

Jiří Dvořák – list of publications, talks, etc.

(last revision: 8. 11. 2017)

List of papers

M. Prokešová, J. Dvořák, E.B.V. Jensen (2017): Two-step estimation procedures for inhomogeneous shot-noise Cox processes. *Annals of the Institute of Statistical Mathematics* 69 (3), 513–542. DOI: 10.1007/s10463-016-0556-y. Available online: <http://link.springer.com/article/10.1007/s10463-016-0556-y>

J. Švihlík, J. Kybic, D. Habart, H. Hlushak, J. Dvořák, B. Radochová (2017): Langerhans islet volume estimation from 3D optical projection tomography. Chapter in *Computer Vision – ACCV 2016 Workshops; ACCV 2016 International Workshops, Taipei, Taiwan, November 20–24, 2016, Revised Selected Papers, Part II*, 583–594.

J. Dvořák, M. Prokešová (2016): Parameter estimation for inhomogeneous space-time shot-noise Cox point processes. *Scandinavian Journal of Statistics* 43 (4), 939–961. DOI: 10.1111/sjos.12222. Available online: <http://onlinelibrary.wiley.com/doi/10.1111/sjos.12222/epdf>

A. Pidnebesna, K. Helisová, J. Dvořák, R. Lechnerová, T. Lechner (2016): Statistical analysis and modelling of submissions to municipalities in the Czech Republic. *Informační Bullentin České statistické společnosti (Information Bullentin of the Czech statistical society)*, 27 (4), 1–18.

J. Dvořák, M. Prokešová (2016): Asymptotic properties of the minimum contrast estimators for projections of inhomogeneous space-time shot-noise Cox processes. *Applications of Mathematics* 61 (4), 387–411. IF 2015: 0.507

J. Dvořák, J. Švihlík, D. Habart, J. Kybic (2016): Comparison of volume estimation methods for pancreatic islet cells, in *Proceedings of SPIE 9788, Medical Imaging 2016: Biomedical Applications in Molecular, Structural, and Functional Imaging*. DOI: 10.1117/12.2216783.

J. Dvořák (2015): Model fitting for space-time point patterns using projection processes, in *Proceedings of the 19th European Young Statisticians Meeting* (ed. S. Nagy), Prague, Matfyzpress, 34–39.

M. Prokešová, J. Dvořák (2014): Statistics for inhomogeneous space-time shot-noise Cox processes. *Methodology and Computing in Applied Probability* 16 (2), 433–449. DOI: 10.1007/s11009-013-9324-0. IF 2011: 0.753.

J. Boldyš, J. Dvořák, O. Bělohávek, M. Skopalová (2013): Monte Carlo simulation of PET images for injection dose optimization. *International Journal for Numerical Methods in Biomedical Engineering* 29 (9), 988–999. DOI: 10.1002/cnm.2527. IF 2011: 1.409.

J. Dvořák, J. Boldyš, O. Bělohávek, M. Skopalová (2013): Application of the random field

theory in PET imaging – injection dose optimization. *Kybernetika* 49 (2), 280–300. IF 2011: 0.454.

J. Dvořák, E.B.V. Jensen (2013): On semi-automatic estimation of surface area. *Journal of Microscopy* 250 (2), 142–157. IF 2011: 1.631. Available online as a research report of the CSGB centre.

E. Čadková, M. Komárek, R. Kaliszová, V. Koudelková, J. Dvořák, A. Vaněk (2012): Sorption of Tebuconazole onto Selected Soil Minerals and Humic Acids. *Journal of Environmental Science and Health Part B-Pesticides, Food Contaminants, and Agricultural Wastes* 47, 336–342. IF 2011: 0.886.

J. Dvořák, M. Prokešová (2012): Moment estimation methods for stationary spatial Cox processes – a comparison. *Kybernetika* 48 (5), 1007–1026. IF 2011: 0.454.

J. Dvořák (2011): On moment estimation methods for spatial Cox processes, in *WDS'11 Proceedings of Contributed Papers: Part I – Mathematics and Computer Sciences* (eds. J. Šafránková and J. Pavlů), Prague, Matfyzpress, 31–36.

O. Bělohávek, M. Skopalová, J. Boldyš, J. Dvořák (2011): Weight correction of applied ^{18}F -FDG activity for PET examination, research report (in Czech), PET center of Na Homolce Hospital, Prague.

J. Boldyš, J. Dvořák, O. Bělohávek, M. Skopalová (2011): Monte Carlo simulation of PET images for injection dose optimization. *Computational Vision and Medical Image Processing: VipIMAGE 2011*. Editors J.M.R.S. Tavares and R.M. Natal Jorge. Taylor and Francis, London.

J. Dvořák, P. Kříž, V. Skubanič (2009): Simulace jednofrontového systému GI/GI/N v programu R (Simulation of a single queue system GI/GI/N in the R environment), *Informační Bullentin České statistické společnosti (Information Bullentin of the Czech statistical society)*, 20 (3), 1–12.

Doctoral thesis

Statistical inference for spatial and space-time Cox point processes (2014, MFF UK, Prague), under supervision of RNDr. Michaela Prokešová, Ph.D.

Diploma thesis

Influence of injection dose and body parameters on PET image quality by means of Monte Carlo simulations (2010, MFF UK, Prague), under supervision of Mgr. Jiří Boldyš, Ph.D.

List of given talks

Seminar on Stochastic Geometry, MFF UK, 2. 5. 2017. *Log-gaussovské Coxovy bodové procesy s komplikovanou nehomogenitou v intenzitě a interakcích (Quick inference for complex Cox process models with different types of inhomogeneity and aggregation).*

Friday seminar, Department of Image Processing, UTIA AS CR, 17. 2. 2017. *Functional ANOVA testing.*

Workshop Stochastika 2017, Kohútka, 7. 2. 2017. *On efficient evaluation of certain integrals appearing in the moment estimation methods for point processes.*

Probabilistic and statistical models, Prague, Czech Republic, 11. 10. 2016. *Minimum contrast estimation for inhomogeneous space-time cluster point processes.*

ROBUST 2016, Loučná pod Desnou, 15. 9. 2016. *Metoda minimálního kontrastu pro nehomogenní časoprostorové shlukové bodové procesy (Minimum contrast estimation for inhomogeneous space-time cluster point processes).*

AU Workshop on Stochastic Geometry, Stereology and their Applications, Sandbjerg Estate, Sønderborg, Denmark, 5. – 10. 6. 2016. *Cluster reconstruction and parameter estimation for Neyman-Scott point processes.*

11th French-Danish Workshop on Spatial Statistics and Image Analysis in Biology, Rennes, France, 26. 5. 2016. *Minimum contrast estimation for inhomogeneous space-time cluster point processes.*

Friday seminar, Department of Image Processing, UTIA AS CR, 26. 2. 2016. *Finite Mixture Models and the Expectation-Maximization algorithm.*

Beseda KPMS, MFF UK, 24. 2. 2016. *Odhady mnohorozměrných gaussovských směsí a jejich použití pro nehomogenní shlukové bodové procesy (Estimation of multivariate Gaussian mixtures and their application to inhomogeneous cluster point processes).*

Seminar on Stochastic Geometry, MFF UK, 23. 2. 2016. *Poznámky k metodě minimálního kontrastu pro shlukové bodové procesy (Remarks on the method of minimum contrast for cluster point processes).*

Open day of the Faculty of Mathematics and Physics, Praha, 26. 11. 2015. *Pravděpodobnost, statistika a my (Probability, statistics and us).*

19th European Young Statisticians Meeting, Praha, 4. 9. 2015. *Model fitting for space-time point patterns using projection processes.*

Summer Maths-Physics Camp, Zadov, 21. 7. 2015. *Stereologie – jak zkoumat svět stereo (Stereology – looking into the world in a stereo way).*

18th Workshop on Stochastic Geometry, Stereology and Image Analysis, Lingen, Germany, 24. 3. 2015. *Inhomogeneous space-time point processes — model fitting without the first-order separability assumption.*

Workshop Stochastika 2015, Kohútka, 12. 2. 2015. *Parameter estimation for inhomogeneous space-time shot-noise Cox point processes: avoiding first-order separability assumptions.*

Seminar on Stochastic Geometry, MFF UK, 2. and 16. 12. 2014. *Asymptotické vlastnosti odhadů minimálním kontrastem na párovou korelační funkci pro prostorové bodové procesy (Asymptotic properties of minimum contrast estimates for spatial point processes using the pair-correlation function).*

Friday seminar, Department of Image Processing, UTIA AS CR, 7. 11. 2014. *How NOT to test your hypotheses using functional characteristics.*

Oberseminar Stochastik, Institut für Mathematik, Universität Augsburg, Augsburg, Germany, 25. 6. 2014. *Inhomogeneous space-time shot-noise Cox point processes – asymptotics for estimators based on projection processes (extended version).*

10th French-Danish Workshop on Spatial Statistics and Image Analysis in Biology, Aalborg, Denmark, 21. 5. 2014. *Inhomogeneous space-time shot-noise Cox point processes – asymptotics for estimators based on projection processes.*

11th German Probability and Statistics Days, Ulm, Germany, 5. 3. 2014. *Inhomogeneous space-time shot-noise Cox point processes – parameter estimation using projection processes.*

ROBUST 2014, Jetřichovice, 20. 1. 2014. *Časoprostorové shot-noise Coxovy bodové procesy – odhady parametrů a jejich asymptotické vlastnosti (Space-time shot-noise Cox point processes – parameter estimation and asymptotic properties).*

Seminar of the Department of Cybernetics, FEL CVUT, Prague, 9. 1. 2014. *Semi-automatic estimation of particle surface area by means of local stereology.*

Friday seminar, Department of Image Processing, UTIA AS CR, 22. 11. 2013. *The zoological garden of stochastic geometry.*

Summer Maths-Physics Camp, Nekoř, 18. 7. 2013. *Cokoliv jste si mysleli o statistice, statistika za to nemůže! (Whatever you think about statistics, it's not statistics' fault!)*

11th European Congress of Stereology and Image Analysis, Kaiserslautern, Germany, 10. 7. 2013. *On semi-automatic estimation of surface area by means of local stereology.*

17th Workshop on Stochastic Geometry, Stereology and Image Analysis, Torun, Poland, 11. 6. 2013. *Parameter estimation for inhomogeneous space-time shot-noise Cox point processes.*

Workshop Stochastika 2013, Kohútka, 30. 1. 2013. *Dvoukrokové metody odhadu pro nehomogenní shot-noise Coxovy bodové procesy (Two-step estimation methods for inhomogeneous shot-noise Cox point processes).*

Mariánská seminar, Department of Image Processing, UTIA AS CR, 16. 1. 2013. *Introduction to Kálmán filtering.*

Friday seminar, Department of Image Processing, UTIA AS CR, 19. 10. 2012. *Semi-automatic*

estimation of particle surface area by means of local stereology.

ROBUST 2012, Němčičky, 11. 9. 2012. *Časoprostorové Coxovy bodové procesy s Lévyho bází (Space-time Cox point processes with Lévy basis).*

Stereology, Spatial Statistics and Stochastic Geometry, Prague, 28. 6. 2012. *The semi-automatic surfactor.*

CSGB seminar, Department of Mathematical Sciences, Faculty of Science and Technology, Aarhus University, Aarhus, 29. 5. 2012. *On estimation of surface area by means of local stereology.*

VipIMAGE 2011, Olhão, Portugal, 13. 10. 2011. *Monte Carlo simulation of PET images for injection dose optimization.*

Week of Doctoral Students 2011, MFF UK, Prague, 31. 5. 2011. *On moment estimation methods for spatial Cox processes.*

Friday seminar, Department of Image Processing, UTIA AS CR, 1. 4. 2011. *Vlastnosti maximálně věrohodných odhadů (Properties of maximum likelihood estimates).*

Workshop Stochastika 2011, Kohútka, 3. 2. 2011. *Algoritmus Expectation-Maximization a jeho aplikace při rekonstrukci tomografických snímků (Expectation-Maximization algorithm and its application to the problem of tomographic reconstruction).*

Friday seminar, Department of Image Processing, UTIA AS CR, 10. 9. 2010. *Simulace závislosti kvality PET obrazů na dávce radiofarmak a tělesných parametrech metodou Monte Carlo (Influence of injection dose and body parameters on PET image quality by means of Monte Carlo simulations).*

Czech Summer School on Stochastic Geometry, Horská Kvilda, 23. 6. 2010. *Applications of the random field theory in medical imaging.*

Friday seminar, Department of Image Processing, UTIA AS CR, 27. 3. 2009. *Náhodná pole v analýze (medicínských) obrazů (Random fields in medical image analysis).*

Teoretický seminář chemické fyziky (Theoretical seminar of chemical physics), MFF UK, Prague, 9. 12. 2008. *Metoda PET zobrazování v lékařské diagnostice (PET imaging in medical diagnostics).*

List of poster presentations

SPIE Medical Imaging, San Diego, USA, 27. 2. – 3. 3. 2016. *Comparison of volume estimation methods for pancreatic islet cells.* Co-author, presented by Jan Švihlík.

6th EPITA Winter Symposium & 35th AIDPIT Workshop, Innsbruck, Austria, 24. – 26. 1. 2016. Topics: Pancreas, Islet Clinical, Islet Experimental, Diabetes. *Real volumes of isolated human pancreatic islets.* Co-author, presented by David Habart.

ROBUST 2014, Jetřichovice, 19. – 24. 1. 2014. *Space-time shot-noise Cox point processes – parameter estimation and asymptotic properties.*

Geometry and Physics of Spatial Random Systems, Freudenstadt, Germany, 9. – 13. 9. 2013. *Refined Parameter Estimation for Inhomogeneous Space-Time Shot-Noise Cox Point Processes.*

Summer School on Topics in Space-Time Modeling and Inference, Aalborg, Denmark, 27. – 31. 5. 2013. *Two-step Estimation Procedures for Inhomogeneous Shot-noise Cox Processes.*

Nonparametrics and Geometry, Prague, 15. – 19. 8. 2011. *Comparison of Moment Estimation Methods for Stationary Spatial Cox Processes.*

16th Workshop on Stochastic Geometry, Stereology and Image Analysis, Sandbjerg Estate, Sønderborg, Denmark, 5. – 10. 6. 2011. *Comparison of Moment Estimation Methods for Stationary Spatial Cox Processes.*

Attended workshops and conferences (no speech or poster presentation)

03/2016 – Workshop Biostatistics (Prague)

06/2012 – Ph.D. course Statistical methodology in spatial epidemiology, by Yongtao Guan (Aalborg, Denmark)

09/2011 – Summer Academy: Stochastic Analysis, Modelling and Simulation of Complex Structures (Mittelberg, Austria)

06/2011 – Summer Camp: Analysis of Spatial Point Patterns (Sandbjerg Estate, Sønderborg, Denmark)

01/2010 – Stochastická analýza a její aplikace VI (KPMS MFF UK)

01/2009 – Stochastická analýza a její aplikace V (KPMS MFF UK)

10/2008 – Hermann Otto Hirschfeld Lecture 2008 (CASE, Humboldt-Universität zu Berlin)

Foreign research stays

01/2016: Department of Management Science, School of Business Administration, University of Miami, Miami, Florida, USA.

06/2014 – 07/2014: Institut für Mathematik, Universität Augsburg, Augsburg, Germany.

01/2012 – 06/2012: Centre for Stochastic Geometry and Advanced Bioimaging, Department of Mathematical Sciences, Faculty of Science and Technology, Aarhus University, Aarhus, Denmark.

Grants (principal investigator)

Student grant GA UK no. 664313 (the grant agency of the Charles University in Prague), 2013–2014. Dvoukrokové metody odhadu pro nehomogenní shot-noise Coxovy procesy – prostorové a časoprostorové (Two-step estimation methods for inhomogeneous shot-noise Cox processes – spatial and spatio-temporal).

Grants (participating)

Czech Science Foundation, project no. GA16–03708S, 2016–2018. Prostorová geometrická statistika náhodných množin v eukleidovských prostorech (Spatial geometric statistics of random sets in Euclidean spaces). Principal investigator: prof. Lev B. Klebanov, DrSc.

Czech Science Foundation, project no. GA14-10440S, 2014–2016. Automatická analýza mikroskopických snímků Langerhansových ostrůvků (Automatic analysis of microscopy images of Islets of Langerhans). Principal investigator: Ing. Jan Švihlík, Ph.D.

Czech Science Foundation, project no. GAP201/10/0472, 2010–2014. Stochastická geometrie – nehomogenita, kótování, dynamika a stereologie (Stochastic geometry – inhomogeneity, marking, dynamics and stereology). Principal investigator: prof. RNDr. Viktor Beneš, DrSc.

Awards and scholarships

Scholarship of the Mobility Fund of the Charles University in Prague (2015) supporting the research stay in Miami.

Scholarship of the German Academic Exchange Service (DAAD) supporting the research stay in Augsburg (2014).

Outstanding student contribution award, ROBUST 2014, Jetřichovice, Czech Republic.

Student grant from the Faculty of Mathematics and Physics, Charles University in Prague, 2013–2014. Příprava materiálů v anglickém jazyce ke cvičení předmětu Teorie pravděpodobnosti 1 (NMSA333) (Preparing english materials for exercises to Probability Theory 1).

Hans Elias bursary awarded by the ISS (the International Society for Stereology) for attending the 11th European Congress of Stereology and Image Analysis, Kaiserslautern, Germany, July 2013.

2nd-3rd place in the Ph.D. student competition for the best contribution, ROBUST 2012, Němčičky, Czech Republic.

Scholarship of the Mobility Fund of the Charles University in Prague (2011) supporting the research stay in Aarhus.

Best diploma thesis 2010 award (awarded by the Dean of Faculty of Mathematics and Physics, Charles University in Prague) for the thesis *Influence of injection dose and body parameters on PET image quality by means of Monte Carlo simulations*.

Supervised bachelor theses

Adéla Nguyenová: *Projekce časoprostorových bodových procesů (Projections of space-time point processes)*, 2017, MFF UK, Prague.

Monika Camfrlová: *INAR modely časových řad (INAR time series models)*, 2017, MFF UK, Prague.

Soňa Maděričová: *Přesné obálkové testy (Exact envelope tests)*, 2017, MFF UK, Prague.

Kateřina Koňasová: *Směrová K-funkce pro stacionární bodové procesy (Alternative K-functions for stationary point processes)*, 2016, MFF UK, Prague.

Jan Moravec: *Bodové procesy na lineárních sítích (Point processes on linear networks)*, 2013, MFF UK, Prague.

Reviewed bachelor theses

Klára Čelíková: *Pokryvání kružnice náhodnými oblouky (Covering the circle by random arcs)*, 2017, MFF UK, Prague, under supervision of doc. Zbyněk Pawlas, Ph.D.

Anna Halászová: *Optimální řízení v radikálních řetězcích s diskrétním časem (Optimal control in radical chains with discrete time)*, 2017, MFF UK, Prague, under supervision of Mgr. Petr Dostál, Ph.D.

Petra Kochaniková: *Urnové modely s náhodným vracením (Urn models with stochastic replacements)*, 2016, MFF UK, Prague, under supervision of doc. Zbyněk Pawlas, Ph.D.

Boris Valter: *Vlnková transformace (Wavelet transform)*, 2015, MFF UK, Prague, under supervision of doc. RNDr. Zdeněk Hlávka, Ph.D.

Miroslav Svoboda: *Spojité procesy s kvadratickou variací (Continuous processes with quadratic variation)*, 2015, MFF UK, Prague, under supervision of Mgr. Petr Dostál, Ph.D.

Katarína Brisudová: *Neceločíselné momenty náhodných veličin (Fractional moments of random variables)*, 2014, MFF UK, Prague, under supervision of doc. RNDr. Zbyněk Pawlas, Ph.D.

Eva Kielkowská: *Bodové procesy odvozené od Poissonova procesu (Point processes derived from the Poisson process)*, 2014, MFF UK, Prague, under supervision of prof. RNDr. Viktor Beneš, DrSc.

Dominik Matula: *Náhodné trojúhelníky (Random triangles)*, 2013, MFF UK, Prague, under supervision of prof. RNDr. Jiří Anděl, DrSc.

Martin Kalaš: *Coupling a rychlost konvergence diskrétních MCMC algoritmů (Coupling and speed of convergence of discrete MCMC algorithms)*, 2011, MFF UK, Prague, under supervision of RNDr. Michaela Prokešová, Ph.D.

Reviewed diploma theses

Ivan Heda: *Modely kótovaných bodových procesů (Models of marked point processes)*, 2016, MFF UK, Prague, under supervision of doc. Zbyněk Pawlas, Ph.D.

Ladislav Starý: *Analýza výskytu extrémálních hodnot v čase a prostoru (Analysis of occurrence of extremal values in time and space)*, 2015, MFF UK, Prague, under supervision of doc. Petr Volf, CSc.

Peter Hujer: *Analýza incidence konkurujících si rizik a využití modelů kopulí (Analysis of incidence of competing risks and application of copula models)*, 2015, MFF UK, Prague, under supervision of doc. Petr Volf, CSc.

Jan Vyhnánek: *Hodnocení komplexity signálu ve zpracování zobrazení pomocí funkční magnetické rezonance (Signal complexity evaluation in the processing of functional magnetic resonance imaging)*, 2012, MFF UK, Prague, under supervision of Mgr. Jiří Boldyš, Ph.D.

Teaching

Winter term 2017/2018: Náhodné procesy 2 (Stochastic Processes 2), NMSA409, 1 class of exercises per week. Prostorová statistika (Spatial Statistics), NMST543, 1 class of exercises per week. Teorie pravděpodobnosti 2, NMSA405, 2 classes of exercises per week.

Summer term 2016/2017: Základy matematického modelování (Introduction to Mathematical Modelling), NMF310, 1 class per week + 1 class of exercises per week. Pravděpodobnostní a statistické problémy (Probabilistic and Statistical Problems), 2 classes of exercises per week.

Winter term 2016/2017: Náhodné procesy 2 (Stochastic Processes 2), NMSA409, 1 class of exercises per week. Prostorová statistika (Spatial Statistics), NMST543, 1 class of exercises per week. Teorie pravděpodobnosti 2, NMSA405, 2 classes of exercises per week.

Summer term 2015/2016: Základy matematického modelování (Introduction to Mathematical Modelling), NMF310, 1 class per week + 1 class of exercises per week. Prostorové modelování (Spatial Modelling), NMTP438, 1 class of exercises per week. Pravděpodobnostní a statistické problémy (Probabilistic and Statistical Problems), 2 classes of exercises per week.

Winter term 2015/2016: Náhodné procesy 2 (Stochastic Processes 2), NMSA409, 1 class of exercises per week. Prostorová statistika (Spatial Statistics), NMST543, 1 class of exercises per week. Teorie pravděpodobnosti 2, NMSA405, 2 classes of exercises per week.

Summer term 2014/2015: Základy matematického modelování (Introduction to Mathematical Modelling), NMF310, 1 class per week. Prostorové modelování (Spatial Modelling), NMTP438, 1 class of exercises per week. Pravděpodobnostní a statistické problémy (Probabilistic and Statistical Problems), 2 classes of exercises per week.

Winter term 2014/2015: Náhodné procesy 2 (Stochastic Processes 2), NMSA409, 1 class of exercises per week. Prostorová statistika (Spatial Statistics), NMST543, 1 class of exercises per week. Tutor for international students for the subject Probability Theory 1.

Summer term 2013/2014: Pravděpodobnostní a statistické metody (Probabilistic and Statistical Methods), NMSA160, 1 class of exercises per week.

Winter term 2013/2014: Pravděpodobnost a statistika (Probability and Statistics), NMAI059, 1 class of exercises per week. Tutor for an international student for the subject Probability Theory 1.

Summer term 2012/2013: Pravděpodobnost a matematická statistika (Probability and Mathematical Statistics), NSTP022, 1 class of exercises per week.

Winter term 2012/2013: Pravděpodobnost a statistika (Probability and Statistics), NMAI059, 1 class of exercises per week.

Summer term 2010/2011: Pravděpodobnost a matematická statistika (Probability and Mathematical Statistics), NSTP022, 1 class of exercises per week.

Society membership and related activities

Member of the Local Organizing Committee of the conference Stereology, Spatial Statistics and Stochastic Geometry 2018.

Member of the Editorial board of the journal *Applications of Mathematics* (2017 – today)

Member of the Editorial board of the journal *Pokroky matematiky, fyziky a astronomie* (2016 – today)

The Union of Czech Mathematicians and Physicists (2015 – today)

Bernoulli Society for Mathematical Statistics and Probability (2011 – 2014)