Curriculum Vitae — Stephan Sturm

February 2019

Contact Information

Stephan Sturm
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Research Interests: Mathematical Finance & Stochastic Analysis

Employment

Since 07/18	Associate Professor (tenured), Department of Mathematical Sciences, Worcester Polytechnic Institute
07/12 - 06/18	Assistant Professor (tenure track), Department of Mathematical Sciences, Worcester Polytechnic Institute
07/13 - 12/13	Lecturer, Department of Finance, School of Management, Boston University
02/10 - 08/12	RTG Postdoctoral Research Associate & Lecturer, ORFE Department, Princeton University
11/09 - 01/10	Research Fellow, DFG Research Center MATHEON, Berlin
04/04 - 08/09	Teaching Assistant, TU Berlin
07/01 - 08/01	Vienna University Computer Center, University of Vienna
07/00 - 08/00	AVL India Pvt. Ltd., Gurgaon (Haryana), India
08/98 - 09/99	Compulsory Civilian Service, Auschwitz Foundation, Brussels

Education

04/04 – 01/10	PhD in Mathematics, TU Berlin Thesis: Small-time large deviations for sample paths of infinite dimensional symmetric Dirichlet processes (Adviser: Alexander Schied)
10/96 – 03/04	BS/MS in Mathematics, University of Vienna Thesis: Calculation of the Greeks by Malliavin Calculus (Advisers: Walter Schachermayer and Josef Teichmann)

Administration

2019–21	Associate Editor, SIAM Journal on Financial Mathematics
2019–20	Associate Director, Center for Industrial and Applied Mathematics and Statistics, WPI
Since 2018	Steering Committee, Eastern Conference on Mathematical Finance

Publications

Peer-reviewed Journals

1) Z. Feinstein, W. Pang, B. Rudloff, E. Schaanning, S. Sturm and M. Wildman. *Sensitivity of the Eisenberg-Noe clearing vector to individual interbank liabilities.* **SIAM J. Finan. Math.**, 9:4, 1286–1325. 2018
2) J. He, N.C. Johnson, G.A. Vecchi, B. Kirtman, A.T. Wittenberg and S. Sturm *Precipitation Sensitivity to Local Variations in Tropical Sea Surface Temperature.* **J. Climate**, 31:22, 9225–9238. 2018
3) M. Bichuch, A. Capponi and S. Sturm. *Arbitrage-free XVA.* **Math. Finance**, 28:2, 582–620. 2018
4) R. Sircar and S. Sturm. *From Smile Asymptotics to Market Risk Measures*, **Math. Finance**, 25:2, 400–425. 2015
5) M. Bichuch and S. Sturm. *Portfolio Optimization under Convex Incentive Schemes.* **Finance Stoch.**, 18:4, 873–915. 2014
6) P. Friz, S. Gerhold, A. Gulisashvili and S. Sturm. *On refined Volatility Smile Expansion in the Heston Model.* **Quant. Finance**, 11:8, 1151–1164. 2011
7) M. Beiglböck, P. Friz and S. Sturm. *Is the Minimum Value of an Option on Variance generated by Local Volatility?* **SIAM J. Finan. Math.** 2, 213–220. 2011

Currently under Review

8) M. Bichuch, A. Capponi and S. Sturm. *Robust XVA.* 34 pages. Under revision for **Math. Finance.**
9) J. Lee, S. Sturm and C. Zhou. *A Risk-Sharing Framework of Bilateral Contracts.* 36 pages. Submitted to **Journal of Economic Dynamics and Control**

Non Peer-reviewed Papers

10) M. Bichuch, A. Capponi and S. Sturm. *Arbitrage-free pricing of XVA - Part I: framework and explicit examples.* 34 pages. `http://arxiv.org/abs/1501.05893`. *Strongly revised version incorporated in: Arbitrage-free XVA*
11) M. Bichuch, A. Capponi and S. Sturm. *Arbitrage-free pricing of XVA - Part II: PDE representation and numerical analysis.* 19 pages. `http://arxiv.org/abs/1502.06106`. *Strongly revised version incorporated in: Arbitrage-free XVA*

Theses

12) S. Sturm. *Small-time Large Deviations for Sample Paths of infinite dimensional symmetric Dirichlet Processes.* PhD Thesis. Berlin (**TU Berlin**). 2010
13) S. Sturm. *Calculation of the Greeks by Malliavin Calculus.* Master's Thesis. Vienna (**University of Vienna**). 2004

Reviews (for Mathematical Reviews of the AMS)

14) MR2881181 B. Chu. *Large deviations estimation of the windfall and shortfall probabilities for optimal diversified portfolios.* **Ann. Finance** 8, no. 1, 97–122. 2012

15) MR2920297 D. Aïssani and Z. Benouaret. *Modèles de risque et files d'attente: la mèthode de stabilité forte. (French) [Risk models and queues: the strong stability method]* **J. Afr. Stat.** 5, 210–218. 2010

16) MR2838099 R. Coviello, C. di Girolami and F. Russo. *On stochastic calculus related to financial assets without semimartingales.* **Bull. Sci. Math.** 135 , no. 6–7, 733–774. 2011

Talks & Research Visits (* invited) — past 3 years

05/07/19	* Applied Mathematics Seminar, Department of Mathematics, Universita Autònoma de Madrid, Madrid, Spain
04/22/19	* Mathematical Finance Colloquium, Department of Mathematics, University of Southern California, Los Angeles, CA
04/13 – 14/19	* AMS Eastern Sectional Meeting, Special Session on Financial Mathematics, Hartford, CT
03/05/19	* Post/Doctoral Seminar in Mathematical Finance, ETH Zurich, Zurich, Switzerland
03/04/19	* Colloquium of the Institute of Data Analysis and Process Design, Zurich Universty of Applied Sciences (ZHAW), Winterthur, Switzerland
11/22 – 25/18	* INFORMS Annual Meeting 2018, Session on Systemic Risk and Network Models, Phoenix, AZ
11/22 – 25/18	* INFORMS Annual Meeting 2018, Topics in FinTech and Risk Management, Phoenix, AZ
07/22 – 23/18	* Workshop on Stopping Time Problems in Game Theory, Economics and Finance, Stony Brook Center for Game Theory, Stony Brook, NY
07/09 – 13/18	SIAM Annual Meeting 2018, Session on Financial Risk after the Crisis, Portland, OR
05/23/18	* Lunch Time Seminar, Department of Finance and Risk Engineering, NYU Tandon School of Engineering, New York, NY
05/14/18	* Department Seminar, Department of Statistics and Applied Probability, UC Santa Barbara, Santa Barbara, CA
04/04/18	* Mathematical Finance and Applied Probability Seminar, Department of Mathematics, University of Connecticut, Storrs, CT
03/01/18	* SEEM Seminar, Department of Systems Engineering and Engineering Management, The Chinese University of Hong Kong, Hong Kong
02/13/18	* Seminar on Financial Mathematics, Department of Mathematics, The Hong Kong University of Science and Technology, Hong Kong
10/22-25/17	* INFORMS Annual Meeting 2017, Session on Stochastic Systems in Finance, Houston, TX

Talks & Research Visits (cont'd) (* invited) — past 3 years

07/03-07/17	International Workshop on BSDEs, SPDEs and their Applications, Edinburgh, UK
03/28/17	* Mathematical Finance and Stochastic Analysis Seminar, Illinois Institute of Technology, Chicago, IL
03/27/17	* Applied Mathematics Colloquium, Illinois Institute of Technology, Chicago, IL
10/27 – 29/16	*2^{nd} Workshop on Risk Measures, XVA Analysis, Capital Allocation and Central Counterparties, Shanghai, China
09/24 – 25/16	AMS Eastern Sectional Meeting, Special Session on Financial Mathematics, Brunswick, ME
09/15/16	*1^{st} European COST Conference on Mathematics for Industry in Switzerland, Winterthur, Switzerland
09/12 – 14/16	Vienna Congress on Mathematical Finance – VCMF 2016, Vienna, Austria
07/15 – 19/16	9^{th} World Congress of the Bachelier Finance Society, Session on CVA and XVA Models, New York, NY
07/07 – 09/16	*IMS-FIPS Workshop, Invited Session on Portfolio Optimization, Edmonton, AB
03/08/16	*Colloquium of the Institute of Data Analysis and Process Design, Zurich Universty of Applied Sciences (ZHAW), Winterthur, Switzerland
01/06 – 09/16	*Joint Mathematics Meeting, AMS Special Session on Problems and Challenges in Financial Engineering and Risk Management, Seattle, WA

Referee for the following peer reviewed journals

Applied Mathematical Finance

Finance & Stochastics

International Journal of Theoretical and Applied Finance

Management Science

Mathematical Finance

Quantitative Finance

Stochastic Models

SIAM Journal on Financial Mathematics

Organization

AMS Special Session on Financial Mathematics, Joint Mathematics Meeting 2019, Baltimore, MD (jointly with Maxim Bichuch and Anja Richter; 11 speakers)

Special Session on Financial Mathematics, AMS Eastern Sectional Meeting Fall 2016, Brunswick, ME (jointly with Maxim Bichuch and Xuwei Yang; 15 speakers)

First Eastern Conference on Mathematical Finance, Worcester, MA (jointly with Agostino Capponi, Andreea Minca and Ronnie Sircar; 19 speakers)

AMS *Mathematical Research Communities 2015 in Financial Mathematics* (jointly with Maxim Bichuch, Michale Carlise, Olympia Hadjiliadis and Birgit Rudloff; 40 participants)

Recent Advances in Mathematical Finance. SIAM Mini Symposia at the Joint Mathematics Meeting 2014, Baltimore, MD (jointly with Maxim Bichuch and Ronnie Sircar; 18 speakers)

Special Session on Financial Mathematics, AMS Eastern Sectional Meeting Spring 2013, Chestnut Hill, MA (jointly with Hasanjan Sayit; 21 Speakers)

Founder and coordinator of the *Stochastic Analysis and Financial Mathematics Common*, an interdepartmental student-faculty seminar in Stochastic Analysis and its applications in Financial Mathematics

Advising

PhD Thesis (in Mathematical Sciences, WPI)

1. Weijie Pang. *In the Wake of the Financial Crisis – Regulators and Investors Perspectives*. In progress
2. Jiaxuan Ye. *The Carried Interest Loophole – Incentives of Tax Deferral* (Co-Advisor with G. Wang; ongoing). In progress
3. Patchara Santawisook. *Price Impact in the VIX Futures Market.* (ongoing). In progress

Masters Project (in Financial Mathematics, WPI)

1. Jiahao Hou. *Deep Learning of XVA*. In progress
2. Blanche Sonia Mahop Ngo. *Systemic Risk in Microfinance in Cameroon.* (Co-Advisor: G. Somasse). In progress
3. Ming Min. *Numerical Methods for European Option Pricing with BSDEs.* 2018
4. Tingwen Zhou. *Arbitrage-Free Pricing of XVA for American Options in Discrete Time.* (Co-Advisor: G. Wang). 2018

5. Anastasiia Parkhomenko *Calibration of an Optimal Bidding Model for the Mobile Advertisement Markets* (Co-Advisor: M. Blais, Sponsor: Cidewalk, Inc.). 2016
6. Patchara Santawisook. *Implied Volatility and Extracted Risk Neutral Density of VIX Options during the Crisis and Relatively Calm Periods*. 2015
7. Mihnea Andrei. *A Discrete Model for the Default Risk of Inter-banking Networks*. 2014
8. Junling Hu. *Barrier Option Pricing under SABR Model Using Monte Carlo Methods*. 2013

Capstone Project (in MA 575 Market and Credit Risk Models and Management, WPI)

Quingnan Shi. *Optimal Stock Execution Strategy*. 2013

Major Qualifying Projects, WPI

1. Lisandra Lao. *Supplier Digital Identity for State Streets Vendor Onboarding Process*. (Co-Advisors: M. Blais and K. Sweeney, Sponsor: State Street, Boston). Ongoing
2. Daniel Perreault. *Choosing Investment Strategies by their Outcomes*. 2018
3. Griffin Bishop, Leo Grande, Samuel Pridotkas, Harutyun Sadoyan. *Deep Learning for Data Privacy Classification*. (Co-Advisor: R. Paffenroth, Sponsor: Aristo Consulting, Zurich, Switzerland). 2018
4. Stephen Kosmo. *Trade Compression in Over-the-Counter Markets*. 2018
5. Luke Buquicchio, Everett Harding and Juan-Luis Herrero Estrada. *Ensemble of Feedforward Neural Networks Applied to Credit Default* (Co-Advisor: Randy Paffenroth, Sponsor: Zurich University of Applied Sciences (ZHAW)). 2018
6. Natalie Wellen. *Modeling Over-The-Counter Derivatives Trading with and without Central Clearing Parties*. 2017 **Provost's MQP Award in Mathematical Sciences, 2017**
7. Shannon Feeley, Ian Jacoway and Gina Rios. *Process Mining the Credit Suisse Advisory Process*. (Co-Advisor: R. Paffenroth, Sponsor: Credit Suisse, ISRP Zurich, Switzerland). 2017
8. Laura Antul. *Calibration of an Optimal Bidding Model for the Mobile Advertisement Markets*. (Co-Advisor: M. Blais, Sponsor: Cidewalk, Inc.). 2016. **Provost's MQP Award in Mathematical Sciences, 2016**
9. Catherine Bonner and Jeremiah Campanelli. *Arbitrage-Free Pricing of XVA for Options in Discrete Time*. (Co-Advisor: G. Wang). 2016. **Provost's MQP Award in Actuarial Mathematics, 2016**
10. Youwei Hu and Jeremy Macaluso. *Mathematical Modeling of Ad Impressions Markets*. (Co-Advisor: M. Blais; Sponsor: Chitika, Inc.). 2015

Interactive Qualifying Projects, WPI

1. Irean Ali, Matthew Elliott, Kamil Gumienny and Prachi Patel. *Ueber den Tellerrands Cooking Events*. Berlin Project Center, 2019 (Co-Advisor: K. Foo; Sponsor: Ueber den Tellerrand)
2. Matt Farah, Manuel Freile, Matthew Outama and Faris Asim Shaikh. *Community Events, Berlin* . Berlin Project Center, 2019 (Co-Advisor: K. Foo; Sponsor: Ueber den Tellerrand)
3. Natalie Bloniarz, Emma Brimdyr, Daniel McKay and Kelly McMahon. *Disposable Mentality: Consumer Behavior Surrounding Disposable Plastics*. Hong Kong Project Center, 2018 (Co-Advisor: T. Balistrieri; Sponsor: Friends of the Earth Hong Kong)
4. Sean Brady, Emily Hao, Ronglin Na and Kalyn Ricciuti. *The Essence of Place in Central, Hong Kong*. Hong Kong Project Center, 2018 (Co-Advisor: T. Balistrieri; Sponsor: Urban Renewal Authority)
5. Michael Ambrose, Risbel Rivas, Nathan Rose and Armando Zubillaga. *Halal Demand in Hong Kong*. Hong Kong Project Center, 2018 (Co-Advisor: T. Balistrieri; Sponsor: Hong Kong Standards and Testing Center)
6. Jameson Moore, Eduardo Paoli Lauria, Christina Skavicus and Hannah Yeung. *Creating Opportunities for Cross-Generational Interaction Through Placemaking in Hong Kong*. Hong Kong Project Center, 2018 (Co-Advisor: T. Balistrieri; Sponsor: School of Architecture, The Chinese University of Hong Kong)
7. Ian Macgregor, Caleb Mullen, Ian Sun and Shane Whittaker. *Investigation of Tourists' Perception of Shark Fin Soup in Hong Kong and Novel Approaches for Influencing Cross-Cultural Value-Based Change*. Hong Kong Project Center, 2018 (Co-Advisor: T. Balistrieri; Sponsor: Hong Kong Shark Foundation)
8. Daniela Baez, Josie Brashaw, Marco Intelandi and Connor McNamara. *Water Taxis in Hong Kong: Their Potential and Future*. Hong Kong Project Center, 2015 (Co-Advisor: T. Balistrieri; Sponsor: Designing Hong Kong and Harbour Business Forum)
9. Elijah Eldredge, Ian Nolan and Kelcy Williams. *Extra-Curricular Student Entrepreneurship at Hangzhou Dianzi University*. Hangzhou Project Center, 2016 (Co-Advisor: G. Pollice; Sponsor: School of Business, Hangzhou Dianzi University)
10. Zitong Jiang, Alex Markoski and Jonathan McIntyre. *ChuangChao Investment Investigation of the WeWork Formats Feasibility in Hangzhou*. Hangzhou Project Center, 2016 (Co-Advisor: G. Pollice; Sponsor: ChungChao Investment)
11. Jason Lowder, Melody Shum and Nonthakorn Olaranont. *Foreign Dining Experience: A Feasibility Study of a Non-Chinese Food Venture at Hangzhou Dianzi University*. Hangzhou Project Center, 2016 (Co-Advisor: G. Pollice; Sponsor: Hangzhou Dianzi University Logistics Service Corporation)
12. Andrew Buley, Gilberto Hernandez, Justin Shanahan and Justine Sherman. *Determining the Feasibility of Traffic Management Through Mobile Applications in*

China. Hangzhou Project Center, 2016 (Co-Advisor: G. Pollice; Sponsor: Zhejiang Smart City Research Center)

13. Carlos Carle, Sophia Gudenrath, Nicholas Hollan and Courtney Lewis. *The 59store in the United States: A Feasibility Study*. Hangzhou Project Center, 2016 (Co-Advisor: G. Pollice; Sponsor: The 59store)
14. Lidya Gebremeskel, Nathaniel O'Connor, Oliver Spring and Olivia Steen. *A Comparative Analysis of Research Literature Resources*. Hangzhou Project Center, 2016 (Co-Advisor: G. Pollice; Sponsor: Hangzhou DAC Biotech)
15. Jacqueline Barr, Jessica Cheu and Samuel Smith. *Analyzing Optimal Reward Systems for Maintaining Book Donations*. Hangzhou Project Center, 2016 (Co-Advisor: G. Pollice; Sponsor: 123 Library)
16. Ryan Baker, Duc Minh Do and Sam Mailand. *The Use of Technology to Enhance English Language (ESL) Teaching*. Hong Kong Project Center, 2015 (Co-Advisor: C. Peet; Sponsor: The Caritas Institute of Higher Education)
17. Miguel Mora, Weijia Tao, Cheryl Travison and Daniel Turnbull. *Food and Beverage on the Victoria Harbour Waterfront*. Hong Kong Project Center, 2015 (Co-Advisor: C. Peet; Sponsor: Designing Hong Kong and Harbour Business Forum)
18. Fuchen Chen, Zachary Culp and Benjamin Root. *Evaluation of IAQ Perception of Shopping Malls in Hong Kong*. Hong Kong Project Center, 2015 (Co-Advisor: C. Peet; Sponsor: Business Environment Council Limited)
19. Zachary Harmony, Meagan Hiatt, Paige Waechter and Chuankai Zhou. *Promoting Universal Accessibility of the East Kowloon Harbor Front*. Hong Kong Project Center, 2015 (Co-Advisor: C. Peet; Sponsor: School of Architecture, The Chinese University of Hong Kong)
20. Ozan Akyıldız, Paul Calamari, Zachary Sellman and Stephanie Symecko. *Microplastic Pollution in Littoral Environments*. Hong Kong Project Center, 2015 (Co-Advisor: C. Peet; Sponsor: The Hong Kong Institute of Education)
21. Tobin Dancy, François-Xavier Stricker-Krongrad, Jennifer Wallace and Borong Zhang. *Improving the Green Building Standards in Hong Kong*. Hong Kong Project Center, 2015 (Co-Advisor: C. Peet; Sponsor: Hong Kong Green Building Council Limited)

Undergraduate Summer Research Projects, WPI

- Stephen Kosmo. *Trade Compression in Over-the-Counter Markets*. — supported by an A &S Summer Grant ($ 5,000.-)
- Shannon Feeley, Khasan Dymov and Natalie Wellen. *Modeling Financial Networks with Central Clearing Parties*. — Khasan Dymov was supported by a WPI SURF Grant ($ 4,000.-), Natalie Wellen was supported by a Clare Booth Luce Fellowship
- Mihnea Andrei, Chuqi Cai and Jiali Gao. *Default Contagion and Systemic Risk*. — Mihnea Andrei was supported by a WPI SURF Grant ($ 4,000.-)

REU in Industrial Mathematics and Statistics, WPI

- Rajita Chandak (Brown University), Monte Fischer (University of Georgia), Jack Ladd (Oberlin College), Anthony Sisti (University of Connecticut). *Pricing VIX and TYVIX Options using a Risk-Neutralized Historical Distribution* (Co-Advisor: Marcel Blais; Sponsor: Doherty Advisors; Funded by NSF). 2018
- Rajita Chandak (Brown University), Monte Fischer (University of Georgia), Jack Ladd (Oberlin College) and Anthony Sisti (University of Connecticut). *Machine Learning Approaches to Exception Handling.* (Co-Advisor: M. Blais, Sposor: State Street Global Services). 2018

Senior Theses (in ORFE, Princeton University)

- Sida Huang. *Oil Prices in a Changing World.* 2012
- Eric Chiang. *Simulation of Asset Bubbles with Margin Constraints and Heterogeneous Beliefs.*2011
- Zachary Jay Liebmann. *Out–of–the–Money Put Options on Nearby Oil Futures.* 2011
- Adam Nassr. *An Analysis of Derivative Opportunities in Islamic Finance.* 2011
- Ka Lun Tam. *Implied Volatility of Options in Changing Market Conditions.* 2011

Teaching

Worcester Polytechnic Institute

MA 528 Measure-theoretic Probability Theory (Fall 2013, Fall 2014)

MA 529 Stochastic Processes (Spring 2015)

MA 572 Financial Mathematics II (Spring 2019)

MA 573 Computational Methods of Financial Mathematics (Spring 2017, D–term, Spring 2018)

MA 575 Market and Credit Risk Models and Management (Spring 2013)

MA 1023 Calculus III (A–term, Fall 2018)

MA 2631 Probability (A–Term, Fall 2012; Fall 2013 [2 sections]; Fall 2014 [2 sections]; Fall 2015; Summer 2018)

MA 3211 Theory of Interest (B–Term, Fall 2012)

MA 4237 Probabilistic Methods in Operations Research (B–Term, Fall 2015; Fall 2017)

MA 4891 Topics in Mathematics: Point-set Topology (D–term, Spring 2019)

MA 4892 Topics in Actuarial Mathematics: Rational Pricing of Derivative Securities (A–Term, 2016)

Boston University

MF 795 Stochastic Methods of Mathematical Finance II (Fall 2013)

Princeton University

ORF 535 Financial Risk Management (Fall 2011)

ORF 515 / FIN 503 Asset Pricing II: Stochastic Calculus & Advanced Derivatives (Spring 2010, 2011 & 2012)

ORF 557 Stochastic Analysis Seminar (Fall 2010): Mini-course on Asymptotics of Implied Volatility in Stochastic Volatility Models

Honors, Awards & Grants

REU Site: Research Experiences for Undergraduates in Industrial Mathematics and Statistics (Co–PI; PI: B. Tilley) *NSF Grant, Division of Mathematical Sciences*, 02/14/18 – 01/31/21. ($ 299,606.-)

Fellow at the *Institute for Pure and Applied Mathematics (IPAM)*, 03/09 – 06/12/15.

Recognition of Excellence in Mentoring Undergraduate Research. **Council on Undergraduate Research**, 2017

AMS *Mathematical Research Communities 2015 in Financial Mathematics* (organized with Maxim Bichuch, Michale Carlise, Olympia Hadjiliadis and Birgit Rudloff; 40 participants)

WPI Arts & Sciences Summer Research Funding, for **Stephen Kosmo** in the project *Trade Compression in OTC Derivatives Markets*

WPI Summer Undergraduate Research Fellowships (SURF), for **Khasan Dymov** in the project *Modeling Financial Networks with Central Clearing Parties*

WPI Summer Undergraduate Research Fellowships (SURF), for **Mihnea Andrei** in the project *Default Contagion and Systemic Risk*

Provosts's Award for the best MQP in Mathematical Sciences 2017 (Advisor)

Provosts's Award for the best MQP in Actuarial Mathematics 2016 (Advisor)

Provosts's Award for the best MQP in Mathematical Sciences 2016 (Advisor)

Languages English, French and German (native)

Memberships AMS, CIMS, INFORMS, SIAM