

# Vittorio Cipriani - Curriculum Vitae

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NATIONALITY: Italian

## Education

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- 05/23     *PhD in Computer Science, Mathematics and Physics, University of Udine, Italy*  
Dissertation title: "Many problems, different frameworks: classification of problems from computable analysis to algorithmic learning theory". Supervised by Alberto Marcone and Luca San Mauro
- 09/19     *MSc in Computer Science, University of Camerino, Italy (last year at TU Wien)*  
Dissertation title: "Algorithmic Learning of Computable Structures". Supervised by Ekaterina Fokina, Luca San Mauro and Carlo Toffalori. Grade: 110 with distinction out of 110
- 07/17     *BSc in Computer Science, University of Camerino, Italy*  
Dissertation title: "Towards a Workbench for Topological Data Analysis". Supervised by Emanuela Merelli.  
Grade: 110 with distinction out of 110

## Positions

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- 09/23-     Technische Universität Wien, Institut für Diskrete Mathematik und Geometrie  
Postdoctoral fellow

## Net Research Experience

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Total: 5 years and 1 month.

- Before PhD 3 years and 1 month of research  
PhD program duration: 6 semester and 1 trimester full-time, with 2 months dedicated to teaching duties and training.
- After PhD 2 years of research

## Research Interests

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KEYWORDS: Computable analysis, Weihrauch reducibility, computability theory, algorithmic learning theory, computable structure theory, descriptive set theory.

MAIN RESULTS:

- Studied connections between reverse mathematics and Weihrauch reducibility, leading to the first systematic study of theorems at the level of  $\Pi_1^1\text{-CA}_0$  (see [3] below).
- Investigated various graph theoretic problems through the lenses of Weihrauch reducibility and (effective) descriptive set theory (see [4,5] below).
- Introduced and developed the novel framework of  $E$ -learnability allowing to calibrate the complexity of (non) learnable families of structures and revealing unexpected connections among algorithmic learning theory and descriptive set theory (see [1,2,6,7] below).

## Publications and ongoing research

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- [1] Calculating the Mind Change Complexity of Learning Algebraic Structures (with Bazhenov and San Mauro). In: Berger, U., Franklin, J.N.Y., Manea, F., Pauly, A. (eds) *Revolutions and Revelations in Computability*. CiE 2022. Lecture Notes in Computer Science, vol 13359, [https://doi.org/10.1007/978-3-031-08740-0\\_1](https://doi.org/10.1007/978-3-031-08740-0_1).
- [2] Learning algebraic structures with the help of Borel equivalence relations (with Bazhenov and San Mauro). In *Theoretical Computer Science*, 2023, <https://doi.org/10.1016/j.tcs.2023.113762>. Available at <https://arxiv.org/abs/2110.14512>.
- [3] The Weihrauch lattice at the level of  $\Pi_1^1$ – $CA_0$ : the Cantor-Bendixson theorem (with Marcone and Valenti). In *The Journal of Symbolic Logic*, 2025, doi:10.1017/jsl.2024.72. Available at <https://arxiv.org/abs/2210.15556>.
- [4] The complexity of finding supergraphs (with Pauly), In: Della Vedova, G., Dundua, B., Lempp, S., Manea, F. (eds) *Unity of Logic and Computation*. CiE 2023. Lecture Notes in Computer Science, vol 13967. Springer, Cham., [https://doi.org/10.1007/978-3-031-36978-0\\_15](https://doi.org/10.1007/978-3-031-36978-0_15).
- [5] Embeddability of graphs and Weihrauch degrees (with Pauly), *In Journal of Mathematical Logic* 2025, <https://doi.org/10.1016/j.tcs.2023.113762>. Available at <https://arxiv.org/abs/2305.00935>.
- [6] Classifying different criteria for learning algebraic structures (with Bazhenov, Jain, San Mauro and Stephan), *In Annals of Pure and Applied Logic*, <https://doi.org/10.1016/j.apal.2025.103648>. Available at <https://arxiv.org/abs/2410.22933>.
- [7] On the learning power of Friedman-Stanley jumps (with Marcone and San Mauro), *submitted for publication*. Available at <https://www.arxiv.org/pdf/2501.12846>.
- [8] On statistical learning of graphs (with Delle rose, San Mauro and Soldà), *submitted for publication*. Available at <https://arxiv.org/abs/2507.13054>.
- [9] Uniformity in learning structures (with Rossegger), *submitted for publication*. Available at <https://arxiv.org/abs/2512.01867>.
- [10] Hyperarithmetic Aspects of Unfriendly Partitions of Recursive Graphs (with Belanger, Goh, Richter, Stephan, and Tang), *in preparation*.
- [11] Dichotomy results for classes of countable graphs (with Fokina, Harrison-Trainor, Ko and Rossegger), *in preparation*.

## Selected Talks

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### INVITED TALKS

- 07/24 “On the computational complexity of unfriendly partitions”  
*Computability and Complexity in Analysis* Swansea University (UK)
- 07/24 “Characterizing learnability for families of structures”  
*AMS-UMI International Joint Meeting (Computability Theory special session)*, University of Palermo (Italy)
- 03/24 “Classifying isomorphism problems and learning of algebraic structures”  
*UW Logic Seminar (online)*, University of Wisconsin-Madison (USA)
- 10/21 “Cantor-Bendixson Theorem in the Weihrauch lattice”  
*Midwest Computability Seminars (online)*, University of Wisconsin-Madison (USA)

### CONTRIBUTED TALKS

20 contributed talks given at international meetings, including several editions of Logic Colloquium, Computability in Europe, Computability and Complexity in Analysis, Computability, Complexity and Randomness and Continuity, Computability and Constructivity.

### INVITED PARTICIPATIONS

- 03/25      “Weihrach Complexity: Structuring the Realm of Non-Computability”
- 03/22      “New directions in computability theory” at CIRM, Luminy (France)

## Research Visits

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- 05/25      University of Bari (3 weeks)
- 05/24      National University of Singapore (3 weeks)
- 04/24      University of Bari (3 weeks)
- 12/22      Swansea University (3 months)

## Events

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- 07/24      (Co-organizer) “Computable structure theory and interactions” (TU Wien)
- 01/23      (Staff member) “UNESCO World Logic Day” (University of Udine)
- 07/21      (Co-organizer) “Equivalences, Numberings, Reducibilities”, a satellite event of the 8th european congress of mathematics, University of Udine (online)

## Teaching Experience

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- 21-22      Teaching assistant for Linear Algebra (BSc in Computer Science, University of Udine)

## Awards and Grants

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- 22-24      Association for Symbolic Logic Travel Grant for: Logic Colloquium 2022, 2024 and Computability, Complexity and Randomness 2023
- 04/18      Merit Prize from the association “Pozzo di Miele” for MSc students

## Services to the field

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### CURRENT MEMBERSHIPS

*Associazione Italiana di Logica e sue Applicazioni (AILA), Computability in Europe and American Mathematical Society.*

### REVIEWER

Journals: Theoretical Computer Science, Journal of Symbolic Logic.

SCIENTIFIC DISSEMINATION Member of “AILA x MaddMaths” (<https://maddmaths.simai.eu/aila/>) for the dissemination and communication of logic.

## Languages

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ITALIAN (mother tongue), ENGLISH (fluent spoken and written) GERMAN (basic).