Vittorio Cipriani - Curriculum Vitae

Personal details

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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

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 $\mathbf{\Pi}^1_1\text{-}\mathsf{CA}_0$ (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

[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. 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 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 $\mathbf{\Pi}^1_1-\mathsf{CA}_0$: 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`.

[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*;

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

[10] Dichotomy results for classes of countable graphs (with Fokina, Harrison-Trainor, Ko and Rossegger) *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

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	"Weihrauch Complexity: Structuring the Realm of Non-Computability"
03/22	"New directions in computabilty theory" at CIRM, Luminy (France)

Research Visits

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

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

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

Italian (mother tongue), English (fluent spoken and written) German (basic).