ALENA KOPANIČÁKOVÁ

MAÎTRESSE DE CONFÉRENCES, TOULOUSE-INP (ENSEEIHT)

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Personal information

Nationality	Slovak
Family status	Single
Address	Toulouse, France

Employment history

09/2024 –	**Maîtresse de conférences, Section 26 (Associate Professor in Applied Mathematics), Toulouse-INP (ENSEEIHT)**
Toulouse, France	Institute de Recherche en Informatique de Toulouse (IRIT) - APO Team
07/2024– Toulouse, France	**International Chair of Hybridizing AI and Large-scale Simulations for Engineering Design, Artificial and Natural Intelligence Toulouse Institute (ANITI)** Co-chairs: M. Bauerheim (ISAE-SUPAERO), P. Novello (IRT Saint-Exupéry)
06/2022 – 05/2024 Providence, USA	**Researcher, Division of Applied Mathematics, Brown University** Realized via a grant from Swiss National Science Foundation, Host: Prof. G. Karniadakis *Research areas:* Multilevel and domain decomposition methods for scientific machine learning (physics-informed networks, operator learning approaches)
06/2022 – Remote	**Scientific collaborator, Euler Institute, Università della Svizzera italiana (USI), Mandate contract, 20%** *Research areas:* Large scale coupled simulations of fracture in sedimentary rocks
02/2021 – 05/2022 Lugano, Switzerland	**Post-doctoral Researcher, Euler Institute, USI** *Research areas:* Multilevel methods for ODE-based neural networks
10/2015 – 1/2021 Lugano, Switzerland	**Research Assistant, Institute of Computational Science, USI** *Research areas:* Non-convex multilevel minimization
07/2017 – 12/2017 Los Angeles, USA	**Research Intern, Walt Disney Animation Studios** *Research areas:* Subdivision-surfaces and multiscale framework for cloth simulations
06/2015 – 09/2015 Lugano, Switzerland	**Student Assistant, Institute of Computational Science, USI** *Research areas:* Globalized domain-decomposition algorithms

Education

10/2015 – 11/2020 Lugano, Switzerland	**PhD in Computational Science (Awarded by USI)** Thesis: *Multilevel minimization in trust-region framework - Algorithmic and software developments.* Advisor: Prof. R. Krause
09/2013 – 07/2015	**Master of Science in Informatics (Awarded by USI)** 08/2014 – 07/2015 Master of Science in Informatics, USI

02/2014 – 07/2014	Erasmus exchange program, USI
09/2013 – 08/2014	Master of Artificial Intelligence, Technical University of Košice

Thesis: *Investigating Optimization Strategies for Quadratic Programming Components of a Data Analysis Framework.* Advisor: Prof. I. Horenko

09/2010 – 07/2013	**Bachelor of Business for Informatics (Awarded by Technical University of Košice)**
Košice, Slovakia	Thesis: *Data analysis of an emotion recognition system.* Advisor: Prof. P. Sinčák

Acquired funding and resources

Third-party funding:

11/2024 –	STAML: Scalable Training Algorithms for Machine Learning, Call: Emergences, Transversalités et International (ETI), Toulouse-INP, 1 year, PI, approx. 15 000 EUR
07/2024 –	Hybridization of Nonlinear Multiscale Solution Strategies for Large-Scale Multiphysics Applications, Swiss National Science Foundation, 1 year, PI, Forfeited due to joining Toulouse-INP, approx. 123 000 CHF
07/2024 –	Hybridizing AI and Large-scale Simulations for Engineering Design, A seed funding for an International Chair, ANITI, 4 years, PI, approx. 230 000 EUR
06/2022 –	Multilevel training of DeepONets - multiscale and multiphysics applications, Swiss National Science Foundation, Postdoc-Mobility grant, 2 years, PI, approx. 115 000 CHF

Computational resources:

10/2024 –	Parallel training algorithms for scientific machine learning, 40 000 GPU computing hours on Jean Zay

Teaching activities and supervision of junior researchers

ENSEEIHT, France:

2024/2025	Teaching load of 96 hours (50% reduction for new recruits)

USI, Switzerland:

In the spring semester of 2022, I served as substitute lecturer for "Solution and Optimization Methods for Large Scale Problems" class (MSc/PhD).
Moreover, during my PhD studies, I served as a teaching assistant and substitute lecturer for the following lectures:

02/2019 – 07/2019	Solution and Optimization Methods for Large Scale Problems	*MSc/PhD*
09/2018 – 01/2019	Calculus	*BSc*
08/2018	Functional and Numerical Analysis	*MSc/PhD, block course*
02/2018 – 07/2018	Multiscale methods	*MSc/PhD*
02/2017 – 07/2017	Optimization methods	*BSc*
09/2016 – 01/2017	Enterprise Resource Planning	*MSc*

Supervision of junior researchers:

List of co-supervised PhD students (PhD in Informatics/Computational Science/Applied Mathematics):

04/2025 –	Aymane Kssim (Toulouse-INP/ANITI), *Parallel training algorithms for scientific machine-learning*, together with S. Gratton (ANITI/Toulouse-INP)
05/2024 –	Marc Salvadó (USI/Universitat Politècnica de Catalunya), *Parallel approaches for scientific machine-learning*, together with R. Krause (KAUST)
01/2022 –	Samuel Cruz (USI), *Domain-decomposition methods for machine-learning*, together with R. Krause (KAUST)

List of co-supervised Master theses (MSc in Computational Science/Mathematics):

09/2024 –	Laurynas Varnas, *Decomposing Graph Neural Networks (USI)*, together with R. Krause (KAUST), and A. Heinlein (TU Delft)
01/2023 – 02/2024	Marc Salvadó(USI), *Multilevel approaches to enhance the training of transformer models*, together with R. Krause (USI) *(10/10)*
09/2021 – 03/2022	Andrea Angino (USI/Insubria), *Knight descent - a parallel stochastic method for non-linear*

	optimization problems, together with R. Krause (USI), and M. Donatelli (Insubria) *(10/10)*
09/2019 – 09/2020	Samuel Cruz (USI), *Learning multilevel hierarchies*, together with R. Krause (USI) *(10/10)*
09/2019 – 07/2020	Vanessa Braglia (USI), *Multilevel training for neural networks*, together with Krause *(10/10)*

List of co-supervised Bachelor theses (BSc in Informatics):

09/2021 – 02/2022	Stefano Gonçalves (USI), *Implementation of a hybrid data-parallel algorithm for neural network training with reduced communication targeted to GPU-based supercomputers*, together with R. Krause (USI) *(10/10)*
09/2020 – 07/2021	Filippo Cesana (USI), *Python Front-End for Utopia with Algorithmic Implementations Related to Financial Machine Learning*, together with R. Krause (USI), and Dr. P. Zulian (USI) *(8/10)*

List of co-supervised student assistants/interns:

06/2025 –	Beya Hachicha (M1 stage, Toulouse-INP), *Extreme learning machines*
04/2025 –	Maxime Hanus (M1 stage, ESILV), *Operator learning for unstructured geometries*
03/2025 –	Mahmoud Aharmouch (M2 stage, Paul Sabatier University), *AI-enhanced nonlinear iterative methods*
02/2022 – 12/203	Marc Salvadó (USI), *Layer parallel training of large language models*, together with Prof. J. Schroder (University of New Mexico), Dr. E. Cyr (Sandia National labs)
07/2021 – 10/2021	Francesco Lacommare (ETH), *Multilevel variant of Adam optimizer*
06/2020 – 10/2021	Filippo Cesana (USI), *Python interface for UTOPIA*, together with Dr. P. Zulian (USI)
06/2020 – 05/2021	Dylan Ramelli (USI), *xSDK integration for UTOPIA*, together with Dr. P. Zulian (USI)
08/2020 – 01/2021	Nicholas Robertson (USI/EPFL), *Domain decomposition and machine learning*
06/2019 – 12/2020	Lisa Gaedke-Merzhäuser (Freie Universität Berlin/USI), *Multilevel training of deep residual networks*
01/2019 – 09/2020	Samuel Cruz (USI), *Learning multigrid transfer operators using reinforcement learning*
06/2019 – 07/2020	Vanessa Braglia (USI), *Multilevel variance reduction methods*
06/2016 – 12/2016	Eric Botter (USI), *Continous integration using CDash*

Administrative responsibilities

Memberships in scientific societies:

01/2022	Participant of Swiss Science Postdoc Council
10/2021 –	Member of Association of Applied Mathematics and Mechanics (GAMM)
09/2021 –	Member of Swiss Mathematical Society (SWISSCOMAS)
01/2019 –	Member of Society for Industrial and Applied Mathematics (SIAM)

Reviewing activities:

I have served as a reviewer for the following journals: Computer Methods in Applied Mechanics and Engineering (CMAME), Optimization Methods and Software (OMS), Numerical Linear Algebra with Applications (NLAA), SIAM Journal on Scientific Computing (SISC), Journal of Computational Physics (JCP), Applied Sciences, Journal of forecasting, and Thematic Einstein Semester (TES) Proceedings.
Some of the reviewing activities have been certified using Publons and are linked to my ORCID profile.

Organization of scientific events:

05/2025	Co-organizer of minisymposia "Advances in iterative methods for coupled problems.", at Coupled problems. Together with P. Zulian, H. Kothari, P. Benedusi, R. Krause
04/2025	Co-organizer of minisymposia "Machine learning and multilevel and domain decomposition methods.", at GAMM Annual Meeting. Together with J. Weber
07/2024	Co-organizer of minisymposia "Accelerating failure predictions through advances in scientific machine-learning and scientific computing", at WCCM/PANACM 2024. Together with S. Goswami.
06/2024	Co-organizer of minisymposia "Advancing SCiML Surrogates via Numerical Methods and Vice Versa", at ECCOMAS Congress. Together with A. Heinlein and S. Goswami.
03/2024	Co-organizer of minisymposia "Scientific machine-learning: Algorithms and Applications" at Central-European Conference on Scientific Computing (Algoritmy). Together with H. Kothari, R. Krause, S. Pezzuto.

06/2023	Co-organizer of Thematic Einstein semester workshop, "Optimization for machine learning", at Humboldt Universität zu Berlin. Together with D. Walter, A. Kannan, O. Weinstein, C. Totzeck
08/2022	Co-organizer of minisymposia "Combining the domain decomposition and the multilevel methods with machine learning approaches" at International Multigrid Conference. Together with H. Kothari.
05/2021 – 07/2021	Co-organizer, FoMICS-DADSi seminars on "Physics Informed Neural Networks." Together with P. Zulian, M. Nestola, R. Krause, S. Pezzuto, L. Gambardella.
07/2015, 2016, 2017	Student Volunteer, Platform for Advanced Scientific Computing (PASC) Conference

Prizes and awards

05/2024	ICIAM award for outstanding contributions and scientific activity, International Center for Advanced Computing in Medicine
02/2023	Selected for Rising Stars in Computational and Data Sciences event, Oden Institute for Computational Engineering and Sciences, University of Texas at Austin
09/2022	Early Career Travel Award for the SIAM Conference on Mathematics of Data Science, National Science Foundation (NSF grant DMS – 1757085)
08/2022	Travel Support Award for the International Conference on Domain Decomposition Methods (DD26)
07/2022	Women in STEM Travel Support Award for the European Solid Mechanics Conference
10/2019, 10/2018	Selected for Eurohack19/18: GPU programming hackathon week
02/2014 – 07/2014	Semester Study Abroad Award (Erasmus Exchange Program)
02/2009, 02/2010	Academic merit scholarship, Technical University of Košice

Collaborations:

02/2024 –	Prof. A. Heinlein (TU Delft, Netherlands); Topic: *Training algorithms for graph neural networks*
06/2023 – 06/2024	ANSYS (CTO Research's office, USA); Topic: *Hybridization of SciML and linear iterative methods*
10/2022 –	Prof. S. Gratton (University of Toulouse, France), Prof. Ph. L. Toint (Université de Namur, Belgium); Topic: *Multilevel objective-function-free-optimization*
09/2022 – 02/2024	Prof. T. Driesner, Dr. E. Pezzuli (ETHZ, Switzerland); Topic: *Large-scale simulations of jointing in sedimentary rocks*
06/2022 –	Prof. G. Karniadakis, Dr. S. Goswami, Dr. Y. Lee (Brown University, USA); Topic: *Scientific machine-learning (SciML)*
06/2022 –	Dr. E. Cyr (Sandia National Lab), Prof. J. Schroder (University of New Mexico); Topic: *Layer-parallel training of Transformers using multilevel reduction-in-time*
10/2018 –	Dr. A. Fadel, A. Fink (Swiss National Supercomputing Centre, Switzerland); Topic: *MPI/GPU based programming and code optimizations*
04/2018 – 12/2022	F. Chegini, Dr. M. Weiser (Zuse Institute Berlin, Germany); Topic: *Multifidelity methods for inverse problems in electro-cardiology*
10/2017 –	Dr. P. Zulian, Dr. M. Nestola, Dr. H. Kothari (USI, Switzerland); Topic: *Large-scale multiphysics simulations*
06/2018 – 09/2019	Prof. P. Deuflhard (Zuse Institute Berlin, Germany); Topic: *Affine-similar Newton's methods*
09/2016 – 12/2019	C. Bilgen, Prof. K. Weinberg (University of Siegen, Germany); Topic: *Phase-field fracture simulations*