10th European Summer School in Financial Mathematics

Dresden, 28 August - 1 September 2017

Dresden. Photo: TU Dresden, Anja Upmeier

TENTH EUROPEAN SUMMER SCHOOL IN FINANCIAL MATHEMATICS

"Rough Volatility and Transaction Costs"

Lectures by:

Jim Gatheral
Johannes Muhle-Karbe
Mathieu Rosenbaum
Walter Schachermayer

Dresden, Institute of Mathematical Stochastics, 28 August - 1 September 2017

An EMS Applied Mathematics school,

funded by TU Dresden's Institutional Strategy

The European Summer School in Financial Mathematics aims at bringing together the most talented young researchers in mathematical finance. The successful applicants will be sponsored for their travel and living expenses during the summer school.

For its tenth anniversary, the European Summer School in Financial Mathematics will be held in Dresden at the Institute of Mathematical Stochastics on the campus of TU Dresden.

The Summer School is centred around four advanced courses related to two main topics:

1. Models for volatility in financial markets based on rough stochastic processes such as fractional Brownian motion
2. Mathematical methods for markets with transaction costs.

Student presentations and discussion sessions will allow participants to engage with each other and discuss their current research.

One of the aims of the Summer School is to encourage active cooperation and collaboration in mathematical finance among European institutions. We very much count on the members of the Scientific Committee for their support in achieving this aim.

This school belongs to the series of the EMS Applied Mathematics schools. We gratefully acknowledge funding by TU Dresden's Institutional Strategy which is part of the Excellence Initiative of the German Federal and State Governments.

Technische Universität Dresden

Förderverein für Mathematik zu Dresden e.V.

Institut Louis Bachelier

European Mathematical Society

Chaire Risques Financiers

Fédération Bancaire Française

Main Lecture Courses

Blaues Wunder. Photo: Jens Kühn

The summer school will be structured around two main topics:

Topic 1: 'Rough volatility'

The recent topic of rough volatility connects the microstructure of financial markets with the large-scale behavior of volatility. This approach results in parsimonious models that are consistent across different time-scales and show remarkable agreement with econometric data. The necessary mathematical theory involves processes with rough paths and hence leaves the conventional semi-martingale framework of mathematical finance.

Lecturers:

- Jim Gatheral (Baruch College New York)
  - Lecture 1 (pdf)
  - Lecture 1 (Jupyter Notebook)
  - Lecture 2 (pdf)
  - Lecture 2 (Jupyter Notebook)
  - fast simulation of rBergomi (.zip)
  - Lecture 3 (pdf)
  - Lecture 3 (Jupyter Notebook)
- Mathieu Rosenbaum (Ecole Polytechnique)
  - Lecture 1 (pdf)
  - Lecture 2 (pdf)
  - Lecture 3 (pdf)

Topic 2: 'Models with transaction costs'

Common mathematical models of financial markets ignore many of the complexities and frictions that are relevant in reality. Transaction costs are a significant example of such a friction, and also play a role in the context of market regulation. For financial mathematics, the presence of transaction costs raises the challenge to adapt classic results on hedging and portfolio optimization to a new setting. For some problems, an asymptotic approach proves useful, in which transaction costs are treated as a small perturbation of a frictionless model.

Lecturers:

- Johannes Muhle-Karbe (University of Michigan):

  'Equilibrium Models with Transaction Costs'

  Abstract: How do changes in market structure or regulatory measures like a transaction tax affect asset prices? To answer such questions, one needs to consider 'equilibrium models'. This means that prices are not directly specified in reduced form, but instead determined endogenously by matching supply and demand. This lecture series surveys recent progress in this direction.

  - Lecture 1 (pdf)
  - Lecture 2 (pdf)
  - Lecture 3 (pdf)
- Walter Schachermayer (University of Vienna)

  'The Asymptotic Theory of Transaction Costs'

  Abstract: We present recent progress on portfolio optimization under proportional transaction costs. Special emphasis will be laid on the following aspects: (i) the asymptotic behaviour when transaction costs tend to zero and (ii) the case of price processes which fail to be semi-martingales such as fractional Brownian motion.
  The lectures are based on Lecture Notes which appear in the EMS Series in 2017.

  - Lecture notes can be found on Walter Schachermayer's webpage (publication Nr. 166)

Schedule

Mini courses

- The mini courses will take place from Monday to Thursday from 9:00 - 12:00 and from 14:00 - 17:00 with coffee breaks in between. On Friday, the summer school will end at 15:30.
- The schedule of the summer school can be found here.

Social program

- Moday evening: the welcome reception will take place in the restaurant of the guest house.
- Wednesday: We will take a river cruise on the river Elbe, lasting approximately from 14:00 to 17:00. Coffee/Tea and Cake will be served on the boat.

Schloss Pillnitz. Photo: Sächsische Dampfschifffahrt

Participation Fee is 30 EUR (regular) or 23 EUR (with valid student ID).

Organising and scientific committees

Organising committee

- Bruno Bouchard
- Stefano De Marco
- Martin Keller-Ressel
- Mathieu Rosenbaum
- Nizar Touzi

Local Organisers

- Paolo Di Tella
- Martin Haubold
- Martin Keller-Ressel
- Stephanie Nargang
- Cindy Röhling
- Robert Wardenga

Scientific committee

The Scientific Committee consists of European leaders and representatives of financial mathematics. We warmly thank them for their encouragement and for accepting to be part of this committee.

Peter Bank	Peter Imkeller	Wolfgang Runggaldier	Mete Soner
Tomas Björk	Youri Kabanov	Walter Schachermayer	Josef Teichmann
Santiago Carillo	Ralf Korn	Martin Schweizer	Albert Shiryaev
Mark Davis	Nicole El Karoui	Gilles Pagès	Huyen Pham
Marco Frittelli	Damien Lamberton	Bernard Lapeyre	Lukas Stettner
David Hobson	Bernt Øksendal	Denis Talay	Chris Rogers

Regular Participants

Mr.	Abi Jaber	Eduardo	Université Paris Dauphine
Mr.	Balint	Daniel	ETH Zürich
Mr.	Bartl	Daniel	Universität Konstanz
Mr.	Beßlich	David	TU Berlin
Mr.	Bilarev	Todor	HU Berlin
Mr.	Blanchard	Romain	Université de Reims Champagne-Ardenne
Mr.	Bogus	Kamil	Wrocław University of Science and Technology
Mr.	Chuni	Vinayak	University of Bologna
Mrs.	Damian	Camilla	WU Vienna University of Economics and Business
Mr.	Dang	Quoc Viet	London School of Economics and Political Science
Mr.	De March	Hadrien	École Polytechnique
Mr.	De Santis	Davide	London School of Economics
Mr.	El Euch	Omar	École Polytechnique
Mr.	Engelhardt	Stefan	Friedrich-Schiller University Jena
Mr.	Farhat	Heythem	École Polytechnique
Mr.	Fiorin	Lucio	University of Padova
Mr.	Frentrup	Peter	HU Berlin
Mrs.	Ghio	Maddalena	Scuola Normale Superiore Pisa
Mrs.	Gu	Lingqi	Uni Wien
Mr.	Ignazio	Vincenzo	ETH Zürich
Mr.	Khosrawi-Sardroudi	Wahid	Uni Freiburg
Mrs.	Klein	Maike	Friedrich-Schiller University Jena
Mrs.	Kleisinger-Yu	Xi	ETH Zürich
Mr.	Koch	Stefan	Uni Mannheim
Mr.	Kulchitsky	Yuri	National Research University Moscow
Mrs.	Lacombe	Chloe	Imperial College London
Mrs.	Lin	Yiqing	CMAP, École Polytechnique, France
Mr.	Lisovskii	Dmitrii	Lomonosov Moscow State University
Mrs.	Michalik	Zofia	University of Warsaw
Mr.	Minutillo Menga	Luca	Scuola Normale Superiore Pisa
Mr.	Mollaret	Sébastien	Université Paris Est Marne-la-Vallé
Mr.	Möllmann	Tonio	Scuola Normale Superiore Pisa
Mr.	Muguruza Gonzales	Aitor	Imperial College, London
Mr.	Müller	Marvin	ETH Zürich
Mr.	Muscat	Jonathan	University of Warwick
Mr.	Nika	Zsolt	Pázmány Péter Catholic University, Hungary
Mr.	Norgilas	Dominnykas	University of Warwick
Mr.	Palosch	David	University of Konstanz
Mr.	Pigato	Paolo	WIAS
Mr.	Reitsam	Thomas	LMU München
Mr.	Rotondi	Francesco	Università Bocconi Milan
Mrs.	Saliba	Pamela	École Polytechnique
Mr.	Schelling	Denis	London School of Economics and Political Science
Mr.	Smith	Greig	University of Edinburgh
Mr.	Sojmark	Andreas	University of Oxford
Mr.	Stemper	Benjamin	TU Berlin
Mrs.	Terenzi	Giulia	Université Paris Est Marne-la-Vallé
Mr.	Vassallo	Danilo	Scuola Normale Superiore Pisa
Mr.	Virrion	Benjamin	PSL Research University Paris

Mr.	Voß	Moritz	TU Berlin
Mr.	Wiesel	Johannes	University of Oxford
Mr.	Yin	Liming	Shanghai Jiao Tong University
Mr.	Zeng	Matthew	University of Warwick
Mr.	Zhang	Yunbo	Shanghai Jiao Tong University
Mr.	Zhou	Alexandre	École de Ponts ParisTech

Senior Participants

Mrs.	Alós	Elisa	Universitat Pompeu Fabra Barcelona
Mr.	Bayer	Christian	WIAS
Mr.	Becherer	Dirk	HU Berlin
Mr.	Czichowsky	Christoph	London School of Economics and Political Science
Mr.	De Marco	Stéfano	École Polytechnique
Mr.	Friz	Peter	TU Berlin
Mr.	Mastrolia	Thibaut	École Polytechnique
Mr.	Sgarra	Carlo	Polytecnico di Milano