Marco Abbadini

POSTDOCTORAL RESEARCHER

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Education and academic titles

Marie Skłodowska Curie Postdoctoral Fellowship · Computer Science   *2023/09/01 – present*

UNIVERSITY OF BIRMINGHAM, UK. DEPARTMENT OF COMPUTER SCIENCE.

- Project: *DCPOS: Dualities via ComPactness, Openness and their Symmetry*.
- Supervisor: Prof. Achim Jung.

PostDoc · Mathematics   *2020/12/01 – 2023/08/31*

UNIVERSITY OF SALERNO, ITALY. DEPARTMENT OF MATHEMATICS.

- Project: *Łukasiewicz logic, MV-algebras and duality*.
- Supervisor: Prof. Luca Spada.

PhD · Mathematics   *2017/09/25 – 2021/04/09*

UNIVERSITY OF MILAN, ITALY. DEPARTMENT OF MATHEMATICS.

- Academic title awarded: "Dottore di Ricerca in Scienze Matematiche" (Degree of Doctor of Philosophy in Mathematical Sciences).
- Title of the thesis: *On the axiomatisability of the dual of compact ordered spaces*.
- Advisor: Prof. Vincenzo Marra.
- Date of defense: 9 April 2021.
- Final grade: Excellent with honours.
- PhD defense committee:
    1. G. Rosolini (Chairman – University of Genoa),
    2. S. J. van Gool (Secretary – IRIF, Université Paris-Cité),
    3. G. Bezhanisvili (New Mexico State University).
- Three years, fully funded by the University of Milan.
- Abstract published in the Bulletin of Symbolic Logic. DOI: 10.1017/bsl.2021.54.

MS · Mathematics   *2015/11/01 – 2017/07/19*

UNIVERSITY OF MILAN, ITALY. DEPARTMENT OF MATHEMATICS.

- Academic title awarded: "Dottore Magistrale in Matematica" (Master Degree in Mathematics).
- Title of the thesis: *The algebraic structure of probability measures and expectations*.
- Advisor: Prof. Vincenzo Marra (Department of Mathematics, University of Milan, Italy).
- Date of graduation: 19 July 2017.
- Final grade: 110/110 cum laude.
- Erasmus+: Semester abroad at the University of Bonn, Germany (Spring 2015/16).
- Erasmus+: Semester abroad at the University of Stuttgart, Germany (Fall 2016/17).

BS · Mathematics *2012/07/16 – 2015/10/21*

University of Milan, Italy. Department of Mathematics.

- Academic title awarded: "Dottore in Matematica" (Bachelor Degree in Mathematics).

Publications

Publications in international peer-reviewed journals

1. M. Abbadini, D. Hofmann. Barr-coexactness for metric compact Hausdorff spaces. *Theory and Applications of Categories*, to appear. Preprint available at arXiv:2408.07039.

2. M. Abbadini, V. Marra, L. Spada. Stone-Gelfand duality for metrically complete lattice-ordered groups. *Advances in Mathematics*, 461:110067, 2025. DOI: 10.1016/j.aim.2024.110067.

3. M. Abbadini, G. Bezhanishvili, L. Carai. Vietoris endofunctor for closed relations and its de Vries dual. *Topology Proceedings*, 64:213-250, 2024. URL: https://topology.nipissingu.ca/tp/reprints/v64/.

4. M. Abbadini, I. Di Liberti. Duality for coalgebras for Vietoris and monadicity. *Journal of Symbolic Logic*. To appear. DOI: 10.1017/jsl.2024.14.

5. M. Abbadini, G. Bezhanishvili, L. Carai. MacNeille completions of subordination algebras. *Cahiers de Topologie et Géométrie Différentielle Catégoriques*, 65(2):151-199 (2024). URL: https://cahierstgdc.com/wp-content/uploads/2024/04/ABBADINI-Al-LXV-2.pdf.

6. M. Abbadini, G. Bezhanishvili, L. Carai. A generalization of de Vries duality to closed relations between compact Hausdorff spaces. *Topology and its Applications*, 337:108641 (2023). DOI: 10.1016/j.topol.2023.108641.

7. M. Abbadini, L. Reggio. Barr-exact categories and soft sheaf representations. *Journal of Pure and Applied Algebra*, 227(12):107413, 2023. DOI: 10.1016/j.jpaa.2023.107413.

8. M. Abbadini, P. Jipsen, T. Kroupa, S. Vannucci. A finite axiomatization of positive MV-algebras. *Algebra Universalis*, 83:28, 2022. DOI: 10.1007/s00012-022-00776-3.

9. M. Abbadini, L. Spada. Are locally finite MV-algebras a variety? *Journal of Pure and Applied Algebra*, 226(4):106858, 2022. DOI: 10.1016/j.jpaa.2021.106858.

10. M. Abbadini. Equivalence à la Mundici for commutative lattice-ordered monoids. *Algebra Universalis*, 82:45, 2021. DOI: 10.1007/s00012-021-00736-3.

11. M. Abbadini, L. Reggio. On the axiomatisability of the dual of compact ordered spaces. *Applied Categorical Structures*, 28(6):921–934, 2020. DOI: 10.1007/s10485-020-09604-y.

12. M. Abbadini. Operations that preserve integrability, and truncated Riesz spaces. *Forum Mathematicum*, 32(6): 1487–1513, 2020. DOI: 10.1515/forum-2018-0244.

13. M. Abbadini. Dedekind σ-complete ℓ-groups and Riesz spaces as varieties. *Positivity*, 24(4):1081–1100, 2020. DOI: 10.1007/s11117-019-00718-9.

14. M. Abbadini. The dual of compact ordered spaces is a variety. *Theory and Applications of Categories*, 34(44):1401–1439, 2019. URL: http://www.tac.mta.ca/tac/volumes/34/44/34-44.pdf.

Proceedings in international peer-reviewed conferences

15. M. Abbadini, F. Di Stefano, L. Spada. Unification in Łukasiewicz logic with a finite number of variables. In *Information Processing and Management of Uncertainty in Knowledge-Based Systems*, 1239:622–633. Springer International Publishing, 2020. DOI: 10.1007/978-3-030-50153-2_46.

Preprints

16. M. Abbadini, F. Guffanti. Freely adding one layer of quantifiers to a Boolean doctrine. Preprint available at arXiv:2410.16328.

17. M. Abbadini, S. Fioravanti, P. Aglianò. Varieties of MV-monoids and positive MV-algebras. Preprint available at arXiv:2405.08471.

18. M. Abbadini, F. Guffanti. Quantifier-free formulas and quantifier alternation depth in doctrines. Preprint available at arXiv:2404.08551.

Talks

Invited plenary talks at international conferences

1. Boolean algebras, Lattices, Universal Algebra, Set Theory, Topology 2023, University of North Carolina at Charlotte, NC, USA. (17 May 2023)
   Positive MV-algebras.

Invited talks at special sessions in international conferences

2. 2024 Association for Symbolic Logic North American Annual Meeting. Iowa State University, IA, USA. Invited to the Special Session on Algebraic Logic. (15 May 2024)
   A duality for metrically complete lattice-ordered groups.

Invited talks at international workshops

3. Third Algebra Week (2023), University of Siena, Italy. (5 July 2023)
   Positive subreducts of MV-algebras.

4. Duality, Order, (Co)algebras, Topology and Related topics, online. (7 July 2021)
   Unital commutative distributive ℓ-monoids and their unit intervals.

5. Third Algebra Week (2020), University of Siena, Italy. (June 2020) (Cancelled due to COVID-19 pandemic.)
   Equivalence à la Mundici for lattice-ordered monoids.

Invited talks at national workshops

6. 4th Southern and Midlands Logic Seminar, University of Birmingham, UK. (13 December 2023)
   Natural dualities.

Contributed talks at international conferences

7. 38th Summer Conference on Topology and its Applications, University of Coimbra, Portugal. (9 July 2024)
   Vietoris endofunctor for closed relations.

8. Topology, Algebra and Categories in Logic 2024, University of Barcelona, Spain. (4 July 2024)
   Vietoris endofunctor for closed relations and its de Vries dual.

9. 104th Workshop on General Algebra "Arbeitstagung Allgemeine Algebra", South-West University "Neofit Rilsk", Blagoevgrad, Bulgaria. (10 February 2024)
   Natural dualities with an infinite dualizing object.

10. "Modalities in Substructural Logics: Theory, Methods and Applications" Workshop 2023, Vienna, Austria. (29 September 2023)
    Stone duality for finitely valued algebras with a near-unanimity term.

11. 108th Peripatetic Seminar on Sheaves and Logic, University of Palermo, Terrasini, Italy. (17 September 2023)
    Soft sheaf representations in Barr-exact categories.

12. Logic, Algebra and Truth Degrees 2023, Ivane Javakhishvili State University, Tbilisi, Georgia. (11 September 2023)
    Free extensions.

13. Logic Colloquium 2023, University of Milan, Italy. (8 June 2023)
    Jónsson-Tarski duality beyond dimension 0.

14. 3rd ItaCa Workshop, University of Pisa, Italy. (21 December 2022)
    Comonadicity over Set *of coalgebras of Vietoris functors*.

15. Topology, Algebra and Categories in Logic 2022, University of Coimbra, Portugal. (24 June 2022)
    An approach à la de Vries for compact Hausdorff spaces and closed relations.

16. Category Theory 20→21, University of Genoa, Italy. (1 September 2021)
    The opposite of the category of compact ordered spaces is monadic over the category of sets.

17. Boolean Algebras, Lattices, Universal Algebra, Set Theory, Topology 2021, New Mexico State University, Las Cruces, NM, USA, online. (13 June 2021)
    The opposite of the category of compact ordered spaces as an infinitary variety.

18. 99th Workshop on General Algebra "Arbeitstagung Allgemeine Algebra", University of Siena, Italy. (21 February 2020)
    Priestley duality above dimension zero: algebraic axiomatisability of the dual of compact ordered spaces.

19. Topology, Algebra, and Categories in Logic 2019, University of Nice, France. (20 June 2019)
    Norm-complete Abelian ℓ-groups: equational axiomatization.

20. PhDs in Logic XI, University of Bern, Switzerland. (25 April 2019)
    Stone-Gelfand duality for groups.

21. Boolean Algebras, Lattices, Universal Algebra, Set Theory, Topology 2018, University of Denver, CO, USA. (10 August 2018)
    Operations that preserve integrability, and truncated Riesz spaces.

Contributed talks at national conferences

22. XXVIII Logic Meeting of the Italian Association of Logic and its Applications, Udine, Italy. (4 September 2024)
    Vietoris endofunctor for closed relations and its de Vries dual.

23. XXVII Meeting of the Italian Association for Logic and its applications (AILA), Università della Campania "L. Vanvitelli", Caserta, Italy. (13 September 2023)
   Duality for metrically complete Abelian ℓ-groups.

TALKS AT LOCAL SEMINARS

24. Université catholique de Louvain, Louvain-la-Neuve, Belgium. (7 January 2025)
   Coalgebraic flavour of metric compact Hausdorff spaces.

25. University of Milan, Italy. (31 October 2024)
   Quantifier-free fragments and quantifier alternation depth in doctrines.

26. University of Manchester, UK. (9 October 2024)
   Quantifier-free fragments and quantifier alternation depth in doctrines.

27. University of Padua, Italy. (2 May 2024)
   Quantifier alternation depth in universal Boolean doctrines.

28. University of Birmingham, UK. (23 November 2023)
   An abstraction of the unit interval with Euclidean topology and denominators.

29. Université catholique de Louvain, Louvain-la-Neuve, Belgium. (13 November 2023)
   Soft sheaf representations in Barr-exact categories.

30. University of Bern, Switzerland. Bern Logic Seminar. (20 April 2023)
   Positive MV-algebras.

31. University of the Witwatersrand, Johannesburg, South Africa. (30 March 2023)
   Unique embeddability property.

32. Paris-Saclay University, Laboratoire Méthodes Formelles (LMF), Paris, France, online. (4 January 2023)
   An abstraction of the unit interval with denominators.

33. University of Padua, Italy, online. (5 December 2022)
   Dualities for compact Hausdorff spaces.

34. Université Paris Cité, IRIF, France. Sémantique. (25 November 2022)
   A generalization of de Vries duality to closed relations between compact Hausdorff spaces.

35. University of Amsterdam, Institute for Logic, Language and Computation, Netherlands, online. Lectures on Logic and its Mathematical Aspects (LLAMA seminar). (11 May 2022)
   Free extension for universal algebras.

36. New Mexico State University, USA, online. Algebra Seminar. (14 March 2022)
   Free extension for universal algebras.

37. University of Caserta, Italy. Model theory seminar. (14 February 2022)
   Positive MV-algebras.

38. University of Denver, USA, online. Nonclassical Logic Webinar. (5 May 2021)
   Is the category of locally finite MV-algebras equivalent to an equational class?

39. University of Denver, USA, online. Nonclassical Logic Seminar. (8 May 2020)
    Equivalence à la Mundici for lattice-ordered monoids.

40. University of Salerno, Italy. (23 January 2020)
    Equivalence à la Mundici for lattice-ordered monoids.

41. University of Nice, France. Groupe de travail 'Dualité de Stone, langages formels et logique'. (3 October 2019)
    On concrete dual adjunctions.

42. Czech Academy of Sciences, Prague, Czech Republic. Applied Mathematical Logic Seminar. (6 February 2019)
    The dual of compact ordered spaces is a variety.

43. University of Salerno, Italy. (13 December 2018)
    Archimedean Cauchy-complete MV-algebras form a variety.

44. University of Milan, Italy. Workshop "PhD^2 - PhD days" (6 July 2018)
    Operations that preserve integrability: characterization and related algebraic structures.

Seminars for students

45. New Mexico State University, USA, online. For graduate students. (24 March 2022)
    Lawvere's algebraic theories.

46. University of Salerno, Italy. For students of the course "Universal Algebra". (28 May 2021)
    The algebraic approach to Constraint Satisfaction Problems (CSP).

47. University of Milan, Italy. For students of the course "Algebra 2". (5 December 2019)
    The Rubik's Cube. Ideas to create a solution strategy.

Posters, Lightning talks, Courses

48. Mini-course (3 hours) for PhD Students and PostDocs, University of Birmingham, UK. (17 and 24 October 2024)
    Stone duality.

49. Lightning talk at the Autumn school "Proof and Computation", Fischbachau, Germany. (19 September 2024)
    Algebras of logic, step-by-step.

50. Poster at the XXI Congresso dell'Unione Matematica Italiana, University of Pavia, Italy. (2 September 2019)
    Dualità di Stone-Gelfand per i gruppi.

Teaching Experience

Teaching assistant. *University of Salerno, Italy. Department of Chemistry and Biology.*

Fall 2022/23
- Course: *Mathematical Methods for Environmental Sciences*.
- For students in the first year of the bachelor's degree in Environmental Sciences.
- Tasks: exercise classes.
- 20 h.

Teaching assistant. *University of Salerno, Italy. Department of Mathematics.*

Fall 2022/23
- Course: *Mathematical Logic*.
- For students in the third year of the bachelor's degree in Mathematics.
- Tasks: exercise classes.
- 20 h.

Co-supervision of Bachelor thesis in Mathematics. *University of Salerno, Italy. Department of Mathematics.*

24 Oct 2022
- Title: *Universal constructions in Algebra and in Category Theory*.
- Student: Chiara Carratù.
- Supervisor: Prof. Luca Spada.
- Date of defense: 24 October 2022.

Teaching assistant. *University of Salerno, Italy. Department of Mathematics.*

Fall 2021/22
- Course: *Mathematical Logic*.
- For students in the third year of the bachelor's degree in Mathematics.
- Tasks: exercise classes.
- 20 h.

"Cultore della materia". *University of Salerno, Italy. Department of Computer Science.*

2021/2022
- Course: *Discrete Mathematics*.
- For students in the first year of the bachelor's degree in Computer Science.
- Tasks: exam assistant (2h).

Adjunct Professor. *University of Salerno, Italy. Department of Chemistry and Biology.*

Fall 2021/22
- Course: *Mathematics 1*.
- For students in the first year of the bachelor's degree in Environmental Sciences.
- Joint with Prof. Serafina Lapenta.
- Tasks: classes (16 h), office hours, preparation and evaluation of written exams, conduction of oral examinations.

28 Sept 2021	**Co-supervision of Bachelor thesis in Mathematics.** *University of Salerno, Italy. Department of Mathematics.* • Title: *Lawvere's theories: an algebraic approach to Universal Algebra*. • Student: Maria Bevilaqua. • Supervisor: Prof. Luca Spada. • Date of defense: 28 September 2021.
2021/2022	**"Cultore della materia".** *University of Salerno, Italy. Department of Chemistry and Biology.* • Course: *Mathematics 1*. • For students in the first year of the bachelor's degree in Environmental Sciences. • Tasks: exam assistant.
Fall 2019/2020	**Teaching Assistant.** *University of Milan, Department of Mathematics.* • Course: *Algebra 2*. • For students in the second year of the bachelor's degree in Mathematics. • Tasks: exercise classes (28h), office hours (3h), exam assistant (4h).

Awards, Scholarships, Qualifications

2024	**Abilitazione Scientifica Nazionale - Seconda Fascia.** Validity: until 2035.
2023-2025	**Marie Skłodowska Curie Individual Fellowship.** Host institution: School of Computer Science of the University of Birmingham, UK. Scientific Area: Mathematics. Awarded by the European Union under the Horizon 2020 Programme, and delivered by UK Research and Innovation.
2023	**Scholarship to conduct one month of research.** Host institution: School of Computer Science of the University of Birmingham, UK. Awarded by the Italian National Institute of High Mathematics 'Francesco Severi' (INDAM). Renounced.
2023	**Qualification aux fonctions de maître de conférences en Mathématiques.** Validity: until 2027/12/31.
2023	**Qualification aux fonctions de maître de conférences en Informatique.** Validity: until 2027/12/31.
2017 – 2020	**PhD scholarship.** Three years, fully funded. Awarded by the University of Milan.
Fall 2016	**Erasmus scholarship.** One Semester. Awarded by the University of Milan, on behalf of the E.U.
Spring 2016	**Erasmus scholarship.** One Semester. Awarded by the University of Milan, on behalf of the E.U.

2012/09/11	**Award for the enrolment in the graduate programme in Mathematics.** Awarded by the Italian National Institute of High Mathematics 'Francesco Severi' (INDAM). Awarded on a national basis to the 80 most promising Bachelor's students in Mathematics in their first year, based on a written test.

Participation in research projects

DCPOS: Dualities via ComPactness, Openness and their Symmetry   *2023 Sep – Present*

UNIVERSITY OF BIRMINGHAM, UK

- Role: Experienced Researcher.
- Marie Skłodowska Curie PostDoctoral Individual Fellowship, EU Horizon 2020, delivered by the UK Research and Innovation (UKRI) under the UK government's Horizon Europe funding guarantee. Grant number EP/Y015029/1.

MOSAIC: Modalities in Substructural Logics: Theory, Methods and Applications   *2021 Dec – 2023 Sep*

UNIVERSITY OF SALERNO, ITALY

- Role: Team member.
- Funded by the European Union, Rise-MSCA-2020, Project 101007627.
- Within this project I conducted the following secondments:
    - 2-month research visit to M. A. Moshier, Chapman University, Orange, CA, USA (2022).
    - 1-month research visit to C. van Alten, University of the Witwatersrand, Johannesburg, South Africa (2023).

Theory and applications of resource sensitive logics   *2019 Dec – 2022 Dec*

UNIVERSITY OF SALERNO, ITALY

- Role: Team member.
- Funded by the Italian Ministry of University and Research, PRIN project n. 20173WKCM5.

Organisation of conferences and seminar series

Series of seminars in logic   *2023/04/17 – 2023/06/17*

DEPARTMENT OF MATHEMATICS, UNIVERSITY OF SALERNO, ITALY

- Role: organizer.
- 6 seminars + 1 final workshop.

Conference "LATD 2022 and MOSAIC 2022 Kick Off Meeting"   *2022/09/05 – 2022/09/10*

PAESTUM, ITALY

- Role: organizer.
- International conference (84 participants).

Workshop "PhD²ays 2020"   *2020/12/09 – 2020/12/11*

University of Milan, Italy (Online)

- Role: organizer.
- Local workshop, in which PhD students expose their research to postgraduate students ($\sim$ 35 participants).

Visits

2025	**Université catholique de Louvain, Louvain-la-Neuve, Belgium. Institut de Recherche en Mathématique et Physique.** Visiting M. Gran and delivering the talk "Coalgebraic flavour of metric compact Hausdorff spaces". 4 days.
2024	**University of Aveiro, Portugal. Department of Mathematics.** Visiting D. Hofmann. 5 days.
2024	**University of Luxembourg, Luxembourg. Department of Mathematics.** Visiting F. Guffanti. 3 days.
2024	**Université catholique de Louvain, Louvain-la-Neuve, Belgium. Institut de Recherche en Mathématique et Physique.** Visiting M. Gran and delivering the talk "Soft sheaf representations in Barr-exact categories". 2 days.
2023	**University of Bern, Switzerland. Mathematisches Institut.** Visiting G. Metcalfe and delivering the talk "Positive MV-algebras". 3 days.
2023	**University of the Witwatersrand, Johannesburg, South Africa. Department of Computer Science.** Visiting C. van Alten and delivering the talk "Unique embeddability property". Secondment within the MSCA–RISE research project "Mosaic" (Modalities in Substructural Logics: Theory, Methods and Applications). 1 month.
2023	**University of Aveiro, Portugal. Department of Mathematics.** Visiting D. Hofmann. 8 days.
2022	**Université Paris Cité, Paris, France. Institut de Recherche en Informatique Fondamentale (IRIF).** Visiting S. van Gool and delivering the talk "A generalization of de Vries duality to closed relations between compact Hausdorff spaces". 3 days.
2022	**Chapman University, Orange, CA, USA. Department of Mathematics.** Visiting M. A. Moshier. Secondment within the MSCA–RISE research project "Mosaic" (Modalities in Substructural Logics: Theory, Methods and Applications). 2 months.
2022	**Oxford University, UK. Department of Computer Science.** Visiting L. Reggio. 5 days.
2020	**University of Salerno, Italy. Department of Mathematics.** Visiting L. Spada and delivering the talk "Equivalence à la Mundici for lattice-ordered monoids". 4 days.

2019	**University of Nice**, France. **Laboratoire Jean Alexandre Dieudonné.** Visiting W. Fussner and delivering the talk "On concrete dual adjunctions". 3 days.
2019	**Czech Academy of Sciences**, Prague, Czech Republic. **Department of Computer Science.** Visiting L. Reggio and delivering the talk "The dual of compact ordered spaces is a variety". 4 days.
2018	**University of Salerno**, Italy. **Department of Mathematics.** Visiting L. Spada and delivering the talk "Archimedean Cauchy-complete MV-algebras form a variety". 6 days.

Visits hosted

2024	**S. van Gool.** At University of Birmingham, UK. School of Computer Science. 5 days.
2023	**A. Přenosil.** At University of Salerno, Italy. Department of Mathematics. 5 days.
2023	**F. Guffanti.** At University of Salerno, Italy. Departmente of Mathematics. 2 days

Schools and courses

Upcoming: Sept. 2024	**"Proof and Computation" autumn school 2021** Fischbachau, Germany.
June 2024	**Topology, Algebra and Categories in Logic 2024 Summer School.** Barcelona, Spain.
April 2023	**Midlands Graduate School 2024.** Leicester, UK.
Spring term 2023/24	**Course "Advanced Functional Programming" (with Agda).** University of Birmingham, UK.
Fall term 2023/24	**Course "Functional Programming" (with Haskell).** University of Birmingham, UK.
Fall term 2023/24	**Course "An introduction to the theory of profinite groups".** University of Salerno, Italy.
June 2022	**Topology, Algebra and Categories in Logic 2022 Summer School.** Praia de Mira, Portugal.
June 2019	**Topology, Algebra and Categories in Logic 2019 Summer School.** Île de Porquerolles, France.

Reviewing activities

Peer reviewer for international journals and conferences.

Academic associations

Member of the Italian Association for Logic and its Applications (AILA).

Languages

Italian	**Mother tongue**.
English	**Fluent**. (2017/02/18: TOEFL IBT 106/120.)
Spanish	**Intermediate**.
German	**Basic**. (2016/10/12: B2 certificate issued by University of Stuttgart, Germany.)