

UNIVERSITY OF MILAN

Public selection for recruiting No. ___ research associate(s) under art.24, paragraph 3.a, of Law No.240/2010 for competition sector 11/C2 - Logic, History and Philosophy Of Science, (scientific-disciplinary sector M-FIL/02 - Logic and Philosophy Of Science) at the Department of PHILOSOPHY (announcement published in Official Gazette No. 19 of 8 March 2022) - Competition code 4961

Gavin St. John

CURRICULUM VITAE

PERSONAL DATA

SURNAME	ST JOHN
NAME	GAVIN
DATE OF BIRTH	10/06/1988
WEBSITE	HTTPS://GAVINSTJOHN.WORDPRESS.COM/
ORCID ID	0000-0002-5509-2980

DOCTORAL DEGREE

Doctor of Philosophy (PhD) - Mathematics
 Department: Natural Sciences and Mathematics
 University: University of Denver (USA)
 Date of completion: 13 June 2019
 Advisor: Prof. Nikolaos Galatos
 Thesis: Decidability for residuated lattices and substructural logics

MASTERS AND BACHELORS DEGREES

Master of Science (MS) - Pure Mathematics,
 Department: Mathematics and Statistics
 University: Youngstown State University (USA)
 Date of completion: 18 May 2013
 Advisor: Prof. Jamal Tartir
 Thesis: On formally undecidable propositions of Zermelo-Fraenkel set theory

Bachelor of Science (BS) - Mathematics & Philosophy
 Department: Mathematics
 University: University of Pittsburgh (USA)
 Date of completion: 30 April 2011
 Double Major: Bachelor of Arts (BA) in Physics & Astronomy

RESEARCH CONTRACTS, RESEARCH FELLOWSHIP CONTRACTS, POSTDOCTORAL SCHOLARSHIPS OR SIMILAR CONTRACTS

Postdoctoral Researcher
 Department: Department of Pedagogy, Psychology, Philosophy.
 University: Università degli studi di Cagliari
 Dates: 01/10/2020 to 31/03/2021
 Funding Authority: Progetto PRIN 2017 - MIUR: "Logic and cognition. Theory, experiments, and applications", CUP: 2013YP4N3
 Project Title: "Quantum structures and substructural logics: a unifying approach"
 Scientific Manager: Prof. Antonio Ledda

Research Physics Intern

Company: NorthWest Research Associates, Monterey Bay, CA (USA) -

Dates: May 2009 - August 2010

Scientific Manager: Dr. L.J. Nickisch

Activities:

- Developing a simulator for HF radio wave propagation in the earth's ionosphere. Work required extensive use of Matlab programming, often writing my own scripts and developing multiplatform GUI's for professional use. This work resulted in a publication [4] in the journal *Radio Science*.
- Developed forensic techniques for audio analysis by creating FFT and MUSIC based computing algorithms in Matlab.

RESEARCH INTERESTS AND BACKGROUND

My research deals with substructural logics and their algebraic semantics, residuated lattices. These logics include classical, intuitionistic, linear, relevance, bunched-implication, many-valued logics, and many others. They find applications to areas as diverse as mathematical linguistics, philosophy, management of pointers in computer architecture, engineering, theoretical physics, and functional programming. The following is a list of topics highlighting the main threads of my formal expertise:

Decidability and undecidability in substructural logics and residuated structures

- I studied decidability and complexity for large classes of substructural logics utilizing the techniques of proof theory, universal algebra, complexity theory, and positive linear algebra.
- My work [2] has been published in the *Journal of Symbolic logic*, I have presented my results in this area at 7 international conferences and workshops (3-5 & 7-10), of which 3 I was an invited speaker, with 4 peer-reviewed extended abstracts, and an invited speaker at 3 seminars (12-14).
- Ongoing collaboration with Nikolaos Galatos (University of Denver): undecidable word problems for the multiplicative and join fragment for classes of residuated lattices; decidability for classes of idempotent semirings; complexity bounds for proof-searches for extensions of substructural logics.
- Ongoing collaboration with Tommaso Moraschini (University of Barcelona): decision problems for intuitionistic logics of finite width.

Substructural aspects of Quantum logic

- I have studied quantum logics from the lens of substructural logics and residuated structures using proof-theoretic and algebraic techniques.
- My work has been published in *The Review of Symbolic Logic* [1] and in *Proceedings 18th International Conference on Quantum Physics and Logic* [3]. I have presented research in this area at one international conference (6), as an invited speaker at one local seminar (11), and will present as an invited speaker at one international workshop (2).
- On going research with Davide Fazio, Antonio Ledda, and Francesco Paoli (University of Cagliari): Proof theory for substructural quantum logic and the calculus of pointed left-residuated lattice ordered groupoids.
- On going research with Wesley Fussner (University of Bern): algebraic aspects of residuated ortholattices and their assertional logic; associativity relations of Sasaki operators in quantum logics.

Connexive implications in substructural logics

- On going work with Davide Fazio (University of Cagliari): term-definable connexive implications in substructural logics. I will present preliminary results at the one upcoming international conference (1).

SCIENTIFIC PUBLICATIONS

Peer reviewed articles in international journals and proceedings:

- [1] Davide Fazio, Antonio Ledda, Francesco Paoli, Gavin St. John, "A substructural Gentzen calculus for orthomodular quantum logic." *The Review of Symbolic Logic*. Accepted for publication. January 2022 doi:10.1017/S1755020322000016
- [2] Nikolaos Galatos and Gavin St. John, "Most simple extensions of FLe are undecidable." *Journal of Symbolic Logic*. Accepted for publication, June 2021. doi:10.1017/jsl.2021.46.
- [3] Wesley Fussner and Gavin St. John, "Negative translations of orthomodular lattices and their logic". *Proceedings 18th International Conference on Quantum Physics and Logic (QPL 2021)*, Gdansk, Poland, and online, 7-11 June 2021, Electronic Proceedings in Theoretical Computer Science 343, pp. 37-49. 2021. doi:10.4204/eptcs.343.3
- [4] L.J. Nickisch, Gavin St. John, Sergey Fridman, Mark Hausman, Christopher J. Coleman, "HiCIRF: A high-fidelity HF channel simulation." *Radio Science*, 47(4), 2012. doi:10.1029/2011rs004928

Doctoral Thesis:

- [5] Gavin St. John, "Decidability for residuated lattices and substructural logics." *Electronic Theses and Dissertations*. 1623. 2019. <https://digitalcommons.du.edu/etd/1623>

Extended Abstracts from international conferences:

- Nikolaos Galatos and Gavin St. John, "Undecidability methods for residuated lattices." TACL2019 (Topology, Algebra, and Categories in Logic), Nice (France), June 2019. <https://math.unice.fr/tac/assets/2019/abstracts.pdf>
- Gavin St. John, "Subvariety containment for idempotent semirings." BLAST 2019, University of Colorado, Boulder, May 2019. <https://math.colorado.edu/blast/2019/abstractsBooklet.pdf>
- Nikolaos Galatos and Gavin St. John. "Undecidability of FLe in the presence of structural rules." AsubL (Algebra & Substructural Logics), University of Cagliari, June 2018. <https://sites.unica.it/asubl6/abstracts/>
- Gavin St. John. "Undecidability of $\{\cdot, 1, \vee\}$ -equations in subvarieties of commutative residuated lattices." TACL2017 (Topology, Algebra, and Categories in Logic), Prague (Czech Republic), June 2017. https://www.cs.cas.cz/tac/2017/list_abstracts.html

PRESENTATIONS AT NATIONAL AND INTERNATIONAL CONFERENCES, WORKSHOPS, AND SEMINARS

Invited Speaker at international conferences and workshops:

- (1) Spring Western Sectional Meeting of the American Mathematical Society: Special Session on Algebraic Logic, University of Denver, USA. To occur 14-16 May 2022. http://www.ams.org/meetings/sectional/2294_program_ss17.html
Title: Connexive implications in FLe-algebras
- (2) Ordered Algebras and Logic Workshop, Les Diablerets, Switzerland, To occur 30 March - 2 April 2022. <https://mathsites.unibe.ch/ordalglogicworkshop/>
Title: Residuated ortholattices and associativity in quantum logic
- (3) Shanks Workshop 2020: Ordered Algebras and Logic, Vanderbilt University, USA, 5-7 March 2020. <https://my.vanderbilt.edu/shanksoal2020/>
Title: Fragments of residuated lattices axiomatized by simple equations and decidability
- (4) 4th Syntax Meets Semantics (SYSMICS) Workshop, Chapman University, USA, 14-17 September 2018. <https://math.chapman.edu/~jipsen/sysmics/>
Title: Undecidability of FLe in the presence of structural rules

(5) Algebra Week, University of Siena, Italy, 19-22 June 2018.

<https://algebraweeksiena.wordpress.com/>

Title: Undecidability for varieties of residuated lattices

Contributing Speaker at international conferences and workshops:

(6) BLAST 2021, University of New Mexico, USA, 9-13 June 2021.

<https://math.nmsu.edu/blast-2021/>

(7) BLAST 2019, University of Colorado Boulder, USA, 20-24 May 2019.

<https://math.colorado.edu/blast/2019/>

(8) Algebra and Substructural Logics (AsubL): Take 6, University of Cagliari, Italy, 11-13 June 2018.

<https://sites.unica.it/asubl6/>

(9) Topology, Algebra, & Categories in Logic (TACL), Charles University, Czech Republic, 26-30 June 2017. <https://www.cs.cas.cz/tac12017/>

(10) Fall Western Sectional Meeting of the AMS: Special Session on Algebraic Logic, University of Denver, 8-9 October 2016. http://www.ams.org/meetings/sectional/2235_program_ss1.html

Invited Seminar Presentations:

(11) Bern Logic Seminar, University of Bern (Switzerland), October 2021

(12) ALOPHIS Seminar, University of Cagliari (Italy), November 2020

(13) Graduate Algebra Seminar, University of Siena (Italy), July 2017

(14) Front Range Logic Seminar, University of Denver (USA), May 2016

RESEARCH VISITS

Tommaso Moraschini

Location: University of Barcelona, Barcelona, Spain.

Dates: 5 November - 5 December 2021.

Objective: Ongoing work in regards to undecidability methods applied to Kripke frames of intuitionistic logics of finite width.

Wesley Fussner

Location: University of Bern, Bern, Switzerland.

Dates: 4-18 October 2021.

Objective: Advance research for quantum logic and residuated ortholattices, with funding from the grant *New Environments for Quantum Reasoning (2021)*. Was an invited speaker at (11), with a talk entitled *Sequent calculi for quantum logic and related structures*.

<https://mathsites.unibe.ch/bernlogicseminar/HS2021.html#StJohn>

Prof. Paolo Aglianò

Location: University of Siena, Siena, Italy

Dates: 1-14 July 2017.

Objective: Research in Residuated Frames. Was also an invited speaker at the Graduate Algebra Seminar of the University of Siena, giving a talk entitled *Applications of Residuated Frames*.

PARTICIPATION AND AFFILIATION IN INTERNATIONAL PROJECTS AND GRANTS

MOSAIC 2021-2025 Modalities in Substructural Logics: Theory, Methods and Applications.

H2020-MSCA-RISE-2020 (101007627).

Int. Coordinator: Tommaso Flaminio (Barcelona, Spain)

New Environments for Quantum Reasoning (March - December 2021)

financed by the French National Institute for Mathematical Sciences and Their Interactions (INSMI), under the funding scheme Projets Exploratatoires Premier Soutien (PEPS).

Principle Investigator: Wesley Fussner (University of Bern, formerly CNRS and Université Côte d'Azur, France).

SYSMICS: Syntax Meets Semantics: Methods, Interactions, and Connections in Substructural logics.
H2020-MSCA-RISE-2015
Int. Coordinator: Luca Spada (University of Salerno, Italy)

PEDAGOGICAL EXPERIENCE

Visiting Teaching Professor

Department of Mathematics, University of Denver, January 2020 - June 2020

- Calculus in Several Variables, 1 course (40 hours), Spring Quarter 2020
- Calculus III, 2 courses (40 hours each, 80 total), Spring Quarter 2020
- Calculus II, 2 courses (40 hours each, 80 total), Winter Quarter 2020

Adjunct Faculty

Department of Mathematics, University of Denver

- Linear Algebra, 1 course (40 hours), Autumn Quarter 2019
- Calculus II, 1 courses (40 hours), Autumn Quarter 2019
- Calculus III, 1 courses (40 hours), Autumn Quarter 2019

Probability & Statistics Coach (Teaching Assistant)

Tsinghua MathCamp 2017, Tsinghua University (Beijing, China), July 2020-August 2020
The Tsinghua MathCamp is a four-week summer camp for a highly select group of mathematically talented high school students, from all across China, to take university-level courses in mathematics.

Graduate Teaching Assistant

Department of Mathematics, University of Denver, August 2013-June 2019

- (Instructor) College Algebra and Trigonometry, 1 course (20 hours), Winter Quarter 2016
- TA for Graduate courses in: Abstract Algebra; Group Theory; Ring & Field Theory; Real Analysis; Topology
- TA for Undergraduate courses in: Calculus I-III; Multivariable Calculus; Linear Algebra; Differential Equations; Probability & Statistics; Business Calculus; Mathematics & Art

Graduate Teaching Assistant

Department of Mathematics & Statistics, Youngstown State University, August 2011-May 2013

- (Instructor) Intermediate Algebra, 1 course (60 hours), Spring Semester 2013
- (Instructor) Elementary Algebra, 3 courses (60 hours each, 180 total), Fall Semester 2011 to Fall Semester 2012

Instructor for the Upward Bound Program (UPB)

University of Pittsburgh, June - August 2011
The UPB is a program funded by the University of Pittsburgh with the purpose of giving financial and academic assistance to underprivileged high school students, whom wish to become (first-generation) college students.

- (Instructor) Geometry, 1 course (40 hours), Summer Quarter 2011
- (Instructor) Physics, 1 course (40 hours), Summer Quarter 2011
- (Head Tutor) Mathematics and Physics, August 2008- August 2011

NATIONAL AND INTERNATIONAL AWARDS AND ACCOLADES FOR RESEARCH ACTIVITY

Travel Grant, Association for Symbolic Logic (ASL), 2017.

Outstanding Graduate Student in Mathematics, Youngstown State University, 2013.

ORGANISATION AND SERVICE

- Co-organizer, Trends in Logic XXII: Strong & Weak Kleene Logics, to occur at the University of Cagliari from 18-21 July 2022. <https://sites.google.com/view/trendsinlogic2022cagliari/home>
- Co-organizer, Duality, Order, (Co)algebras, Topology, and Related topics, 7-9 July 2021 <http://logica.dipmat.unisa.it/DOCToR/index.html>
- Co-organizer, ALOPHIS Weekly Seminar, Università degli Studi di Cagliari, 2021-present <https://sites.google.com/view/alophis/home>
- Co-organizer, BLAST 2018, University of Denver, August 2018 <https://math.colorado.edu/blast/2018/>
- Co-leader, Professionalism & Diversity Session, Graduate Orientation, University of Denver, 2017
- Representative for Graduate Students of the Four Faculties, University of Denver, 2015-2018
- Co-organizer, Nonclassical Logic Seminar, University of Denver, 2016-2017
- Vice President for The Society of Physics Students, University of Pittsburgh, 2011-2013

Date

22/03/2022

Place

Cagliari, Italy