CV Libor Barto

PERSONAL INFORMATION

ORCID ID: 0000-0002-8481-6458
Date & place of birth: 15.1.1980, Praha (Czechia)
Nationality: Czech
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EDUCATION

2015	Habilitation (algebra and number theory) with the title "Universal Algebra and the Constraint Satisfaction Problem", Charles University, Czechia
2006	PhD (supervisor: Prof. Věra Trnková), title "Full Embeddings and Their Modifications", Mathematical Institute of Charles University, Czechia
2003	Mathematics Diploma (supervisor: Prof. Věra Trnková), Charles University, Czechia

CURRENT POSITION

since 2016	Associate Professor, Department of Algebra, Faculty of Mathematics and Physics, Charles University, Czechia

PREVIOUS POSITIONS

2010–2012	Postdoc position, Department of Mathematics and Statistics, McMaster University, Canada
2007–2015	Assistant Professor, Charles University, Czechia
2007, 2008 (parts)	Researcher, Czech Academy of Sciences

INSTITUTIONAL RESPONSIBILITIES

since 2022	Board member of Cooperatio program "SCI - Mathematics" (program to support science and research at Charles University)
since 2018	Member of PhD study program board (algebra, number theory, logic)

PUBLICATIONS

49 research papers (journals including JACM, JEMS, SICOMP, conference proceedings including STOC, FOCS, SODA, LICS, ICALP).

564 citations without self-citations, h-index 14 according to Web of Science.

Selected papers:

- L. Barto, M. Kozik, *Combinatorial Gap Theorem and Reductions between Promise CSPs*, SODA, 1204-1220, 2022.

- L. Barto, J. Bulín, A. Krokhin, J. Opršal, *Algebraic approach to promise constraint satisfaction*, Journal of the ACM 68(4), 1-66, 2021.

- L. Barto, Z. Brady, A. Bulatov, M. Kozik, D. Zhuk, *Minimal Taylor Algebras as a Common Framework for the Three Algebraic Approaches to the CSP*, LICS, 1-13, 2021.

- L. Barto and M. Pinsker, *Topology is irrelevant (in the infinite domain dichotomy conjecture for constraint satisfaction problems)*, SIAM Journal on Computing 49(2), 365-393, 2020.

- L. Barto, M. Kompatscher, M. Olšák, T. Pham, and M. Pinsker, *Equations in oligomorphic clones and the Constraint Satisfaction Problem for ω-categorical structures*, Journal of Mathematical Logic 19(2), #1950010, 2019.

- L. Barto, J. Opršal, and M. Pinsker, *The wonderland of reflections*, Israel Journal of Mathematics 223, no. 1, 363-398, 2018.

- L. Barto, *Finitely related algebras in congruence modular varieties have few subpowers*, Journal of the EMS 20(6), 1439-1471, 2018.

- L. Barto, M. Kozik, *Robustly solvable constraint satisfaction problems*, SIAM Journal on Computing 45(4), 1646-1669, 2016.

- L. Barto, M. Kozik, *Constraint satisfaction problems solvable by local consistency methods*, Journal of the ACM 61(1), 3:1-3:19, 2014.
- L. Barto, M. Kozik, T. Niven, The CSP dichotomy holds for digraphs with no sources and no sinks (a positive answer to a conjecture of Bang-Jensen and Hell), SIAM Journal on Computing 38/5, 1782-1802, 2009.

GRANT PARTICIPATION

Principal Investigator

2023–2029	ERC Synergy Grant with M. Bodirsky (TU Dresden), M. Pinsker (TU Wien), *Polynomial-time Computation: Opening the Blackboxes in Constraint Problems (POCOCOP)*, total 7.932.935 EUR
2018–2023	ERC Consolidator Grant 771005, *Symmetry in Computational Complexity (CoCoSym)*, 1.211.375 EUR
2013–2017	GAČR 18-20123S, *General algebra and its connections to computer science*, ∼250.000 EUR
2009–2011	GAČR 201/09/P223, *Constraint Satisfaction Problem and Universal Algebra*, postdoc project, ∼25.000 EUR

Team member

2018–2023	UNCE SCI/022, *Methods of Algebra and Logic*, PI J. Krajíček
2018–2020	GAČR 18-20123S, *Expanding the Scope of Universal Algebra*, PI M. Pinsker
2013–2014	7AMB 13P10 13, *General algebra and applications*, PIs D. Stanovský (MFF UK) and A. Zamojska-Dzieno (Politechnika Warszawska), Czech–Polish cooperation project
2009–2010	MEB 040915, *Graph, Grupoids and Algorithms*, PIs J. Ježek (MFF UK) and M. Maróti (University of Szeged), Czech-Hungarian cooperation project
2008-2009	MEB 050817, *An Algebraic Approach to the Constraint Satisfaction Problem*, PIs J. Tůma (MFF UK) and P. Idziak (Jagiellonian University), Czech-Polish cooperation project
2007	LC 505, Eduard Čech Center
2006-2008	GAČR 201/06/0664, *Categorical methods in structural mathematics*, PI M. Demlová (ČVUT Praha)
2002-2004	GAČR 201/02/0148, *Categorical methods in informatics and structural mathematics*, PI M. Demlová (ČVUT Praha)

AWARDS

2012	Award of the President of the Czech Science Foundation (for my postdoctoral grant GAČR 201/09/P223)
2012	The Neuron Award for Promising Young Scientists (annual award financed from private funds of benefactors)

Highschool awards

2000	first prize at International Mathematical Competition for University Students
1998	Grammar School Student Award of the Learned Society of the Czech Republic (for my results at international math olympiads)
1998	silver medal at International Mathematical Olympiad
1997	silver medal at International Mathematical Olympiad

SCIENTIFIC TALKS

Invited conference talks

25 invited talks at international conferences (23 of then plenary), 5 invited tutorials (8 talks total). Selected talks:

- *Minimal Taylor Clones*, invited plenary talk, ISMVL, Nursultan (online), 05/2021.
- *Universal Algebra: Tutorial*, invited tutorial (2 lectures), Homogeneous structures: model theory meets universal algebra, Oberwolfach, Germany (online), 01/2021
- *Algebraic Theory of Promise Constraint Satisfaction Problems, First Steps*, invited plenary talk, FCT, Copenhagen, 08/2021.
- *Constraint satisfaction problems*, invited tutorial (2 lectures), Caleidoscope : Complexity as a Kaleidoscope, Institute Henri Poincare, Paris, 06/2019.

- *Equationally nontrivial algebras*, invited plenary talk, BLAST 2016: Boolean algebras, Lattices, Algebraic Logic, Set Theory, and Topology, Vanderbilt University, Nashville, 08/2017.
- {*Symmetry, Logic, CSP*}, invited plenary talk, workshop {Symmetry, Logic, Computation}, part of the programme Logical Structures in Computation, Berkeley, 11/2016.
- *Infinite domain constraint satisfaction problem*, invited plenary talk, CSL, Marseille, 08/2016.
- *Universal algebra and the constraint satisfaction problem*, invited talk, ASL North American Annual Meeting, Boulder, 05/2014.
- *The distance from congruence distributivity to near unanimity*, invited plenary talk, GAIA: General Algebra and its Applications, Melbourne, 07/2013.
- *The Valeriote conjecture*, invited plenary talk, Conference on Universal Algebra and Lattice Theory, Szeged, 06/2012.

Invitations to research centers

Regular invitations to relevant research centers, in particular the Banff International Research Station (3 invitations), the Leibniz Zentrum für Informatik Dagstuhl (3 invitations), the Mathematisches Forschungsinstitut Oberwolfach (1 invitation; held online).

Invitations to seminars

21 invited seminar talks at other scientific institutions, including CU Boulder, Fields Institute, McMaster University, Paris 7, TU Wien, University of Denver, University of Newcastle (online), CSP Online Seminar ("Durham").

The 2020 Jarník's lecture (annual lecture of the Faculty of Mathematics and Physics, Charles University, Prague)

Contributed talks at conferences

34 talks

SUPERVISION OF GRADUATE STUDENTS AND POSTDOCTORAL FELLOWS

I have supervised 6 graduate students. There were 4 completed PhD thesis under my supervision:

2015–2019	Miroslav Olšák, postdoc at University of Innsbruck (C. Kaliszyk, ERC StG "SMART")
2011–2016	Jakub Opršal, postdoc at Jagiellonian University (M. Kozik), TU Dresden (M. Bodirsky, ERC CoG "CSP-Infinity"), postdoc at Durham University (A. Krokhin, EPSRC grant "The Complexity of Promise Constraint Satisfaction"), now IST-Bridge Fellow at IST Austria (U. Wagner)
2010–2014	Jakub Bulín, postdoc at Jagiellonian University (M. Kozik), University of Colorado (K. Kearnes), Johannes Kepler University (E. Aichinger), now assistant professor at Charles University
2009–2013	Alexandr Kazda, postdoc at Vanderbilt University (R. McKenzie), IST Austria (V. Kolmogorov, ERC CoG "DOiCV")

I have supervised 8 postdocs working on my ERC CoG project, including:

2021–	Michael Kompatscher, previously postdoc at University of Oxford (S. Živný, ERC StG "PowAlgDO")
2018–2022	Antoine Mottet, previously PhD student at TU Dresden (M. Bodirsky), received the Ackermann award in 2018
2018–2019, 2022–	Dmitriy Zhuk, previously Moscow State University, received the Presburger award in 2020, talk at ICM in 2022

ORGANISATION OF SCIENTIFIC MEETINGS

I have (co-)organised 7 scientific conferences and workshops, including

2018	56th Summer School on Algebra and Ordered Sets, 63 participants, Srní, Czechia
2016	Workshop on General Algebra AAA 92, 89 participants, Charles University
2014	Conference on Algebras and Clones (ALC), 59 participants, Charles University
2011	Workshop on Algebra and CSPs, part of Summer Thematic Program on the Mathematics of Constraint Satisfaction, 70 participants, Fields Institute, Toronto, Canada
2010	International Conference on Algebras and Lattices (ICAL), 94 participants, Charles University

REVIEWING ACTIVITES

- Editor of the journals Algebra Universalis (Springer; since 2018) and Acta Scientiarum Mathematicarum (Springer; since 2022)
- PC member of STACS 2022, ICALP 2022
- Reviewer for mathematical and computer science journals, e.g., Journal of the ACM, SIAM Journal on Computing, SIAM Journal on Discrete Mathematics
- Reviewer for conferences in theoretical computer science, e.g., STOC, FOCS, SODA, LICS, ICALP
- Reviewer for grant agencies, e.g., ERC StG, ERC CoG, National Science Foundation (NSF), Natural Sciences and Engineering Research Council of Canada (NSERC), Polish National Science Centre (NCN)

TEACHING ACTIVITIES

- Defended theses: 23 Bachelor, 7 Master
- Courses taught:
  - Charles University: Linear Algebra 1 and 2, Universal Algebra 1 and 2, Computer Algebra, Finite Fields, Introduction to the Complexity of the CSP
  - McMaster University: Calculus for Science I and II, Graph Theory
- Lecture notes:

  with D. Stanovský, Computer Algebra (in Czech), Matfyzpress, 2011

  with J. Tůma, Linear Algebra (in Czech), in preparation
- 1998–2006 Mathematical seminar "PRASE" for high school students, including organization of math camps