years. Some of the measure theoretic origins and applications will also be covered.

Elroy Zeekoei

North-West University, South Africa

On weak p-consistence

It is not always true that if

$$x_n \xrightarrow[n\to\infty]{} 0$$

weakly, then

$$|x_n| \xrightarrow[n\to\infty]{} 0$$

weakly, that is, in general, the lattice operations are not necessarily weakly sequentially continuous.
We show that if the elements of a sequence (x_i) in a Banach lattice E are pairwise disjoint, then

$$(x_i) \in \ell^p_{\text{weak}}(E) \quad \Longleftrightarrow \quad (|x_i|) \in \ell^p_{\text{weak}}(E).$$

Mihail Zervos

LSE, London, England

Long-run portfolio optimisation in the presence of proportional transaction costs: equivalent risk sensitive and robust formulations

We study long-run optimal investment with proportional transaction costs in a market comprising a money market account and a stock, under a no short-selling constraint. We consider two formulations: a risk sensitive portfolio optimisation problem, with risk sensitivity parameter θ, and a robust problem in which the investor penalises deviations from a reference model by their relative entropy.

We show that the two are associated with the same ergodic HJB equation, the robust problem corresponding to the risk sensitive one with θ replaced by $-\theta$. After a suitable rescaling of the controls, both problems reduce to a one-dimensional singular stochastic control problem for the fraction of wealth invested in the stock.

We derive the complete solution to this control problem by constructing a C^2 solution to its HJB equation. The solution takes three qualitatively different forms, depending on the position of the risk sensitive analogue of the Merton fraction relative to the interval $(0, 1)$. In two of these, it is optimal for the investor to move the entire portfolio value into the money market account or into the stock at time 0 and make no trades thereafter. In the third one, it is optimal to keep the fraction of wealth invested in the stock inside an interval $[\alpha^\star, \beta^\star] \subset (0, 1)$ by exerting the minimal effort required to do so.

COSA 2026

4th Conference on Ordered Structures and their Applications

September 14–18, 2026
CIRM, Marseille, France

Thank you to all speakers, participants, organizers, the CIRM team and our sponsors.