### Vittorio Cipriani - Curriculum Vitae

## **Personal details**

ADDRESS: Institut für Diskrete Mathematik und Geometrie, Technische Universität Wien (TU Wien) Wiedner

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PLACE OF BIRTH: Macerata (MC), Italy

NATIONALITY: Italian

## Education

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

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

### **Research Interests**

<u>KEYWORDS</u>: 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 Π<sup>1</sup><sub>1</sub>-CA<sub>0</sub> (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

- Calculating the Mind Change Complexity of Learning Algebraic Structures (with Nikolay Bazhenov and Luca 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. Springer, Cham. https://doi.org/10.1007/978-3-031-08740-0\_1;
- [2] Learning algebraic structures with the help of Borel equivalence relations (with Nikolay Bazhenov and Luca San Mauro). In Theoretical Computer Science, 951:113762, 2023. Available at https://arxiv. org/abs/2110.14512;
- [3] The Weihrauch lattice at the level of Π<sup>1</sup><sub>1</sub>-CA<sub>0</sub>: the Cantor-Bendixson theorem (with Alberto Marcone and Manlio Valenti). In *The Journal of Symbolic Logic*, published online 2025:1-39. doi:10.1017/jsl.2024.72. Available at https://arxiv.org/abs/2210.15556;
- [4] The complexity of finding supergraphs (with Arno 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.
- [5] Embeddability of graphs and Weihrauch degrees (with Arno Pauly), accepted for publication in The Journal of Mathematical Logic. Available at https://arxiv.org/abs/2305.00935;
- [6] Classifying different criteria for learning algebraic structures (with Nikolay Bazhenov, Sanjay Jain, Luca San Mauro and Frank Stephan), *submitted for publication*. Available at https://arxiv.org/abs/ 2410.22933;
- [7] On the learning power of Friedman-Stanley jumps (with Alberto Marcone and Luca San Mauro), submitted for publication. Available at https://www.arxiv.org/pdf/2501.12846;
- [8] On statistical learning of graphs (with Valentino Delle rose, Luca San Mauro and Giovanni Soldà), submitted for publication;

[9] Hyperarithmetic Aspects of Unfriendly Partitions of Recursive Graphs (with David Belanger, Jun Le Goh, Linus Richter, Frank Stephan, and Haoyun Tang) *in preparation*.

## Selected Talks

#### 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

19 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

03/22 "New directions in computability theory" at CIRM, Luminy (France)

## **Research Visits**

05/24 Nationa	University of Sing	apore (3 weeks)
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- 04/24 University of Bari (3 weeks)
- 12/22 Swansea University (3 months)

## **Events**

- 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**

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

# Awards and Grants

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

CIRRENT 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.

## Languages

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