

Antonio Casares

Postdoctoral Researcher in Theoretical
Computer Science

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Birth date: 11 April 1997

Last update: February 2025

Research Experience

- Dec 2023 – **PostDoc**, University of Warsaw, (Poland)
Now Project: *Polynomial Finite State Computation*.
Supervisor: Mikołaj Bojańczyk.
- Oct 2020 – **PhD Thesis**, LaBRI, Université de Bordeaux, (France)
Nov 2023 Title: *Structural properties of automata over infinite words and memory for games*.
Supervisors: Nathanaël Fijalkow and Igor Walukiewicz.
PhD Thesis Award “Science and Technology” from the University of Bordeaux.
- April 2020 – **Master Thesis**, IRIF, Université de Paris, (France)
July 2020 Title: *Optimal transformations of Muller conditions*.
Supervisors: Thomas Colcombet and Nathanaël Fijalkow.
- Sept 2018 – **Bachelor Thesis**, Universidad de Valladolid, (Spain)
July 2019 Title: *Valuations, Hardy fields and o-minimal structures*.
Supervisor: Fernando Sanz Sánchez.

Education

- 2019 – 2020 **Master in Mathematical Logic and Foundations of Computer Science**,
Université de Paris, (France), Average grade: 19.26/20
Supported by the Fondation Sciences Mathématiques de Paris.
- 2015 – 2019 **Bachelor in Mathematics**, Universidad de Valladolid, (Spain), Average grade:
8.88/10
Premio Extraordinario Fin de Grado (Special award for the best student record).
- 2018 – 2019 **Erasmus exchange program**, Université de Versailles, (France), Average
grade: 18.74/20
Courses of the first year of master on algebra and cryptography.

Publications

Book chapters

- To appear **Positionality and Memory**, in “Games on Graphs” (Cambridge University
Press), with Pierre Ohlmann and Pierre Vandenhove, edited by Nathanaël
Fijalkow
<https://antonio-casares.github.io/Publications/ChapterMemory.pdf>

Journals

- TheoretiCS 2024 **From Muller to Parity and Rabin Automata: Optimal Transformations Preserving (History) Determinism**, with Thomas Colcombet, Nathanaël Fijalkow and Karoliina Lehtinen
<https://theoretics.episciences.org/11336>
- LMCS 2024 **Half-Positional Objectives Recognized by Deterministic Büchi Automata**, with Patricia Bouyer, Mickael Randour and Pierre Vandenhover
<https://lmcs.episciences.org/14130>
- LMCS - Accepted for publication **Characterising Memory in Infinite Games**, with Pierre Ohlmann
<https://arxiv.org/abs/2209.12044>

Journal papers under review

- Summitted to TheoretiCS **Positional ω -regular languages**, with Pierre Ohlmann
<https://arxiv.org/abs/2401.15384>
- Set to be submitted to LMCS **Infinite lexicographic products of positional objectives**, with Pierre Ohlmann, Michał Skrzypczak and Igor Walukiewicz
<https://antonio-casares.github.io/Publications/COSW25Lexico.pdf>

Conference papers under review

- Summitted to ICALP 2025 **The memory of ω -regular and $\text{BC}(\Sigma_2^0)$ objectives**, with Pierre Ohlmann
<https://arxiv.org/abs/2502.05840>

Peer-reviewed international conferences

- CSL 2025 **On the Minimisation of Deterministic and History-Deterministic Generalised (co)Büchi Automata**, with Olivier Idir, Denis Kuperberg, Corto Mascle and Aditya Prakash
<https://arxiv.org/abs/2407.18090>
- TACAS 2025 **Fast value iteration: A uniform approach to efficient algorithms for energy games**, with Michaël Cadilhac and Pierre Ohlmann
<https://antonio-casares.github.io/Publications/CC025FVI.pdf>
- LICS 2024 **Positional ω -Regular Languages**, with Pierre Ohlmann
<https://antonio-casares.github.io/Publications/C024-LICS-Positional.pdf>
- MFCS 2024 **The Complexity of Simplifying ω -Automata through the Alternating Cycle Decomposition**, with Corto Mascle
DOI: 10.4230/LIPIcs.MFCS.2024.35
- SOSA 2024 **Simple and Tight Complexity Lower Bounds for Solving Rabin Games**, with Marcin Pilipczuk, Michał Pilipczuk, Uéverton S. Souza, K. S. Thejaswini
DOI: 10.1137/1.9781611977936.16
- ICALP 2023 **Characterising Memory in Infinite Games**, with Pierre Ohlmann
DOI: 10.4230/LIPIcs.ICALP.2023.122

- CONCUR 22, **Half-Positional Objectives Recognized by Deterministic Büchi Automata**, with Patricia Bouyer, Mickael Randour and Pierre Vandenhover
IJCAI 2023
DOI: 10.4230/LIPIcs.CONCUR.2022.20
○ Invited for publication in LMCS special issue.
○ Invited for presentation at IJCAI 2023 (Best Papers from Sister Conferences Track).
<https://www.ijcai.org/proceedings/2023/713>
- ICALP 2022 **On the Size of Good-For-Games Rabin Automata and its Link with the Memory in Muller Games**, with Thomas Colcombet and Karoliina Lehtinen
DOI: 10.4230/LIPIcs.ICALP.2022.117
- TACAS 2022 **Practical Applications of the Alternating Cycle Decomposition**, with Alexandre Duret-Lutz, Klara J. Meyer, Florian Renkin and Salomon Sickert
DOI: 10.1007/978-3-030-99527-0_6
- CSL 2022 **On the Minimisation of Transition-Based Rabin Automata and the Chromatic Memory Requirements of Muller Conditions**
DOI: 10.4230/LIPIcs.CSL.2022.12
○ Helena Rasiowa Award (Best Student Paper Award).
○ Invited for publication in LMCS special issue (declined).
- ICALP 2021 **Optimal Transformations of Games and Automata using Muller Conditions**, with Thomas Colcombet and Nathanaël Fijalkow
DOI: 10.4230/LIPIcs.ICALP.2021.123
- Preprints**
- 2024 **A positional Π_0^3 -complete objective**, with Pierre Ohlmann and Pierre Vandenhover
<https://arxiv.org/abs/2410.14688>

Papers in preparation

- Survey **Transition-based vs state-based acceptance for ω -automata**, single author

Awards and Honours

Thesis Prize “Sciences and Technologies”, *Award for excellent thesis dissertation*, Université de Bordeaux, 2024

Helena Rasiowa Award for the Best Student Paper Award, CSL 2022
Laureate of the *Paris Graduate School of Mathematics (PGSM)*,
Scholarship awarded by the Fondation Sciences Mathématiques de Paris, 2019

Premio extraordinario fin de grado, *Special award to the best record of the undergraduate degree*, Universidad de Valladolid, 2019

Supervising activities

- May 2025 - **Alan Le Brech. Two-month M1 internship**, *Topic: Universal value-iteration algorithms*, (100% supervision)
August 2025 University of Warsaw, Poland.
- Sept 2024 - **Kacper Lewandowski. Master Thesis**, *Topic: On the size of deterministic and history-deterministic automata*, (100% supervision)
June 2025 University of Warsaw, Poland.
- Nov 2024 - **Tutoring students presenting papers in the master's seminar**
March 2025 University of Warsaw, Poland.
- Oct 2023 **Kacper Lewandowski. 3 weeks internship**, *Topic: Lower bounds for energy-games algorithms*, (with Nathanaël Fijalkow and Pierre Vandenhover, 33% supervision)
LaBRI, Université de Bordeaux.

Talks

Fast value iteration: A uniform approach to energy-game solvers

- Program Synthesis days, LaBRI, Bordeaux (France), Nov 2024.
- Automata Seminar, MIMUW, University of Warsaw (Poland), Oct 2024.

A characterisation of positionality for ω -regular languages

- LICS 2024, Tallin (Estonia).
- Seminar “Model Checking and Synthesis”, LMF, Saclay (France), Oct 2024.
- Automata Seminar, MIMUW, University of Warsaw (Poland), Dec 2023
- Automata Seminar, IRIF, Paris (France), Oct 2023.
- Seminar LX Team, LaBRI, Bordeaux (France), Sept 2023.

State-based vs transition-based acceptance for ω -automata

- Highlights 2024 (France), September 2024.
- GT DAAL Meeting, Rennes (France), April 2024.
- Seminar MOVE Team, LIS, Marseille (France), April 2024.

A correspondence between memory and automata for Muller languages

- Automata Seminar, MIMUW, University of Warsaw (Poland), Dec 2022
- CSL 2022, (Online).
- Highlights 2021 (Online).
- Seminar MOVE Team, LIS, Marseille (France), Dec 2021.
- Seminar LX Team, LaBRI, Bordeaux (France), Nov 2021.

Half-positional objectives recognized by deterministic Büchi automata

- Meeting GT Verif, LaBRI, Bordeaux (France), July 2022.
- ANR Delta Meeting, CIRM, Marseille (France), May 2022.

On the size of good-for-games Rabin automata and its link with the memory in Muller games

- Highlights 2022, Paris (France).
- ICALP 2022, Paris (France).
- Seminar MOVE Team, LIS, Marseille (France), Dec 2021.

On the minimisation of transition-based Rabin automata

- Seminar at the Hebrew University of Jerusalem (Israel) (online), July 2021.
- ANR Delta Meeting, IRIF, Paris (France), June 2021.

Optimal transformations of games and automata using Muller conditions

- ICALP 2021 (online).
- Automata Seminar, IRIF, Paris (France), July 2021.
- Formal Methods Seminar, LaBRI, Bordeaux (France), Dec 2020.
- Meeting GT ALGA (online), June 2021.

Some logical paradoxes

- PhD Student Seminar, LaBRI, Bordeaux (France), March 2023.

The synthesis problem: from logic to games

- Student Seminar of the Toulouse Mathematics Institute (online), Feb 2021.

Can we program using only for loops?

- National Meeting of Mathematics Students (ENEM) (online), July 2020.

Organization of Scientific Events and Professional Activities

Oct 2021 – Now	Publicity Chair of the International Conference “Highlights of Logic, Games and Automata” <i>Member of the Steering Committee.</i>
Dec 2021 – Dec 2022	Vice-president of the AFoDIB (PhD student association) <i>LaBRI and INRIA, Bordeaux, France.</i>
Sept 2021 – Sept 2022	Co-organizer of the Formal Methods and Models Seminar <i>LaBRI, Bordeaux, France.</i>
Sept 2021 – Dec 2022	Organizer of the Sémi-doc Seminar (PhD student seminar) <i>LaBRI and INRIA, Bordeaux, France.</i>
Mars 2021 – Nov 2023	Member of the board of the AFoDIB (PhD student association) <i>LaBRI and INRIA, Bordeaux, France.</i>
Sept 2020	Member of the Organizing Committee of Highlights of Logic, Games and Automata <i>Online.</i>

Reviewing activities

Conferences	Reviewer for LICS (2021, 2022, 2024, 2025), ICALP (2024), CAV (2025), SODA (2025), STACS (2022, 2023, 2025), MFCS (2021, 2022, 2024), FSTTCS (2021, 2022), FOSSACS (2023), LATIN (2024), DLT (2023), GandALF (2021).
Journals	Reviewer for LMCS (2024, 2025), ToCL (2021).

Participation in Invitation-Based Scientific Events

Jan – May 2021	Simons Institute Spring 2021 research program “Theoretical Foundations of Computer Systems program” (online).
Autumn 2025	Invitation of Bakh Khoussainov for a research stay in The University of Electronic Science and Technology of China (UESTC) to work in games on graphs.
July 2024	Autobóz research camp (Keibu, Estonia).
Jun 2024	Dagstuhl Seminar “Stochastic Games”.
Sept 2023	Dagstuhl Seminar “The Futures of Reactive Synthesis”.

July 2023	Autobóz research camp (Kassel, Germany).
April 2022	Nomad Automata Workshop (Hauteluce, France).
Nov 2021	Dagstuhl Seminar “Unambiguity in Automata Theory” (online participation).
Dec 2022	Visit to the automata team of MIMUW, University of Warsaw, Poland.
2021 – 2024	Frequent visits to the laboratories IRIF (Paris), and LIS (Marseille).

Teaching

- Fall 2023 **Algorithmic Aspects of Game Theory (3rd-4th year bachelor)**, *Problem sessions + 2 lectures*
University of Warsaw, Poland.
- Fall 2022 **Programmation Impérative 1 (3rd year bachelor)**, *Teacher assistant*, 20 hours, Programming in C
ENSEIRB-MATMECA, Bordeaux INP, France.
- Fall 2022 **Systèmes de Gestion de Bases de Données (4th year bachelor)**, *Teacher assistant*, 12 hours, Database modeling and SQL
ENSEIRB-MATMECA, Bordeaux INP, France.
- Spring 2022 **Algorithmique des Tableaux (1st year bachelor)**, *Teacher assistant*, 32 hours, Sorting algorithms in Python
Université de Bordeaux, France.
- Spring 2022 **Modèles de la Programmation et du Calcul (3rd year bachelor)**, *Teacher assistant*, 32 hours, Automata theory
Université de Bordeaux, France.
- Spring 2021 **Modèles de la Programmation et du Calcul (3rd year bachelor)**, *Teacher assistant*, 32 hours, Automata theory
Université de Bordeaux, France.
- Fall 2020 **Coloration Informatique (1st year bachelor)**, *Teacher assistant*, 32 hours, Programming project in Python
Université de Bordeaux, France.

Languages

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| ○ Spanish: Native | ○ French: Fluent |
| ○ English: Fluent | ○ Polish: Basic |

Other Interests

Music (violin and piano, former member of several orchestras: OSiUP, JOUVA, BISYOC). Philosophy of science, language and the mind. Sports (ultimate frisbee and badminton). Dancing. Board games.