

SERGEY DOVGAL

EMAIL: dovgal.alea@gmail.com

WEBPAGE: <https://electric-tric.github.io/>

PHONE NUMBER: +33617575898

BIRTHPLACE AND DATE: Belarus | 06.01.1993

ACADEMIC CAREER

2020–2021 **Postdoctoral research associate** at LaBRI, Bordeaux : full-time research position

2019–2020 **A.T.E.R.** associate at Institut Galilée, University Sorbonne Paris Nord (former University Paris 13): 192 hours of teaching, part-time research position

2016–2019 **Ph.D.** at University Paris 13

THESIS: AN INTERDISCIPLINARY IMAGE OF ANALYTIC COMBINATORICS

FACILITY: Laboratoire d'Informatique de Paris Nord

ADVISORS: Olivier Bodini and Vlady Ravelomanana

REFEREES: Éric Fusy, Valeriy Liskovets, Konstantinos Panagiotou

JURY: Mireille Bousquet-Mélou, Éric Fusy, Andrea Sportiello, Brigitte Vallée

2014–2016 **Master Thesis** at Moscow Institute of Physics and Technology

THESIS: FISHER AND WILKS THEOREMS FOR LOCAL LOG-DENSITY ESTIMATION

ADVISOR: Vladimir Spokoiny

2010–2014 **Bachelor Thesis** at Moscow Institute of Physics and Technology

THESIS: BOOTSTRAP CREDIBLE SETS FOR LOCAL MAXIMUM LIKELIHOOD

ADVISOR: Evgeny Burnaev and Vladimir Spokoiny

OTHER EMPLOYMENTS AND EDUCATION

2018–2019 **Teaching assistant** at Institut Galilée, University Paris 13

2014–2016 **Junior researcher** at Institute for Information Transmission Problems, Moscow

2014–2016 **Teaching assistant**, Moscow Institute of Physics and Technology, Department of Mathematical Foundations of Control

2013–2016 **Student** at Yandex School of Data Analysis, Moscow

DISTINCTIONS AND AWARDS, PRIZES, COMPETITIONS

2012 **Ivanilov student scholarship** – an award for distinguished faculty students. This award is given to one student per course every year at the faculty of Control and Applied Mathematics at Moscow Institute of Physics and Technology.

2009 **Silver medal** at International Mathematical Olympiad for High School Students.

2010 **Bronze medal** at International Mathematical Olympiad for High School Students.

2011 **Winner's award** at MIPT Discrete Mathematics Olympiad.

2012 **Third place** at intercollegiate all-russian Mathematical Olympiad in MIPT.

2012 **Top 12%** at semi-finals of ACM ICPC in St.Petersburg (26-th place/229 teams)

RESEARCH AND PUBLICATIONS

JOURNAL PUBLICATIONS

TITLE **Statistical properties of lambda-terms**
AUTHORS Maciej Bendkowski, Olivier Bodini, Sergey Dovgal
JOURNAL Electronic Journal of Combinatorics P4.1

CONFERENCE PROCEEDINGS

TITLE **Counting directed acyclic and elementary digraphs**
AUTHORS Élie de Panafieu, Sergey Dovgal
CONFERENCE Formal Power Series and Algebraic Combinatorics (FPSAC) 2020
PUBLISHED Séminaire Lotharingien de Combinatoire, 84B (2020)

TITLE **Symbolic method and directed graph enumeration**
AUTHORS Élie de Panafieu, Sergey Dovgal
CONFERENCE EUROCOMB 2019
PUBLISHED Acta Mathematica Universitatis Comenianae, 88(3), 989–996

TITLE **Shifting the phase transition threshold for random graphs using degree set constraints**
AUTHORS Sergey Dovgal, Vlady Ravelomanana
CONFERENCE Latin American Symposium on Theoretical Informatics (LATIN) 2018

TITLE **Polynomial tuning of multiparametric combinatorial samplers**
AUTHORS Maciej Bendkowski, Olivier Bodini, Sergey Dovgal
CONFERENCE Workshop on Analytic Algorithmics and Combinatorics (ANALCO) 2018

TITLE **Asymptotic distribution of parameters in random maps**
AUTHORS Olivier Bodini, Julien Courtiel, Sergey Dovgal, Hsien-Kuei Hwang
CONFERENCE International Conference on Probabilistic, Combinatorial and Asymptotic Methods for the Analysis of Algorithms (AofA) 2018
PUBLISHED Leibniz International Proceedings in Informatics (LIPIcs), 13:1–13:12

PREPRINTS

TITLE **The birth of the strong components**
AUTHORS Élie de Panafieu, Sergey Dovgal, Dimbinaina Ralaivaosaona, Vonjy Rasendrasahina, and Stephan Wagner
DATE September 2020

TITLE **Tuning as convex optimisation: a polynomial tuner for multi-parametric combinatorial samplers**
AUTHORS Maciej Bendkowski, Olivier Bodini, Sergey Dovgal
DATE February 2020
COMMENT An extended version of the conference paper “Polynomial tuning of multiparametric combinatorial samplers”.

TITLE **The birth of the contradictory component in random 2-SAT**
AUTHOR Sergey Dovgal
DATE April 2019

TRAVEL GRANTS

STIC AMSUD Randomness and Probabilistic Analysis of Algorithms: Argentina, France, RAPA2 Uruguay (2020-2021). Funds for travel and accomodation for short research visits. Under coordination of Véronica Becher, Loick Lhote and Alfredo Viola.

TEACHING AND PEDAGOGICAL EXPERIENCE

UNIVERSITY SORBONNE PARIS NORD

All the teaching in University Paris 13 / University Sorbonne Paris Nord was in French. Each course lasts one semester and contains a final written exam, and one or two intermediate exams, possibly combined with one or two assigned homeworks. My experience amounts to teaching (on average) 8 hours per week, 12 weeks per semester for two semesters: $8 \times 12 \times 2 = 192$ hours + additional **20** hours during 2018–2019.

TITLE	Compilation	TITLE	Advanced Data Structures
LEVEL	Master I	LEVEL	Master I
ACTIVITY	Computer Practice	ACTIVITY	Computer Practice, Exercise Classes
POPULATION	~20 students	POPULATION	~20 students
LANGUAGES	OCaml, C, Java	LANGUAGES	C, Python, Java
TITLE	Introduction to Algorithms	TITLE	Security
LEVEL	Master I	LEVEL	Master I
POPULATION	~30 students	POPULATION	~30 students
ACTIVITY	Exercise Classes	ACTIVITY	Exercise Classes
TITLE	Algorithms	TITLE	Introduction to Scientific Calculus
LEVEL	Cours Préparatoire II	LEVEL	Bachelor II for Engineers
POPULATION	~20 students	POPULATION	~15 students
ACTIVITY	Computer Practice, Exercise Classes	ACTIVITY	Exercise Classes
LANGUAGE	C	LANGUAGE	Matlab/Octave
TITLE	Algorithms and data structures	TITLE	Programming
LEVEL	Bachelor II	LEVEL	Bachelor I
POPULATION	~20 students	POPULATION	~35 students
ACTIVITY	Computer Practice	ACTIVITY	Exercise Classes and Computer Practice
CONTROL	Written exam, project	CONTROL	Mini-tests and written exam
LANGUAGE	C	LANGUAGE	C
TITLE	Functional Programming	TITLE	Logic
LEVEL	Bachelor II	LEVEL	Bachelor I
POPULATION	~20 students	POPULATION	~25 students
ACTIVITY	Exercise Classes and Computer Practice	ACTIVITY	Exercise Classes
LANGUAGE	OCaml		

TITLE **Algebraic specifications and software testing**
 LEVEL Bachelor II
 POPULATION ~50 students
 ACTIVITY Seminars
 LANGUAGE Common Algebraic Specification Language (CASL)

MOSCOW INSTITUTE OF PHYSICS AND TECHNOLOGY

MIPT has a unique experience of giving selected Master Students an opportunity to teach Bachelor Students. In some very exceptional cases they can also teach “elective courses”. Passing such optional courses also has an extra positive credit. The teaching is in Russian. The total teaching load is 9 semester courses, 12 hours each, resulting in $9 \times 12 = 108$ hours.

TITLE **Discrete Mathematics**
 LEVEL Bachelor I
 POPULATION ~20 students
 ACTIVITY Seminars
 CONTROL Homework + mini-exams
 + oral test
 DATE 2014–2016

TITLE **Algebra, Group Theory,
Coding Theory**
 LEVEL Bachelor I
 POPULATION ~20 students
 ACTIVITY Seminars
 CONTROL Written exam + homework credits
 DATE 2015–2016

TITLE **Optimisation**
 POPULATION ~20 students
 LEVEL Bachelor III
 ACTIVITY Seminars
 CONTROL Oral exam
 DATE 2015–2016

TITLE **Enumerative Combinatorics**
 POPULATION 3~5 students
 LEVEL Bachelor III (elective course)
 ACTIVITY Seminars
 CONTROL Written exam
 DATE 2016–2017

TITLE **Advanced topics of
functional analysis**
 LEVEL Bachelor I-III (elective course)
 POPULATION 3~5 students
 ACTIVITY Seminars
 CONTROL Written assignments
 DATE 2014–2015

TITLE **Acoustics and Music Theory**
 LEVEL For everyone (elective course)
 POPULATION 10~50 students
 ACTIVITY Seminars
 CONTROL Project
 DATE 2013–2016

VIDEO AND SUPPLEMENTARY MATERIALS

- During the second semester of 2020-2021 I have recorded several videos for the students of the University Sorbonne Paris Nord covering topics from **logic and lambda calculus**¹.
- More supplementary materials (tutorials, solutions to exercises, old archives) can be found on my personal website².
- Prior to that, I have recorded short videos for the elective course on **Enumerative Combinatorics**³ and has recorded a popular science explanation of my research domain⁴ (in Russian).

¹<https://www.youtube.com/watch?v=114InelfLZI&list=PLHqbWVnDLbsEOaYjpbz49CSDHIFe1xxzq>

²<https://electric-tric.github.io/teaching.html>

³<https://www.youtube.com/watch?v=y0MuyV9brXs&list=PLHqbWVnDLbsHJRj095gAI2aZ33WG4E6aA>

⁴https://www.youtube.com/watch?v=E4fvXP0ck_k

- The full course on **Acoustic and Music Theory** (in Russian) has been videorecorded in 2014⁵.

SUPERVISION AND TUTORSHIP

TITLE	Monitoring of the COVID-19 disease in the Montpellier university hospital
AUTHOR	Nelson Botero Giraldo
LEVEL	Master II
YEAR	2020
ROLE	Tutorship
ADVISOR	Rémi Griveau
INSTITUTE	University Sorbonne Paris Nord, Villetaneuse
TITLE	Stability of clustering
AUTHOR	Lada Tokmakova
LEVEL	Master I
YEAR	2016
ROLE	Assistant supervision with Maxim Panov as main supervisor
INSTITUTE	Higher School of Economics, Moscow

PEDAGOGICAL EDUCATION

TITLE	Teaching mathematics at the beginning of bachelor studies
DURATION	9 hours
INSTITUTE	University Paris Diderot
TITLE	Teaching survival kit / interactive approach to teaching
DURATION	12 hours
INSTITUTE	University Sorbonne Paris Nord

OTHER PEDAGOGICAL ACTIVITIES

TITLE	School Olympiad Corner
DATE	2012–2015
LOCATION	School-Lyceum no.5, Dolgoprudny, Russia

Summer Ecological School (LESh) is an educational project organised by various students originating mostly in Russia. The camp is situated in the countryside, and dedicated for pupils of 12-15 years old. While living in the nature, pupils receive lessons in an informal atmosphere on advanced concepts from mathematics, physics, robotics and programming, biology, chemistry. Each course is followed by an exam. Typically there are very few students (around 2-3 per discipline), and they are pre-selected.

TITLE	Generating functions and their application to combinatorics
DATE	2013
DURATION	4 sessions
LOCATION	Summer ecological school for pupils

⁵<https://www.youtube.com/playlist?list=PLHqbWVnDLbsEG4kbf-58M5uQgVWAvc7m>

TITLE **Mathematical foundations of cryptography and complexity analysis**
DATE 2014
DURATION 4 sessions
LOCATION Summer ecological school for pupils

Summary. Total of more than \sim **450** hours of teaching (university, summer schools, etc)

SOFTWARE AND OPEN SOURCE PROJECTS

- PAGANINI A lightweight Python library for tuning multiparametric combinatorial specifications: proof-of-concept implementation of the first provable polynomial algorithm for multiparametric tuning. Accompanies the paper *Tuning as convex optimisation: a polynomial tuner for multi-parametric combinatorial samplers* with Maciej Bendkowski and Olivier Bodini.
<https://github.com/maciej-bendkowski/paganini>
The documentation for our code is available at
<https://paganini.readthedocs.io/en/latest/tutorial.html>
- BOLTZMANN BRAIN A Haskell library and standalone application meant for random generation of combinatorial structures. It extends Paganini for multiparametric random generation.
<https://github.com/maciej-bendkowski/boltzmann-brain>
- STRONG COMPONENT NOTEBOOKS IPython notebooks for symbolic computations, numerical simulations, numerical values of the integrals of the Airy functions, accompanying a recent paper *The birth of the strong components* with Élie de Panafieu, Dimbinaina Ralaivaosaona, Vonjy Rasendrasahina, and Stephan Wagner.
<https://gitlab.com/vit.north/strong-components-aux>

RECENT TALKS

- 18.03.2021 *The symbolic method for 2-SAT* at ALEA days 2021 (online)
- 21.09.2020 *The birth of the strong components* at Séminaire Combinatoire Énumérative et Algébrique, LaBRI^a
^a<https://visio.u-bordeaux.fr/playback/presentation/2.0/playback.html?meetingId=bfe00d5046e9d24d0c256a9acfb841c176461c85-1600675771035>
- 08.07.2020 *Counting directed acyclic and elementary digraphs*. FPSAC 2020 (online poster session)
- 03.03.2020 *Subcritical phases of random structures* at Combinatorics and Interactions Seminar, Institut Henri Poincaré
- 30.08.2019 *Symbolic method for directed graphs* at EUROCOMB 2019, Bratislava
- 13.03.2019 *Multiparametric Boltzmann sampling and applications* at LINCS, Bell Labs^a
^a<https://youtu.be/ozMVPG8T6KM>
- 26.02.2019 *Boltzmann samplers and beyond*. Survey board talk, GREYC, Caen

LANGUAGES

RUSSIAN	native	ENGLISH	intermediate
FRENCH	intermediate	GERMAN	basic reading skills