

Fabio Zanasi

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Personal Information

Place / Date of Birth Modena, Italy, 17 December 1988
Citizenship Italian
Languages Italian (native), English (fluent), French (medium), Dutch (basic)

Employment

Sep '19 – now **Associate Professor (grade 9)**, *University College London - Programming Principles, Logic and Verification Group*, United Kingdom, (permanent position).
Oct '16 – Sep'19 **Lecturer (grade 8)**, *University College London - Programming Principles, Logic and Verification Group*, United Kingdom, (permanent position).
Oct '15 – Sep'16 **Post-doctoral Researcher**, *Radboud University of Nijmegen - Institute for Computing and Information Sciences*, The Netherlands, employed on Bart Jacobs' ERC project *Quantum Computation, Logic, and Security*.

Education

Sep '12 – Sep '15 **PhD in Computer Science**, *Laboratoire de l'Informatique du Parallélisme - École Normale Supérieure de Lyon*, France, distinction: *Très Honorable* (highest distinction for a PhD in the sciences).
Thesis supervisors: Filippo Bonchi and Daniel Hirschkoff
Aug '10 – Aug '12 **Master of Science in Logic**, *Institute for Logic, Language and Computation - University of Amsterdam*, Netherlands, distinction: *Cum Laude*.
Thesis supervisors: Yde Venema and Alessandro Facchini
Sep '07 – Jul '10 **Bachelor of Arts in Philosophy**, *University of Siena*, Italy, *110/110 Cum Laude*.
Thesis supervisor: Duccio Pianigiani

Research Areas

- algebraic semantics of programming languages
- logical foundations of probabilistic programming and machine learning
- compositional approaches to concurrency and control theory
- category theory
- coalgebra, coinduction, formal languages
- modal fixpoint logics and second-order logics for model checking

Grants

- 2020-2023 **Funded EPSRC Grant**, *Nominal String Diagrams*, EP/V002376/1, Principal Investigator, funding: £ 530.000.
- 2020-2024 **Funded H2020-MSCA-RISE Grant**, *Research and Innovation Staff Exchange*, Co-Investigator, funding: 46.000 € (local), 1.017.000 € (all partners).
- 2019 **Facebook Donation**, *Grant supporting research activities in formal verification*, awarded after a departmental competition, funding: £ 48.000.
- 2018-2020 **Funded EPSRC Grant**, *Enhanced Formal Reasoning for Algebraic Network Theory*, EP/R020604/1, Principal Investigator, First Grant Scheme, funding: £125.000.
- 2012-2015 **PhD Scholarship**, *École Doctorale, École Normale Supérieure de Lyon*.
- 2011-2012 **Nuffic Huygens Scholarship**, *Dutch Ministry of Education*.
Merit-based scholarship; winners are selected among more than 1500 candidates.
- 2007 **National Scholarship**, *Italian Ministry of Education*.
Prize for the highest grade in the final exam of the secondary high school.

Awards

- 2021 **EATCS Best Paper Award**, for the best theory paper of all ETAPS conferences (European Joint Conferences on Theory & Practice of Software).
Awarded by the European Association for Theoretical Computer Science (EATCS).
- 2017 **Best Presentation Award**, *7th Conference on Algebra and Coalgebra in Computer Science (CALCO 2017)*, Ljubljana, Slovenia.
Award voted by the participants.
- Phd Thesis Prize “Franco Montagna” - runner up**, *Italian Association for Logic and its Application (AILA) & Italian Mathematical Society (UMI)*.
Best PhD thesis in Logic by an Italian student appeared between 2015 and 2017.
- 2013 **Best Paper Award**, *5th Conference on Algebra and Coalgebra in Computer Science (CALCO 2013)*, Warsaw, Poland.
Award assigned by the program committee
- AILA Thesis Award**, *Italian Association for Logic and its Application*.
Best master's thesis in logic by an Italian student.
- UvA Thesis Prize - finalist**, *University of Amsterdam*.
Selected among ~75 to represent the faculty of science in the final round of the competition.
- AILA Thesis Award**, *Italian Association for Logic and its Application*.
Best bachelor's thesis in logic by an Italian student.

Publications

Note the standard in theoretical computer science is to publish in peer-reviewed conference proceedings (which typically have low acceptance rates in the order of 20-30%) and to list authors in alphabetical order.

Proceedings of International conferences

- 2021 Robin Piedeleu and Fabio Zanasi, A STRING DIAGRAMMATIC AXIOMATISATION OF FINITE-STATE AUTOMATA. , *proceedings of FoSSaCS'21*.
 Paul Wilson and Fabio Zanasi, THE COST OF COMPOSITIONALITY: A HIGH-PERFORMANCE IMPLEMENTATION OF STRING DIAGRAM COMPOSITION., *proceedings of ACT'21*.
 Filippo Bonchi, Alessandro di Giorgio, and Fabio Zanasi, FROM FARKAS' LEMMA TO LINEAR PROGRAMMING: AN EXERCISE IN DIAGRAMMATIC ALGEBRA., *proceedings of CALCO'21*.
 Tao Gu and Fabio Zanasi, FUNCTORIAL SEMANTICS AS A UNIFYING PERSPECTIVE ON LOGIC PROGRAMMING., *proceedings of CALCO'21*.
- 2020 Paul Wilson and Fabio Zanasi, REVERSE DERIVATIVE ASCENT - A CATEGORICAL APPROACH TO LEARNING BOOLEAN CIRCUITS, *proceedings of ACT'20*.
 Filippo Bonchi, Robin Piedeleu, Pawel Sobociński, and Fabio Zanasi, CONTEXTUAL EQUIVALENCE FOR SIGNAL FLOW GRAPHS, *proceedings of FoSSaCS'20*.
 Tobias Kappe , Paul Brunet , Alexandra Silva , Jana Wagemaker , Fabio Zanasi, CONCURRENT KLEENE ALGEBRA WITH OBSERVATIONS: FROM HYPOTHESES TO COMPLETENESS, *proceedings of FoSSaCS'20*.
 Tao Gu , Alexandra Silva , Fabio Zanasi, HENNESSY-MILNER RESULTS FOR PROBABILISTIC PDL, *proceedings of MFPS'20*.
- 2019 Filippo Bonchi, Robin Piedeleu, Pawel Sobociński, and Fabio Zanasi, GRAPHICAL AFFINE ALGEBRA, *proceedings of LICS'19*.
 Filippo Bonchi, Josh Holland, Robin Piedeleu, Pawel Sobociński, and Fabio Zanasi, DIAGRAMMATIC ALGEBRA: FROM LINEAR TO CONCURRENT SYSTEMS, *proceedings of POPL'19*.
 Tobias Kappe , Paul Brunet , Jurriaan Rot , Alexandra Silva , Jana Wagemaker , Fabio Zanasi, KLEENE ALGEBRA WITH OBSERVATIONS, *proceedings of CONCUR'19*.
 Bart Jacobs, Aleks Kissinger, and Fabio Zanasi, CAUSAL INFERENCE BY STRING DIAGRAM SURGERY, *proceedings of FoSSaCS'19*.
 Pawel Sobocinski, Paul Wilson, and Fabio Zanasi, CARTOGRAPHER: A TOOL FOR STRING DIAGRAMMATIC REASONING, *proceedings of CALCO'19*.
 Tao Gu and Fabio Zanasi, A COALGEBRAIC PERSPECTIVE ON PROBABILISTIC LOGIC PROGRAMMING, *proceedings of CALCO'19*.
- 2018 Tobias Kappe, Paul Brunet, Alexandra Silva, and Fabio Zanasi, CONCURRENT KLEENE ALGEBRA: FREE MODEL AND COMPLETENESS, *proceedings of ESOP'18*.
 Filippo Bonchi, Fabio Gadducci, Aleks Kissinger, Pawel Sobociński, and Fabio Zanasi, REWRITING WITH FROBENIUS, *proceedings of LICS'18*.
- 2017 Tobias Kappe, Paul Brunet, Bas Luttik Alexandra Silva, and Fabio Zanasi BRZOWSKI GOES CONCURRENT — A KLEENE THEOREM FOR POMSET LANGUAGES, *proceedings of CONCUR'17*.

- Filippo Bonchi, Fabio Gadducci, Aleks Kissinger, Pawel Sobociński, and Fabio Zanasi, CONFLUENCE FOR GRAPH REWRITING WITH INTERFACES, *proceedings of ESOP'17*.
- Bart Jacobs and Fabio Zanasi, A FORMAL SEMANTICS OF INFLUENCE IN BAYESIAN REASONING., *proceedings of MFCS'17*.
- Brendan Fong and Fabio Zanasi, A UNIVERSAL CONSTRUCTION FOR (CO)RELATIONS., *proceedings of CALCO'17*.
- 2016 Filippo Bonchi, Fabio Gadducci, Aleks Kissinger, Pawel Sobociński, and Fabio Zanasi, REWRITING MODULO SYMMETRIC MONOIDAL STRUCTURE, *proceedings of LICS'16*.
- Bart Jacobs and Fabio Zanasi, A PREDICATE/STATE TRANSFORMER SEMANTICS FOR BAYESIAN LEARNING, *proceedings of MFPS'16*.
- Fabio Zanasi, THE ALGEBRA OF PARTIAL EQUIVALENCE RELATIONS, *proceedings of MFPS'16*.
- 2015 Filippo Bonchi Pawel Sobociński, and Fabio Zanasi, FULL ABSTRACTION FOR SIGNAL FLOW GRAPHS, *proceedings of POPL'15*, with.
- 2014 Filippo Bonchi Pawel Sobociński, and Fabio Zanasi, A CATEGORICAL SEMANTICS OF SIGNAL FLOW GRAPHS, *proceedings of CONCUR'14*.
- Facundo Carreiro, Alessandro Facchini, Yde Venema, and Fabio Zanasi, WEAK MSO: AUTOMATA AND EXPRESSIVENESS MODULO BISIMILARITY, *proceedings of LICS'14*.
- Filippo Bonchi Pawel Sobociński, and Fabio Zanasi, INTERACTING BIALGEBRAS ARE FROBENIUS, *proceedings of FoSSaCS'14*.
- 2013 Alessandro Facchini, Yde Venema, and Fabio Zanasi, A CHARACTERIZATION THEOREM FOR THE ALTERNATION-FREE FRAGMENT OF THE MODAL μ -CALCULUS, *proceedings of LICS'13*.
- Filippo Bonchi and Fabio Zanasi, SATURATED SEMANTICS FOR COALGEBRAIC LOGIC PROGRAMMING, *proceedings of CALCO'13*.

Journal Articles

- 2021 Bart Jacobs , Aleks Kissinger, and Fabio Zanasi, CAUSAL INFERENCE BY STRING DIAGRAM SURGERY — A DIAGRAMMATIC APPROACH TO INTERVENTIONS AND COUNTERFACTUALS., *Mathematical Structures in Computer Science*.
- 2021 Filippo Bonchi, Pawel Sobocinski, and Fabio Zanasi, A SURVEY OF COMPOSITIONAL SIGNAL FLOW THEORY, *IFIP Advances in Information and Communication Technology, 60 Year festivity volume, (Invited Contribution)*.
- Facundo Carreiro , Alessandro Facchini , Yde Venema, and Fabio Zanasi, MODEL THEORY OF MONADIC PREDICATE LOGIC WITH THE INFINITY QUANTIFIER., *Archive for Mathematical Logic*.
- Filippo Bonchi , Robin Piedeleu , Pawel Sobocinski, and Fabio Zanasi, BIALGEBRAIC FOUNDATIONS FOR THE OPERATIONAL SEMANTICS OF STRING DIAGRAMS., *Information and Computation*.

Tao Gu and Fabio Zanasi, COALGEBRAIC SEMANTICS FOR PROBABILISTIC LOGIC PROGRAMMING., *Logical Methods in Computer Science*, **(Invited Contribution)**.

Tobias Kappe , Paul Brunet , Bas Luttik , Alexandra Silva , Fabio Zanasi, EQUIVALENCE CHECKING FOR WEAK BI-KLEENE ALGEBRA., *Logical Methods in Computer Science*, **(Invited Contribution)**.

2020 Facundo Carreiro , Alessandro Facchini , Yde Venema , Fabio Zanasi, THE POWER OF THE WEAK, *ACM Transactions on Computational Logic*, vol. 21, n.2.

2019 Tobias Kappe, Paul Brunet, Bas Luttik Alexandra Silva, and Fabio Zanasi ON SERIES-PARALLEL POMSET LANGUAGES: RATIONALITY, CONTEXT-FREENESS AND AUTOMATA, *Journal of Logical and Algebraic Methods in Programming*, vol. 103, pp. 130-153, **(Invited Contribution)**.

2018 Brendan Fong and Fabio Zanasi, UNIVERSAL CONSTRUCTIONS FOR (CO)RELATIONS: CATEGORIES, MONOIDAL CATEGORIES, AND PROPS, *Logical Methods in Computer Science*, vol. 14, pp.1-25, **(Invited Contribution)**.

Filippo Bonchi, Pawel Sobociński, and Fabio Zanasi, DECONSTRUCTING LAWVERE WITH DISTRIBUTIVE LAWS, *Journal of Logical and Algebraic Methods in Programming*, vol. 95, pp.128-146, **(Invited Contribution)**.

2017 Filippo Bonchi, Pawel Sobociński, and Fabio Zanasi, THE CALCULUS OF SIGNAL FLOW DIAGRAMS I: LINEAR RELATIONS ON STREAMS, *Information and Computation*, vol. 252, pp.2-29, **(Invited Contribution)**.

2016 Filippo Bonchi, Pawel Sobociński, and Fabio Zanasi, INTERACTING HOPF ALGEBRAS, *Journal of Pure and Applied Algebra*, vol. 221, pp.144-184.

2015 Filippo Bonchi, Stefan Milius, Alexandra Silva, and Fabio Zanasi, KILLING EPSILONS WITH A DAGGER: A COALGEBRAIC STUDY OF SYSTEMS WITH ALGEBRAIC LABEL STRUCTURE, *Theoretical Computer Science*, vol. 604, pp. 102-126, **(Invited Contribution)**.

Filippo Bonchi and Fabio Zanasi, BIALGEBRAIC SEMANTICS FOR LOGIC PROGRAMMING, *Logical Methods in Computer Science*, vol.11, issue 2, pp. 1-47, **(Invited Contribution)**.

2011 Fabio Zanasi, LA DEFINIZIONE NEI SISTEMI LOGICI DI S. LEŚNIEWSKI (*On definitions in Leśniewski's Logical Systems*), *Annali della Facoltà di Lettere e Filosofia dell'Università di Siena*.

Book Chapters

2019 Bart Jacobs and Fabio Zanasi, THE LOGICAL ESSENTIALS OF BAYESIAN REASONING, *Probabilistic Programming*, Cambridge University Press, Gilles Barthe, Joost-Pieter Katoen and Alexandra Silva (eds.).

Proceedings of International Workshops

2017 Fabio Zanasi, REWRITING IN FREE HYPERGRAPH CATEGORIES., *proceedings of GAM'17 (ETAPS)*.

2016 Filippo Bonchi, Pawel Sobociński, and Fabio Zanasi, LAWVERE CATEGORIES AS COMPOSED PROPS, *proceedings of CMCS'16 (ETAPS)*.

- 2014 Filippo Bonchi, Stefan Milius, Alexandra Silva, and Fabio Zanasi, HOW TO KILL EPSILONS WITH A DAGGER - A COALGEBRAIC TAKE ON SYSTEMS WITH ALGEBRAIC LABEL STRUCTURE, *proceedings of CMCS'14 (ETAPS)*.
- 2012 Fabio Zanasi, ON THE EXPRESSIVE POWER OF *MSO* AND *WMSO* ON TREES OF ARBITRARY DEGREE, *IFCoLog workshop series (CiE 2012), student session*.

Theses

- 2015 Fabio Zanasi, INTERACTING HOPF ALGEBRAS - THE THEORY OF LINEAR SYSTEMS, *PhD Thesis*, École Normale Supérieure de Lyon.
- 2012 Fabio Zanasi, EXPRESSIVENESS OF MONADIC SECOND-ORDER LOGICS ON INFINITE TREES OF ARBITRARY BRANCHING DEGREE, *Master's Thesis*, University of Amsterdam.
- 2010 Fabio Zanasi, ON CREATIVE DEFINITIONS IN LESNIEWSKI'S ONTOLOGY, *Bachelor's Thesis*, University of Siena.

Talks at International Conferences and Workshops (Selection)

- 2020 A FINITARY AXIOMATISATION OF KLEENE ALGEBRA, *4th Workshop on String Diagrams in Computation*, Satellite event of STAF'20, Bergen, Norway **Invited Speaker**.
- 2018 A DIAGRAMMATIC ALGEBRA FOR LINEAR AND CONCURRENT SYSTEMS, *Workshop "Diagrammatic Methods for Linear and Non-Linear Systems"*, Shonan Village Center, National Institute of Informatics, Japan, **Keynote Speaker**.
 THE LOGICAL ESSENTIALS OF BAYESIAN REASONING, *ACT'18 (Applied Category Theory)*, Lorentz Center, Leiden, The Netherlands, **Invited Speaker**.
 REWRITING WITH FROBENIUS, *LICS'18*, Oxford, United Kingdom.
- 2017 NEW FOUNDATIONS FOR STRING DIAGRAM REWRITING, *GAM'17 (ETAPS)*, Uppsala, Sweden, **Invited Speaker**.
 A NEW FOUNDATION FOR STRING DIAGRAM REWRITING: ADEQUACY, CONFLUENCE, COMMUTATIVITY, *CLAP III*, Glasgow, United Kingdom, **Invited Speaker**.
 CONFLUENCE FOR GRAPH REWRITING WITH INTERFACES, *ESOP'17*, Uppsala, Sweden.
 FORMAL SEMANTICS OF BAYESIAN INFERENCE, *Workshop "Probabilistic Programming Languages"*, Bellairs Research Institute, Barbados.
- 2016 REWRITING MODULO SYMMETRIC MONOIDAL STRUCTURE, *LICS'16*, New York, USA.
 THE ALGEBRA OF PARTIAL EQUIVALENCE RELATIONS, *MFPS'16*, Pittsburgh, USA.
 A PREDICATE/STATE TRANSFORMER SEMANTICS FOR BAYESIAN LEARNING, *MFPS'16*, Pittsburgh, USA.
 COMPOSING STRING DIAGRAMMATIC THEORIES VIA DISTRIBUTIVE LAWS OF PROPS, *Workshop "Coalgebras in Quantum Physics"*, Bellairs Research Institute, Barbados.

- 2015 FULL ABSTRACTION FOR SIGNAL FLOW GRAPHS, *POPL'15*, Mumbai, India.
- 2014 A CATEGORICAL SEMANTICS OF SIGNAL FLOW GRAPHS, *CONCUR'14*, Rome, Italy.
 INTERACTING BIALGEBRAS ARE FROBENIUS, *FoSSaCS'14*, Grenoble, France.
 HOW TO KILL EPSILONS WITH A DAGGER - A COALGEBRAIC TAKE ON SYSTEMS WITH ALGEBRAIC LABEL STRUCTURE, *CMCS'14 (ETAPS)*, Grenoble, France.
- 2013 SATURATED SEMANTICS FOR COALGEBRAIC LOGIC PROGRAMMING, *CALCO'13*, Warsaw, Poland.
 A CHARACTERIZATION THEOREM FOR THE ALTERNATION-FREE FRAGMENT OF THE MODAL μ -CALCULUS, *LICS'13*, New Orleans, United States.

Academic Activities

Service in International Journals, Conferences and Workshops

- **Executive editor** of *Logical Methods in Computer Science*.
- **Editor** of the Special Issue "Imprecise Probabilities and Logic" of the *International Journal of Approximate Reasoning*.
- **Programme Committee Chair** of the Workshop "Coalgebraic Methods in Computer Science", satellite event of ETAPS'22, Munich, Germany.
- **Chair** of the Workshop "Diagrammatic and Algebraic Methods for Business", satellite event of STAF2020, Bergen, Norway.
- **Local Organiser** of CALCO'19 and MFPS XXXV.
- **Chair** of the Workshop "Compositional Methods for Network Diagrams and Component-Based Systems", Bellairs Research Institute, McGill Uni., Barbados.
- **Chair** of the Workshop "Coalgebra, Now" (satellite event of FLoC'18).
- **Chair** of the Logic Mentoring Workshop (2nd edition, satellite event of LiCS'17).
- **Publicity chair** of CALCO'17, CMCS'16 and CALCO'15.
- **PC member** of MFCS'21, CMCS'20, CALCO'19, SYCO 3, CONCUR-YR'17, CALCO-EI'17, CoAlp-Ty'16, ICE'16.
- **Reviewer** for CALCO, CSL, CONCUR, FoSSaCS, FSCD, FSTTCS, LiCS, LMCS, JLAMP, ICALP, QPL.

Administrative Roles

- **Deputy Programme Director** of the Master of Engineering in Mathematical Computation, University College London.
- **Computer Science Representative** in the Arts and Sciences BASc Interdepartmental Committee, University College London.

PhD Supervision

- 2021 - 2024 **Leo Lobski**, *University College London*, UK.
- 2019 - 2023 **William Smith**, *University College London*, UK, with Alexandra Silva.
- 2019 - 2021 **Micheal Wang**, *University College London*, UK, with Mehrnoosh Sadrzadeh.

- 2019 - 2022 **Alexander Gheorghiu**, *University College London*, UK, with David Pym.
- 2018 - 2022 **Tao Gu**, *University College London*, UK.
- 2018 - 2022 **Paul Wilson**, *University of Southampton*, UK.
- 2016 - 2020 **Tobias Kappé (Completed)**, *University College London*, UK, with Alexandra Silva.
- 2016 - 2019 **Octavio Zapata (Completed)**, *University College London*, UK, with Simone Severini.

Research Assistants

- 2020 - 2023 **Robin Piedeleu**, *University College London*, UK, Employed on EP/V002376/1.
- 2018 - 2020 **Robin Piedeleu**, *University College London*, UK, Employed on EP/R020604/1.

Teaching

- '17, '18, '19, '20, '21 & '22 **Directed Reading (COMP2012/COMP007)**, *University College London*, Lecturer and Module Leader, United Kingdom.
- '17, '18, '19, '20 & '21 **Computability Theory (COMP3004/COMP0017)**, *University College London*, Lecturer and Module Leader, United Kingdom.
- 2019 **Discrete Mathematics (COMP0147)**, *University College London*, Module Leader, United Kingdom.
- 2015 **Introduction to Algorithms and Imperative Programming**, *teaching assistant*, University C. Bernard Lyon I, France.
- 2014 **Automata and Computability Theory**, *teaching assistant*, École Normale Supérieure de Lyon, France.
- 2013 & 2014 **Static Analysis and System Verification**, *teaching assistant*, École Normale Supérieure de Lyon, France.
- 2012 & 2013 **Programming Language Theory**, *teaching assistant*, École Normale Supérieure de Lyon, France.
- 2012 **Python Programming**, *teaching assistant*, University of Amsterdam, The Netherlands.

Collaborations

- Canada Dr. Geoff Cruttwell, Mount Allison University
- Estonia Prof. Pawel Sobociński, Tallin University of Technology
- Germany Prof. Stefan Milius, University of Erlangen-Nürnberg
- Ireland Dr. Alessio Benavoli, University of Limerick
- Italy Dr. Filippo Bonchi, University of Pisa
Prof. Fabio Gadducci, University of Pisa
- Netherlands Prof. Bart Jacobs, Radboud University Nijmegen
Dr. Bas Luttik, Technical University Eindhoven
Dr. Juriaan Rot, Radboud University Nijmegen
Prof. Yde Venema, University of Amsterdam

Switzerland	Dr. Alessandro Facchini, Dalle Molle Institute for Artificial Intelligence
United Kingdom	Prof. Neil Ghani, Strathclyde University
	Prof. Dan Ghica, University of Birmingham & HUAWEI
	Dr. Aleks Kissinger, University of Oxford
United States	Dr. Brendan Fong, MIT, Boston, Massachussets
	Prof. Alexandra Silva, Cornell University