# Anna Melnykova

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Born on 28 February 1994 in Kiev, Ukraine.
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I am Associate Professor (Maître de Conférences) in the University of Avignon, attached to Statistics team of Laboratoire de Mathematiques d'Avignon (LMA). My research interests include statistical and numerical methods for stochastic diffusions with degenerate variance coefficient and, more recently, Hawkes processes. I work on parametric estimation, stochastic modeling and simulation methods.


**Keywords**: Statistics for stochastic diffusions • hypoelliptic diffusions • Hawkes processes • parametric inference • hypothesis testing • approximation schemes • numerical methods


*Language proficiency:*
**English**
**French**
**German**
**Russian, Ukrainian**

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

## Academic curriculum

**Since 2021** — Associate Professor — Université d'Avignon
Teaching: UFR STS, Research: LMA (Statistics Team)

**2020–2021** — ATER at ENSIMAG — Grenoble INP
Principal teaching: Probability and Statistics. Courses are given in French (for first and second year students of ENSIMAG) and English (for international master students).

**2017–2020** — PhD in Mathematics — Cergy Paris Université
**Subject**: Statistical and numerical analysis of jump and diffusion processes in biology.
**Supervisors**: Eva Löcherbach (Sorbonne Université), Adeline Samson (Université Grenoble Alpes)
Thesis is defended on 8th of December 2020 in front of a jury composed of Antoine Lejay and Arnaud Gloter (rapporteurs), Magalie Fromont-Renoir, Evelyn Buckwar, Eva Löcherbach and Adeline Samson (examinators)

**2016–2017** — M.Sc. in Applied Mathematics — 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

| | | |
|---|---|---|
| **July 2021** | Journées de Hawkes **(invité)** | IHP, Paris, France |
| **June 2021** | International Conference on Mathematical Neuroscience 2021 **(invité, minisimposium)** | en ligne |
| **June 2021** | 52èmes Journées de Statistique | en ligne |
| **Aug. 2019** | Conference on Stochastic Analysis and Applications **(invited)** | Risør, Norway |
| **June 2019** | DynStoch 2019 | Delft, Netherlands |
| **June 2019** | 51èmes Journées de Statistique | Nancy, France |
| **Sept. 2018** | Stochastic Equations, Limit Theorems and Statistics of Stochastic Processes | Kiev, Ukraine |
| **June 2018** | DynStoch 2018 | Porto, Portugal |
| **May 2018** | 50èmes Journées de Statistique | Paris Saclay, France |

## Seminars & Working groups:

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|---|---|---|
| **Sep. 2021** | Seminaire d’équipe Proba-Stat | Paris-Dauphine, France |
| **Mars 2021** | Seminaire d’équipe Proba-Stat | Lille, France |
| **Mars 2021** | Seminaire d’équipe Proba-Stat | Marne-la-Vallée, France |
| **Jan. 2021** | Seminaire d’équipe PASTA | Inria Nancy, France |
| **Jan. 2021** | Seminaire d’équipe LMA | Poitiers, France |
| **Nov. 2019** | Demi-journée des doctorants | Grenoble, France |
| **Nov. 2019** | Seminar of LJAD team | Nice, France |
| **Sep. 2019** | Seminar of SAMM team, Sorbonne Université | Paris, France |
| **April 2019** | Seminaire du departement DATA | Grenoble, France |
| **Nov. 2018** | Demi-journée des doctorants | Grenoble, France |
| **Nov. 2018** | Groupe de Travail Math-Bio | Grenoble, France |

# Scientific stays

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|---|---|---|
| **Aug. 2021** | 2 weeks stay to work with Irene Tubikanec | Linz, Austria |
| **Jan. 2020** | 2 weeks stay to work with Irene Tubikanec | Oberwolfach, Germany |

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| 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

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|---|---|---|---|
| 2020-2021 | *Soutien en probabilité et statistique* | 1A in ENSIMAG | 9h, TD |
| | *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 |
| | *Applied Probability and Statistics* | Master 1 | 18h, TD |
| | *Principe et méthodes statistiques* | 1A in ENSIMAG | 36h, TD |
| | *Statistical analysis and document mining* | Master 1 | 20h, CM/TD |
| | *Méthodes Numériques de Base* | 2A in ENSIMAG | 18h, TD |
| 2018-2020 | *Méthodes statistiques pour la biologie* | L3 in UFR IM2AG | 36h/an, TP |
| | Basics of R • Confidence intervals • Hypothesis testing • Data Visualisation | | |
| | *Statistiques et Probabilités Inférentielles* | L2 in UFR Science et Économie | 20h/an, TD |
| | Point estimations • Confidence intervals • Hypothesis testing | | |

# Various organizational activities

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|---|---|---|
| 2019 | *Congrès MATh.en.JEANS 2019*<br>Member of local [volunteering] organizing committee | Grenoble, France |
| 2019 | Co-animation of *Probability reading group* (organizer: J. Chevallier)<br>Lecturer on Measure Theory and Ergodicity for dynamical systems. | Grenoble, France |

# Publications

2020 **A. Melnykova** *"Parametric inference for hypoelliptic ergodic diffusions with full observations"* Statistical Inference for Stochastic Processes, 23 (2020), 595-635, DOI: https://doi.org/10.1007/s11203-020-09222-4)

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

J. Chevallier, **A. Melnykova**, I. Tubikanec *"Theoretical analysis and simulation methods for Hawkes processes and their diffusion approximation"* (to appear in Advances of Applied Probability) https://doi.org/10.14760/OWP-2020-09

## 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"