Anna Melnykova

Last updated: June 25, 2020

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Born on 28 February 1994 in Kiev, Ukraine.
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Currently, I hold a position of a teaching and research assistant (ATER) in Grenoble INP. Prior to that, I was a PhD student in Paris Cergy Université. My research interests include statistical and numerical methods for stochastic diffusions with degenerate variance coefficient and, more recently, point processes in modeling of biological phenomena. In particular, I work on parametric inference, approximation schemes and hypothesis testing. On applied level, I am interested in stochastic models arising in biology and neuroscience.

Language proficiency:
English (fluent)
French (advanced)
German (advanced)
Russian, **Ukrainian** (native)

Programming language proficiency:
R: `RCpp`, `RMarkdown`
Python: `numpy`, `scipy`, `pelican`
Notions of **Julia**, **MatLab** and **Mathematica**
LaTeX, Markdown, `vim`

Academic curriculum

2020–2021 ATER at ENSIMAG — Grenoble INP
Principal teaching: Probability and Statistics. Courses are given in French and English.

2017–2020 PhD candidate in Mathematics — Cergy Paris Université
Subject: Statistics for Neuroscience.
Supervisors: Eva Löcherbach (Sorbonne Université), Adeline Samson (Université Grenoble Alpes)

2016–2017 M.Sc. in Statistics — Université Grenoble Alpes
Thesis: Parametric estimation techniques in hypoelliptic ergodic diffusions.
Supervisor: Adeline Samson (Université Grenoble Alpes)

2014–2016 M.Sc. in Mathematics — National Technical University of Ukraine
Thesis: Asymptotic behaviour of solutions of SDEs.
Supervisor: Oleg Klesov (NTUU "KPI")

2015–2016 Exchange student in Financial Mathematics — University of Ulm
During my stay I was also employed by University of Ulm as a teacher assistant (*"Studentische Hilfskraft"*) at the undergraduate course *"Höhere Mathematik I für Physiker"*.

Scholarships & Grants

2019 "Research in Pairs" grant from Oberwolfach research center
Jointly with Irene Tubikanec (JKU Linz, Austria)

2018 Travel grant to a Master Class organized by Henri Lebesgue Centre in Angers

2018 "Young Researcher" grant for participation in CEMRACS research session

2016 IDEX Academical Excellence Scholarship for international Master students

2015 Baden-Württemberg Stiftung Scholarship for exchange students

Schools & Formations during PhD

2018 Masterclass on Ergodicity of Stochastic Processes — Angers, France
Markov processes • Coupling Methods • Functional Inequalities • Gibbs sampling • Quasi-Stationary Distributions

2018 Health Data Challenge — Aussois, France
Matrix factorization • deconvolution methods • tumor heterogeneity in cancer research

2018 CEMRACS 2018 (summer school + 5 weeks research session) — Luminy, France
Horizontal gene transfer in bacteria populations • Numerical simulation of birth and death process • Hamilton-Jacobi PDE • Asymptotic-preserving numerical scheme

2017 Winter School on Deterministic and Stochastic models in Neuroscience — Toulouse, France
Mean field models • neural field equations • numerical methods • kinetic models of neuronal networks

Talks

Conferences

Sept. 2020 DynStoch 2020 — Aarhus, Denmark
Theoretical analysis and simulation methods of Hawkes processes with Erlang memory kernels

Aug. 2019 Conference on Stochastic Analysis and Applications **(invited)** — Risør, Norway
Statistical testing of the covariance matrix rank in multidimensional neuronal models

June 2019 DynStoch 2019 — Delft, Netherlands
Statistical testing of the covariance matrix rank in multidimensional neuronal models

June 2019 51èmes Journées de Statistique — Nancy, France
Statistical testing of the covariance matrix rank in multidimensional neuronal models

Sept. 2018 Stochastic Equations, Limit Theorems and Statistics of Stochastic Processes — Kiev, Ukraine
Statistical challenges in Neuroscience

June 2018 DynStoch 2018 — Porto, Portugal
Parametric inference for multidimensional hypoelliptic diffusion

May 2018 50èmes Journées de Statistique — Paris Saclay, France
Parametric inference for multidimensional hypoelliptic diffusion

Seminars & Working groups:

Nov. 2019 Demi-journée des doctorants — Grenoble, France
Estimation in a multi-class system of interacting neurons

Nov. 2019 Seminar of LJAD team — Nice, France
Concentration inequalities for a covariance rank estimation in multidimensional neuronal models

Sep. 2019 Seminar of SAMM team, Sorbonne Université — Paris, France
Parameter estimation in hypoelliptic ergodic diffusion with full observations

April 2019 Seminaire du departement DATA — Grenoble, France
Statistical testing of the covariance matrix rank in multidimensional neuronal models

Nov. 2018 Demi-journée des doctorants — Grenoble, France
Parametric inference for multidimensional hypoelliptic diffusion

Nov. 2018 Groupe de Travail Math-Bio — Grenoble, France
Horizontal Gene Transfer: numerical comparison between stochastic and deterministic approach

Various:

March-May 2019 2 lectures at Probability Reading Group — LJK, Grenoble
1st: *Construction of the Lebesgue Integral*
2d: *Ergodicity for dynamical systems*

Scientific stays

Jan. 2020	2 weeks stay to work with Irene Tubikanec	Oberwolfach, Germany
Oct. 2019	2 weeks stay to work with Susanne Ditlevsen	Copenhagen, Denmark
2019	Several short stays to work with Patricia Reynaud-Bouret	Nice, France

Teaching

2020-2021	*Soutien en probabilité et statistique*	1A in ENSIMAG	9h, CM
	Probabilités appliquées	1A in ENSIMAG	36h, TD
	Probabilités appliquées (pour le cursus en alternance)	2A in ENSIMAG	18h, CTD
	Modèles probabilistes pour l'apprentissage	2A in ENSIMAG	18h, TD
	Principe et méthodes statistiques	1A in ENSIMAG	36h, TD
	Statistical analysis and document mining	2A & M1	20h, CM+TD/TP
	Informatique et Evaluation de performance		
2018-2020	*Méthodes statistiques pour la biologie*	L3 in UFR IM2AG	36h/an, TP
	Statistiques et Probabilités Inférentielles	L2 in UFR Science et Économie	20h/an, TD

Various organizational activities

2019 *Congrès MATh.en.JEANS 2019* — Grenoble, France
Member of local [volunteering] organizing committee

Publications

2020 **A. Melnykova** *"Parametric inference for hypoelliptic ergodic diffusions with full observations"* (to appear in S*tatistical Inference for Stochastic Processes*)

V. Calvez, S.F. Iglesias, H. Hivert, S. Méléard, **A. Melnykova**, S. Nordmann "*Horizontal gene transfer: numerical comparison between stochastic and deterministic approaches*" ESAIM: ProcS, 67 (2020), 135-160, DOI: https://doi.org/10.1051/proc/202067009

Submitted:

2020 J. Chevallier, **A. Melnykova**, I. Tubikanec *"Theoretical analysis and simulation methods for Hawkes processes and their diffusion approximation"*

In preparation:

2020 **A. Melnykova**, P. Reynaud-Bouret, A. Samson "Concentration inequalities for an estimator of covariance matrix rank in neuronal models"

2021 S. Ditlevsen, **A. Melnykova**, A. Samson "Estimation in a multi-class systems of interacting neurons"