Aboura Sofiane (Paris Dauphine)

Albrecher Hansjoerg (EPFL)

Alexander Scott (UTS, Australia)

Bounds on prices for Asian-type options via Fourier methods

The problem of pricing arithmetic Asian options is non-trivial and has attracted much interest over the last two decades. This paper provides a method for calculating bounds on option prices and approximations to option deltas. The core idea is finding a highly correlated yet more tractable proxy to the event that the option finishes in-the-money. The paper provides a means for calculating the joint characteristic function of the underlying asset and proxy processes and relies on Fourier methods to compute prices and deltas. Numerical studies show that the lower bound provides rather accurate approximations to prices and deltas while the upper bound provides good though less accurate results.

Ananova Anna (Imperial College)

Baptiste Julien (Paris Dauphine)

Belak Christoph (Kaiserslautern)

Backward Nonlinear Expectation Equations

We provide a general framework for dynamic nonlinear expectations and introduce a novel class of backward nonlinear expectation equations (BNEEs) in continuous time. These can be thought of as backward stochastic differential equations under nonlinear expectations. On the theoretical side, we prove existence and uniqueness of solutions of BNEEs, provide stability and comparison results and establish conditions under which discrete-time backward nonlinear expectation aggregations converge to the continuous-time BNEE solution. On the application side, we show how the general theory of BNEEs can be used to construct dynamic cash-subadditive risk measures (introduced by El Karoui and Ravanelli (2009)) and dynamic risk measures for processes (introduced by Penner and Reveillac (2014)). Moreover, we axiomatically define recursive utility and stochastic differential utility under nonlinear expectations (related to the work of Chen and Epstein (2002) and Epstein and Ji (2014)) and show that the recursive utility indices converge to the stochastic differential utility in the continuous-time limit.

This talk is based on joint work with Frank Seifried and Thomas Seiferling (University of Kaiserslautern).

Boguslavskaya Elena (Brunel University)

Solving multidimensional stopping problems for Lévy processes via A-transform'

We propose a method to solve stopping problems for multidimensional Levy processes in infinite horizon. To achieve our aim we extend the definition of A-transform into multidimensional framework. The A-transform is defined through blending the inverse Laplace transform and Escher transform. The optimal stopping region is formed by studying the shape of the A-transformed payoff function.To illustrate our method we present several examples.

Burnaev Eugene (IITP)

Volatility trading

Burzoni Matteo (Milan)

Robust Arbitrage under Uncertainty in Discrete Time.
In a model independent discrete time financial market (i.e. with no reference probability measures a priori fixed), we discuss the notion of arbitrage and we investigate the richness of the family of probability measures for which the price process is a martingale. We show how different notions of Arbitrage can be studied under the same general framework, in particular, by specifying a class of non-negligible sets S. Properties of elements of the class S reflect into intrinsic properties of the class of polar sets with respect to the set of martingale measures. In particular for S being the open sets we show that the absence of arbitrage opportunities, with respect to an opportune filtration enlargement, guarantees the existence of full support martingale measures. We also provide a dual representation in terms of weakly open sets of probability measures, which highlights the robust nature of our approach. Finally we show how this approach can be applied for the case of models with proportional transaction costs. (based on a joint work with M. Frittelli, M. Maggis).

Cai Jiatu (Paris 7)

Asymptotic replication with modified volatility under small transaction costs
Dynamic hedging of an European option under a general local volatility model with small linear transaction costs is studied. A continuous control version of Leland's strategy that asymptotically replicates the payoff is constructed. An associated central limit theorem of hedging error is proved. The asymptotic error variance is minimized by an explicit trading strategy.

Carassus Laurence (Reims)

Non-concave utility maximization in discrete time This talk will investigate the problem of maximizing expected terminal utility in a (generically incomplete) discrete-time financial market model with finite time horizon. Wewill present the case of a non-concave utility function U with domain of definition either equal to (0,\infty) or to **R.**

It is based on two papers : Carassus et al. [2014] and Carassus and Rasonyi [2014].

Cayé Thomas (ETHZ)

Chau Ngoc Huy (Paris 7)

Market models with optimal arbitrage
We construct and study market models admitting optimal arbitrage. We say that a model admits optimal arbitrage if it is possible, in a zero-interest rate setting, starting with an initial wealth of 1 and using only positive portfolios, to superreplicate a constant $c > 1$. The optimal arbitrage strategy is the strategy for which this constant has the highest possible value. Our definition of optimal arbitrage is similar to the one in Fernholz and Karatzas (2010), where optimal relative arbitrage with respect to the market portfolio is studied. In this work we present a systematic method to construct market models where the optimal arbitrage strategy exists and is known explicitly. We then develop several new examples of market models with arbitrage, which are based on economic agents' views concerning the impossibility of certain events rather than ad hoc constructions. We also explore the robustness of arbitrage strategies with respect to small perturbations of the price process, and provide new examples of arbitrage models which are robust in this sense.

This is a joint work with Peter Tankov.

Choukroun Sébastien (Paris 7)

Backward SDE Representation for Stochastic Control Problems with Non Dominated Controlled Intensity

We are interested in stochastic control problems coming from mathematical nance and, in particular, related to model uncertainty, where the uncertainty aects both volatility and intensity. This kind of stochastic control problems is associated to a fully nonlinear integro-partial differential equation, which has the peculiarity that the measure ((\lambda_a;))a characterizing the jump part is not fixed but depends on a parameter a which lives in a compact set A of some Euclidean space \R^q. We do not assume that the family ((\lambda_a;))a is dominated. Moreover, the dffiusive part can be degenerate. Our aim is to give a BSDE representation, known as nonlinear Feynman-Kac formula, for the value function associated to these control problems. For this reason, we introduce a class of backward stochastic differential equations with jumps and partially constrained diffusive part. We look for the minimal solution to this family of BSDEs, for which we prove uniqueness and existence by means of a penalization argument. We then show that the minimal solution to our BSDE provides the unique viscosity solution to our fully nonlinear integro-partial differential equation. This is a joint work with Andrea Cosso.

Choulli Tahir (Sharjah and Alberta)

Structure Condition In Informational Markets

It has been understood that the ``local'' existence of the Markowitz' optimal portfolio and the solution to the local-risk minimization problem are achieved under specific mathematical structures on the underlying assets price processes (called ``Structure Condition'' in the literature). In this paper, we consider a market model (initial market model) fulfilling these structures, and an arbitrary random time that is not adapted to the flow of the ``public'' information. By adding ---progressively through time--- the information about this random time as it occurs, those structures may fail and hence the optimal portfolio/strategy will fail to exist. Our aim is to address the question of how the incorporation of this random time will affect these structures from different perspectives. Our analysis allowed us to conclude that under some mild assumptions on the market model and the random time, these structures will remain valid on the one hand. On the other hand, we describe the random time models for which these structure conditions are preserved for any market model. Our analysis is supported by illustrations on practical examples and particular cases.

Cont Rama (Imperial College)

Kolmogorov without Markov: Path-dependent Komogorov equations

Path-dependent Kolmogorov equations are a class of infinite dimensional partial differential equations on the space of cadlag functions which extend Kolmogorov's backward equation to path-dependent functionals of semimartingales. Solutions of such equations are non-anticipative functionals which extend the notion of harmonic function to a non-Markovian, path-dependent setting. We discuss existence, uniqueness and properties of weak and strong solutions of path-dependent Kolmogorov equations using the Functional Ito calculus. Various applications to mathematical finance and non-Markovian stochastic control are discussed.

Corcuera José Manuel (Barcelona)

Extension Risk
In this talk we analyze how the right of the issuer to postpone the payment of the face value of a bond can affect its price. We consider the case of contingent convertibles with cancellable coupons in an structural approach and with a market trigger.

Crépay Stephane (Evry)

BSDEs of Counterparty Risk and Invariant Times
This work is motivated by the need to generalize the classical credit risk reduced-form modeling approach for counterparty risk applications. We relax the basic immersion conditions of the classical approach by modeling the default time as an invariant time, such that local martingales with respect to a reduced filtration and a possibly changed probability measure, once stopped right before that time, stay local martingales with respect to the original model filtration and probability measure. Specifically, we study a BSDE with random terminal time that appears in the modeling of counterparty risk in finance. We proceed by reduction of the original BSDE into a simpler BSDE posed with respect to a subfiltration and a changed probability measure. This is done under a relaxation of the classical immersion hypothesis, stated in terms of the changed probability measure, of which we determine the Radon-Nikodym derivative. We provide an Azema supermartingale characterization of invariant times and use it for establishing the equivalence between the original and the reduced BSDE. This allows proving well-posedness of the original nonstandard BSDE by well-posedness of the reduced BSDE, which holds under classical assumptions.
This is a joint work with Shiki Song.

Cuchiero Christa (Vienna)

A new perspective on the Fundamental Theorem of Asset Pricing for large financial markets
In the context of large financial markets we formulate the notion of no asymptotic free lunch with vanishing risk (NAFLVR), under which we can prove a version of the fundamental theorem of asset pricing (FTAP) in markets with an (uncountably) infinite number of assets, as it is for instance the case in bond markets. We workin the general setting of admissible portfolio wealth processes as laid down by Y. Kabanov [3] under a relaxed concatenation property and adapt the FTAP proof variant obtained in [1] for the classical small market situation to large financial markets. In the case of countably many assets, our setting allows to embed the large financial market model considered by M. De Donno et al. [2]. The notion of (NAFLVR) turns out to be an economically meaningful \no arbitrage" condition allowing to conclude the existence of a separating measure whose existence was assumed in [2] to obtain results on super-replication and utility maximization in large financial markets. In view of previous \no arbitrage" conditions considered in the literature, we can show equivalence between (NAFLVR) and the (NAFL) condition introduced in [4].

The talk is based on joint work with Josef Teichmann and Irene Klein.

[1] C. Cuchiero and J. Teichmann. A convergence result in the Emery topology and a variant of the proof of the fundamental theorem of asset pricing. Preprint, arXiv:1406.4301, 2014.
[2] M. De Donno, P. Guasoni, and M. Pratelli. Super-replication and utility maximization in large financial markets. Stochastic Process. Appl., 115(12), 2006-2022, 2005.
[3] Yu. M. Kabanov. On the FTAP of Kreps-Delbaen-Schachermayer. In Statistics and control of stochastic processes (Moscow, 1995/1996), pages 191-203. World Sci. Publ., River Edge, NJ, 1997.
[4] Irene Klein. A fundamental theorem of asset pricing for large financial markets. Math. Finance, 10(4), 443-458, 2000.

Danilova Albina (LSE, UK)

Markov bridges: SDE representation
A Markov bridge is a (Markov) process obtained via the conditioning of a Markov process. In this talk I will characterise the Markov bridge as a solution to a stochastic differential equation (SDE) driven by a Brownian motion in a diffusion setting. Under mild conditions on the transition density of the underlying diffusion process theexistence and uniqueness of a strong solution of the SDE will be established.

Douady Raphael (Paris 1)

Di Tella Paolo (Humboldt)

The Chaotic Representation Property of Certain Families of Martingales

We investigate the chaotic representation property of certain families of square integrable martingales, which we call compensated-covariation stable families. First, we introduce the multiple integrals with respect to elements of a compensated-covariation stable family of martingales. The main result is that any compensated-covariation stable family of martingales which satisfies some further conditions possesses the chaotic representation property. As first examples, we consider continuous Gaussian families of martingales and independent families of compensated Poisson processes. Then we apply the result to the case of Lévy processes. We shall construct families of martingales relative to a Lévy filtration which possess the chaotic representation property. We give several examples including Teugels martingales.

Ekren Ibrahim (ETHZ)

El Karoui Nicole (Paris 6)

Ellanskaya Anastasia (Angers)

Engelbert Hans-Juergen (Jena)

Stochastic Differential Equations for Sticky Reflecting Brownian Motion

Feinberg Eugene (Stony Brook)

Uniform Fatou's Lemma for Converging Finite Measures and its Applications
For a sequence of finite measures converging in total variation and for a sequence of measurable functions defined on a measurable space, we formulate the uniform Fatou's lemma and the necessary and sufficient condition for its validity. This fact has an important application to control with incomplete state observations.This talk is based on joint work with Pavlo Kasyanov and Michael Zgurovsky.

Gainullin Rashit (HSE)

Gonon Lukas (ETHZ)

Goulet Clément (Université Paris 1)

Grbac Zorana (Université Paris 7)

Grépat Julien (Université de Grenoble)

Grigorieva Lioudmila (Besançon)

Guo Gaoyue (Ecole polythechnique)

Martingale optimal transportation

Gushchin Alexander (HSE, Steklov Institute)

Hamadene Said (Université du Maine)

Existence and uniqueness of viscosity solutions for second order integro-differential equations without monotonicity condition

In this talk, we discuss a new existence and uniqueness result of a continuous viscosity solution for integro-partial differential equation (IPDE in short). The novelty is that we relax the so-called monotonicity assumption on the driver which is classically assumed in the literature of viscosity solution of equation with a non local term. Our method is based on the link of those IPDEs with backward stochastic differential equations (BSDEs in short) with jumps for which we already know that the solution exists and is unique.
It is joint work with M.A. Morlais.

Hamel Andreas (Bolzano-Bozen)

First lecture: Set-valued risk measures and beyond

The notion of a set-valued risk measure is motivated, discussed and extended. Scalar risk measures are embedded in two different ways, a boring one and a more surprising one. Related notions are the set of super-hedging portfolios, good-deal portfolios and multi-asset liquidation mappings in markets with frictions. The recent set optimization theory provides tools for essential results such as dual representations.

Second lecture: Set-valued approaches to financial/economics problems involving non-complete preferences

Very often, utility maximization for multivariable positions is done under the tacit assumption that there is a scalar utility functions, i.e. a complete preference. This assumption is replaced by more realistic ones, and tools are provided for solving the corresponding utility maximization, risk minimization and similar problems. Links to stochastic dominance orders for multivariate random variables and several mathematically challenging open problems are discussed.

Harms Philipp (ETHZ)

Consistent yield curve modelling
We present a class of HJM models, which share numerical tractability with factor models, but allow for consistent re-calibration by today's yield curve. By consistency, we mean that
one and the same model is used for simulation, calibration, and estimation of the yield curve. From a mathematical point of view, a rich enough set of increment processes is described, whose concatenation converges to a limit process.

Hinz Juri (UTS, Australia)

Optimal switching for partially observable dynamics in financial applications
Optimal switching problems frequently appear in the context of
decisions-making under incomplete information. In such framework, control decisions must be adapted dynamically to account for to possible regime changes of the underlying dynamics.
Using stochastic filtering theory, Markovian dynamics can be modeled in
terms of latent variables, which naturally leads to high dimensional state space, making practical solutions to these control problems notoriously challenging.
In our approach, we utilize a specific structure of this problem class to present a solution in terms of a simple, reliable, and fast algorithms. Furthermore, we illustrate our methodology our in financial applications and apply a duality-based diagnostics to assess the distance-to-optimality of our approximate solutions.

Horvath Blanka (ETHZ)

Robust Utility Maximization
We study robust local utility maximization, with ambiguity about drifts and volatilities in a general multidimensional It\^o process setting.Explicit formulas for worst case models as well as optimal strategies and their performance are obtained. These can be readily extended to models with frictions, such as proportional transaction costs and linear price impact.
It is joint work with Johannes Muhle-Karbe.

Jaisson Thibault (Polythechnique)

Fractional diffusion as the scaling limit of nearly unstable heavy-tailed Hawkes processes

We consider a sequence of Hawkes processes whose regression kernels have integral close to one and power law decay at infinity of the form x^{-(1+\alpha)}. Such processes are in particular classically used for order flow modeling in finance. We prove that after suitable rescaling, the limiting behavior of the sequence is that of a kind of integrated fractional Cox-Ingersoll-Ross process, with associated Hurst parameter H=\alpha-1/2. This results is in contrast with the case of thin tailed regression kernels, where a classical CIR process is obtained at the limit. In particular, it shows that persistence properties in the point process can lead to an irregular behavior of the limiting process. This theoretical result enables us to give an agent-based foundations to some recent findings about the rough nature of the volatility in financial markets.

Jeanblanc Monique (Evry)

Kabanov Yuri (Besançon)

Kijima Masaaki (Tokyo Metropolitan University)

Kordzakhia Nino (Macquarie, Australia)

Pricing and hedging of multi-stock spread options under Variance-Gamma model
Using a combination of mean-field type approximations and lower bounds we suggest a fast and efficient tools for pricing of multi-stock basket spread options in the Variance-Gamma framework with correlated stocks.
This is a joint work with A. Novikov, S. Alexander, and T. Ling T.

Kornprobst Antoine (Paris 1)

Kostrov Alexander (HSE)

Kutoyants Yuri (Université du Maine)

On Multi-step MLE - Processes in the Problem of Approximation of BSDE

We consider the problem of the construction of the MLE -process which provides the asymptotically optimal estimationof the unknown parameter for all time instant except a small learning period. This estimator-process is then applied to approximate the solution of the backward stochastic differential equation in the case when the forward equation depends on some unknown finite-dimensional parameter. As the models of observations of forward equation we consider ergodic diffusion process and a dynamical system with small noise.

Larsson Martin (ETHZ)

Polynomial preserving diffusions on the unit ball
Polynomial preserving processes are jump-diffusions whose extended generator maps any polynomial to a polynomial of the same or lower degree. In a finance context, this property leads to tractable yet flexible models. Any affine process is polynomial preserving, but in contrast to the affine case, there exist non-trivial polynomial preserving diffusions on compact state spaces. In this work, we characterize those polynomial preserving diffusions whose state space is the unit ball. The interplay of algebraic and geometric considerations plays an essential role in the analysis. In particular, we find connections to the classical problem of expressing nonnegative polynomials as sums of squares, as well as the embedding of the Grassmann manifold of 2-planes as a subvariety of projective space. This is joint work with Sergio Pulido.

Lépinette Emmanuel (Paris Dauphine)

Uniqueness of solution of an integro-differential HJB equation arising in consumption investment problem under transaction costs

In the consumption)investment optimization problem with proportional transaction costs, the value function is a solution to a PDE equation in the viscosity sense. For an integro-differential operator, the notions of sub- and supersolutions are defined in the global sense, in contrast to the standard case where only local domination is sufficient. We present a proof of uniqueness in this general context. This is joint work with Yuri Kabanov

Lu Yi (Paris 6)

Weak approximation of martingale representations

Martingale representation theorem is the cornerstone of option replication in mathematical finance, and the integrands in the theorem are closely related to the hedging strategy. However these terms are not explicit in general. Using functional Itô calculus initially proposed by Dupire, we propose a numerical scheme which allows to approximate these integrands in a quite general framework; And then we analyse the convergence and the error of the approximation. This method applies naturally to the numerical computation of the hedging strategy of path-dependent options in finance.

Malioutov Michael (Boston)

N-Markov models with anysotropic memory for modeling financial time series

We call Stochastic COntext Trees a n-Markov Chains with every state of a string independent of the symbols in its more remote past than the context of length determined by the preceding symbols of this state. Its stationary distribution over contexts is iteratively evaluated explicitly in several examples. We analyze several models viewed as simplified approaches to financial modeling. This is a joint work with P. Grosu and T. Zhang. Our publication is on http://www.jip.ru/2014/275-283-2014.pdf

Martynov Gennady (IITP)

Computing the Gaussianity statistic

We consider the problem of testing hypothesisthat an observed random process is the Gaussian process without any conditons on alternatives. Corresponding Cramer-von Mises statistic is represented by infinite dimensional integral from a squared generalized empirical process.

Mastrolia Thibaut (Paris Dauphine)

Malliavin differentiability of BSDE's.

We give new conditions for the Malliavin differentiability of solutions of Lipschitz and quadratic BSDEs. Incidentally, we provide also a new formulation for the characterization of the Malliavin-Sobolev type space D^{1,p}. This is a joint work with Dylan Possamaï and Anthony Réveillac.

Melnyk Yaroslav (Kaiserslautern)

Small-Cost Asymptotics for Long-Term Growth Rates in Incomplete Markets

This article provides a rigorous asymptotic analysis of long-term growth rates under both proportional and Morton-Pliska transaction costs. We consider a general incomplete financial market with an unspanned Markov factor process that includes the Heston stochastic volatility

model and the Kim-Omberg stochastic excess return model as special cases. Using a dynamic programming approach, we determine the leading-order expansions of long-term growth rates and explicitly construct strategies that are optimal at the leading order. We further analyze the asymptotic performance of Morton-Pliska strategies in settings with proportional transaction costs. We find that the performance of the optimal Morton-Pliska strategy is the same as that of the optimal one with costs increased by a factor of p^{1/2}. Finally, we demonstrate that our strategies are in fact pathwise optimal, in the sensethat they maximize the long-run growth rate path by path. All our results are substantiated by verication arguments.

Y. Melnyk, F. T. Seifried. Small-Cost Asymptotics for Long-TermGrowth Rates in Incomplete Markets. 2014. Available at SSRN: http://ssrn.com/abstract=2521036

Mueller Marvin (TU Dresden)

A Stochastic Moving Boundary Problem and Limit Order Book Model

We introduce a class of continuous models for the limit order book density with infinitesimal tick size, where the evolution of buy and sell side is described by a semilinear second-order SPDE and the mid price process defines a free boundary separating buy and sell side. Following empirical observations by Lipton, Pesavento and Sotiropoulos (2013) we assume price changes to be determined by the bid-ask imbalance. The resulting limit order book model can be considered as a generalization of the linear stochastic Stefan problem introduced by Kim, Sowers and Zheng (2012). In order to show existence of a solution we transform the problem into a stochastic evolution equation, where the boundary interaction leads to an additional drift. Regularity properties of the linear part in the equation allow to control the non-linearities and establish (local) existence and uniqueness results. This provides a framework for further analysis of the problem.

This talk is based on joint work with Martin Keller-Ressel.

Munari Cosimo (ETHZ)

Rethinking risk measures

The theory of risk measures has become a well-recognized research area since the publication of the landmark paper by Artzner, Delbaen, Eber and Heath in 1999. In the context of a one-period economy, the above authors called a risk measure any function assigning to the terminal position of a financial agent the minimal amount of capital that has to be invested in a pre-specified reference asset in order to take the agent's position to a pre-specified acceptable risk level. The focus of the literature soon shifted towards the special class of cash-additive risk measures, for which the reference asset is a risk-free bond with zero interest rate. The central role assigned to cash-additivity was justified on the grounds of a suitable discounting argument. By virtue of this argument, it was claimed that the original theory of risk measures could be reduced to the cash-additive setting by means of discounting. The objective of this talk is to demonstrate that the above-mentioned discounting argument is conclusive only at a first sight and that, unfortunately, it hides a variety of problematical aspects – both from a financial and a mathematical perspective - making the preceding reduction claim and the consequent exclusive focus on cash-additivity essentially illegitimate. Motivated by this failure, we will briefly outline the foundations of a theory of risk measures with respect to a general reference asset and, time permitting, discuss future research perspectives.

The talk is partly based on the joint paper: W. Farkas, P. Koch-Medina, C. Munari, Beyond cash-additive risk measures: when changing the numeraire fails, Finance and Stochastics, 18, 145-173, 2014.

Muravei Dmitri (HSE)

Solvable stochastic volatility models: optimal investment problem

We consider the optimal investment problem for HARA utility and for underlying which follows the geometric Brownian motion with stochastic volatility. For rich class of stochastic volatility models we solve Hamilton-Jacobi-Bellman equation in explicit form. All obtained results are closed form solutions in terms of hypergeometric functions and elementary functions.

Muravlev Alexei (HSE and Steklov Institute, Moscow)

Musiela Marek (Oxford-Man)

Necula Ciprian (Zurich)

The Dynamics of Heterogeneity and Asset Prices

In the context of a continuous-time dynamic stochastic general equilibrium pure-exchange economy, the paper develops a novel methodology, based on measure-valued stochastic processes, for analyzing the evolution of heterogeneity in a tractable manner and studying its impact on asset prices. The agents in the economy differ with respect to impatience, risk aversion, beliefs about the growth rate of output, and to the rules for updating beliefs. The heterogeneity itself is described by a single object, a measure or a distribution, and its dynamics by a measure-valued stochastic process. The new framework is quite general and can be applied for continuous-time complete markets models with arbitrary output dynamics, belief updating rules and with heterogeneity modeled by discrete distributions, if only a finite number of types of agents exist, by absolutely continuous distributions, and by mixed distributions, if some features are discrete and some features are continuous. A key contribution of the paper consists in obtaining for the stock price a closed form formula, in the general setting, and an analytical formula, in the special case of heterogeneous beliefs but homogenous preferences with the risk aversion parameter given by a natural number. We also synthesize and generalize existing results about the equilibrium in heterogeneous pure-exchange complete markets economies and we highlight the importance of the endogenously determined risk tolerance weighted consumption distribution as a key ingredient in driving the equilibrium variables.

This is a joint work with Walter Farkas.

Nguyen Thai (Rouen)

Nguyen Huu Adrien (Ecole des Ponts)

Time consistent stopping theory and application to decreasing impatience

We propose a pedestrian tour through a general theory of stopping problems as interpersonnal game to solve time-inconsistent optimal stopping problems. We introduce rationality, and strong/weak types of equilibria. We then provide a simple explicit example that has interesting properties. This is join work with Traian Pirvu (McMaster University) and Yu-Jui uang (DCU).

Novikov Alexander (UTS, Australia)

Pricing of Asian-type options via lower/upper bound: survey of some recent results

Ortega Juan-Pablo (Besançon)

Ovari Keita (Tokyo)

On the regularity and representation of monotone convex functions on Orlicz and related spaces

Convex risk measures on L^∞ have been studied in various aspects. Among many other fine properties, it is known that a risk measure on L^∞ has the so-called robust representation by probability measures if and only if it has the Fatou property (order lower semicontinuity), and for such a risk measure, there is equivalence between (1) the so-called Lebesgue property (continuity w.r.t. the dominated a.s. Convergence), (2) the weak compactness of all the sublevel sets of the conjugate, and (3) the attainment of the supremum in the robust representation (Jouini-Schachermayer-Touzi's theorem). Each of equivalent properties has importance in application, and the implication (3) $\Rightarrow$ (2) may be viewed as a partial generalization of perturbed James' theorem. Recently, Orihuela and Ruiz Galán obtained a similar equivalence for risk measures on certain class of Orlicz spaces. In this talk, we provide this type of equivalence for monotone convex functions on lattice ideals (solid vector subspaces) of L^0, including especially all Orlicz spcaes, which improve the one by Orihuela and Ruiz Galán, with a much simpler proof, and unifies several other related results. We then discuss applications and implications in financial mathematics.

Palamarchuk Ekaterina (HSE)

Negative time preference and pathwise optimality in linear stochastic control systems

We discuss the issue of pathwise optimality in linear stochastic control systems with agents having negative time preference. It is known that such kind of time preference can be expressed by an increasing discount function. The criterion used to establish the pathwise optimality is based on the total cost per unit of cumulative discount. We provide conditions which guarantee that the average optimal control law is also pathwise optimal with respect to the mentioned criterion.

Pavlov Igor (Rostov-on-Don)

Special Haar interpolations of (B,S)-markets on countable probability spaces

Peresetsky Anatoly (HSE)

Autocorrelation in the global stochastic trend: Does it help to forecast market returns?

Pergamenshchikov Serguei (Rouen)

Ruin problem for the life insurance with the risk investments

We investigate models of the life annuity insurance when the company invests its reserve into a risky asset with price following a geometric Brownian motion. Our main result is an exact

asymptotic of the ruin probabilities for the case of exponentially distributed benefits. As in the case of non-life insurance with exponential claims, the ruin probabilities are either decreasing with a rate given by a power function (the case of small volatility) or equal to unit identically (the case of large volatility). The result allows us to quantify the share of reserve to invest into such a risky asset to avoid a catastrophic outcome: the ruin with probability one. We address also the question of smoothness of the ruin probabilities as a function of the initial reserve for generally distributed jumps. This is a joint work with Yuri Kabanov.

Pham Huyen (Paris 7)

Presman Ernst (CEMI)

On threshold strategies in optimal stopping problem for the general one-dimensional diffusion.

A general regular one-dimensional diffusion (which is defined by a scale function, a speed measure and a killing measure) is considered. We give necessary and sufficient conditions under which the stopping set in optimal stopping problem has a threshold type. We give also a differential characterization of excessive functions and probability of hitting one point from another before killing. This is a joint work with A.Slastnikov.

Possamai Dylan (Paris Dauphine)

Moral hazard in dynamic risk management

We consider a contracting problem in which a principal hires an agent to manage a risky project. When the agent chooses volatility components of the output process and the principal observes the output continuously, the principal can compute the quadratic variation of the output, but not the individual components. This leads to moral hazard with respect to the risk choices of the agent. Using a very recent theory of singular changes of measures for Ito processes, we formulate the principal-agent problem in this context, and solve it in the case of CARA preferences. In that case, the optimal contract is linear in these factors: the contractible sources of risk, including the output, the quadratic variation of the output and the cross-variations between the output and the contractible risk sources. Thus, path-dependent contracts naturally arise when there is moral hazard with respect to risk management. This is a joint work with Nizar Touzi (CMAP, Ecole Polytechnique) and Jaksa Cvitanic (Caltech).

Ren Zhenjie (Polythechnique)

Viscosity solution of semilinear path dependent PDEs

The notion of viscosity solutions introduced by Ekren, Touzi and Zhang considers as test functions all those smooth processes which are tangent in mean. When restricted to the Markovian case, this definition induces a larger set of test functions, and reduces to the notion of stochastic viscosity solutions analyzed by Bayraktar and Sirbu. We take advantage of this enlargement of the test functions, and provides an easier proof of comparison. As a key ingredient for our methodology, we introduce a notion of punctual differentiation, similar to the corresponding concept in the standard viscosity solutions, and we prove that semimartingales are almost everywhere punctually differentiable. This smoothness result can be viewed as the counterpart of the Aleksandroff smoothness result for convex functions. We also developed recently an argument of Perron's method for the existence of the solution.

Riga Candia (Pisa, Italy)

Savostyanov Mikhail (HSE)

Schweizer Martin (ETHZ)

Seiferling Thomas (University Kaiserslautern)

Consumption and portfolio optimization with stochastic differential utility

In this talk we present a general solution of the optimal consumption and portfolio selection problem for an investor with recursive preferences of Epstein-Zin type in an incomplete market. Analytic solutions for special parameterizations have previously been obtained by Chacko and Viceira (2005) and Kraft, Seifried and Steffensen (2013). We approach the optimization problem via the associated Hamilton-Jacobi-Bellman (HJB) partial differential equation. First it is shown that solutions of the HJB equation that satisfy a boundedness condition provide the solution to the corresponding consumption-portfolio optimization problem. For this novel verification theorem for SDU in incomplete markets, utility gradient inequalities similar to those of Schroder and Skiadas (1999) are used in combination with HJB methods. Finally we employ a fixed point argument to construct a classical solution of the HJB meeting the required boundedness conditions. More precisely, generalizing the approach of Berdjane and Pergamenshchikov (2013), we study the Feynman-Kac representation mapping Φ that is associated to a power transform of the HJB equation. A fixed point argument yields a fixed point of Φ in the space of continuous functions as a limit of iterations of Φ. Using the probabilistic representation of this solution we are able to deduce convergence in $C^{0,1}$. This not only yields a theoretical optimality result, but also leads directly to an efficient method for the numerical computation of optimal strategies by iteratively solving linear parabolic PDEs. Our proposed method exhibits superlinear convergence. We illustrate our results for various popular models, including the Heston stochastic volatility model. This talk is based on joint work with Holger Kraft (Goethe University Frankfurt) and Frank Seifried (University of Kaiserslautern).

Shevchenko Pavel (CSIRO, Australia)

MODELLING ANNUITY PORTFOLIOS AND LONGEVITY RISK WITH EXTENDED CREDIT RISK PLUS

Using an extended version of the credit risk model CreditRisk+, we develop a flexible framework to estimate stochastic life tables and to model annuity portfolios, including actuarial reserves. Deaths are driven by common stochastic risk factors which may be interpreted as death causes like neoplasms, circulatory diseases or idiosyncratic components. This approach provides an efficient, numerically stable algorithm for an exact calculation of the one-period loss distribution where various sources of risk are considered. As required by many regulators, we can then derive risk measures for the one-period loss distribution such as value-at-risk and expected shortfall. In particular, our model allows stress testing and, therefore, offers insight into how certain health scenarios influence annuity payments of an insurer. Such scenarios may include improvement in health treatments and better medication. Using publicly available data, we provide estimation procedures for model parameters including classical approaches as well as MCMC methods. We conclude with a real-world example using Australian death data.

This is a joint work with Jonas Hirz and Uwe Schmock.

Shiryaev Albert (Steklov Institute)

Sikic Mario (ETHZ)

Deterministic quadratic hedging and mean variance portfolio optimization
Abstract: We study the problem of quadratic hedging and mean variance portfolio optimization when the trader is not allowed to use any information about the price evolution. This deterministic trading is just the other extreme of the case with full information. By knowing just the mean and cross covariance of the stock price process, we show how a trader would devise an optimal trading strategy. We give examples of those strategies in the Bachelier model, Black Scholes model, and others. Finally, we will discuss the loss of utility and hedging error that arise due to being allowed to use only deterministic strategies.

Soner Mete (ETHZ)

Song Shiqi (Evry)

Credit risk model in reduction

Sonin Isaac (Charlotte)

Optimal stopping of random sequences modulated by Markov Chain

We consider the Problem of optimal stopping of Markov chain (MC) with the following structure. At each moment of discrete time a Decision Maker observes finite MC *U = (U_n)* and the value of i.i.d. random sequence *(X_n)^(s,k),* where *s* is the past and *k* is the current state of MC *U*. The transition matrix, the distributions of all random sequences and the terminal reward function are known. The algorithmic solution of this problem is presented.

Stoyanov Jordan (Newcastle, UK)

Suzuki Teruyoshi (Hokkaido University)

Analysis on the Optimal Default Boundaries where Firm's Cross-ownership of Debts and Equities is Present

Svaluto-Ferro Sara (ETHZ)

Tan Xiaolu (Université Paris Dauphine)

On the optimal Skorokhod embedding problem given multiple marginals
We consider an optimal Skorkohod embedding problem under multiple marginal constraints. Under technical conditions, we establish a duality result. We further discuss its stability w.r.t the marginal constraints and how it is related to the optimal martingale transport problem, as well as its application in finance.

Tankov Peter (Université Paris 7)

Asymptotic indifference pricing in exponential Lévy models
In this work we develop closed form approximations to exponential utility indifference prices in exponential Lévy models by treating the Lévy model as a perturbation of the Black-Scholes model, extending a methodology introduced in a recent paper for linear functionals of Lévy processes (Aleš Černý, Stephan Denkl, and Jan Kallsen. Hedging in Lévy models and the time step equivalent of jumps. ArXiv, September 2013). Our method works well when the Lévy process in quesion is "not too far" from the Brownian motion, and represents the indifference price as the linear combination of the Black-Scholes price and correction terms which depend on tractable characteristics of the underlying Lévy process, such as skewness and kurtosis.
As a by-product, we obtain a simple explicit formula for the spread between the buyer's and the seller's indifference price. On one hand, this formula allows to quantify, how sensitive a given product is to the market incompleteness, or in other words, to the residual risk which cannot be hedged away with a trading strategy involving only the underlying asset. On the other hand, it provides an explanation for the bid-ask forks observed empirically in option markets.

Teichmann Josef (ETHZ)

Touzi Nizar (Polythechnique)

Tran Quoc Tuan (Paris Dauphine)

Vaicenavicius Juozas (Uppsala)

Optimal liquidation of an asset under incomplete information
We study a problem of finding an optimal stopping strategy to liquidate an asset with unknown drift. A Bayesian approach employing filtering theory is used to model the evolution of beliefs about the drift. The constant drift case and a special case of time-varying drift are studied. Joint work with E. Ekström.

Vostrikova Lioudmila (Angers)

Change-point models in Mathematical Finance.

Zhitlukhin Mikhail (HSE)

Zivoi Danijel (ETHZ)

Mean-variance indifference valuation

In the first part the time-consistent mean-variance portfolio selection problem with liability H is studied in finite discrete-time. In the second partthe conditional mean-variance criterion is interpreted as a dynamic evolution of utility functions. A dynamic valuation rule is defined in the spirit of utility indifference pricing but with respect to local mean-variance efficiency. An explicit formulafor the valuation rule in terms of the Föllmer-Schweizer decomposition of the liability H is presented.