

# Sebastián Barbieri

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Chilean-Italian  
born in August 1, 1989, Temuco, Chile

## Employment and education

- 2019–2020 **Postdoctoral position**, *LaBRI, Université de Bordeaux*, under the supervision of Sébastien Labbé.
- 2017–2019 **Postdoctoral Fellow**, *Department of mathematics of the University of British Columbia*, under the supervision of Brian Marcus.
- 2014–2017 **PhD**, *École Normale Supérieure de Lyon*, under the supervision of Nathalie Aubrun and Stéphan Thomassé.  
Title : *Shift spaces on groups: computability and dynamics*.
- 2014–2014 **Second semester of Master 2**, *École Normale Supérieure de Lyon*.
- 2008–2014 **Civil Mathematical Engineering**, *Universidad de Chile*.
- 2008–2013 **Bachelor's degree in engineering sciences, mention mathematics**, *Universidad de Chile*.

## Publications

### Journals

- [1] Sebastián Barbieri and Felipe García-Ramos. A hierarchy of topological systems with completely positive entropy. *Journal d'Analyse Mathématique*, in press.
- [2] Sebastián Barbieri, Ricardo Gómez, Brian Marcus, and Siamak Taati. Equivalence of relative Gibbs and relative equilibrium measures for actions of countable amenable groups. *Nonlinearity*, in press.
- [3] Nathalie Aubrun, Sebastián Barbieri, and Stéphan Thomassé. Realization of aperiodic subshifts and uniform densities in groups. *Groups, Geometry, and Dynamics*, 13(1):107–129, 2019.
- [4] Sebastián Barbieri. A geometric simulation theorem on direct products of finitely generated groups. *Discrete Analysis*, 9:25, 2019.
- [5] Sebastián Barbieri and Mathieu Sablik. A generalization of the simulation theorem for semidirect products. *Ergodic Theory and Dynamical Systems*, 39(12):3185–3206, 2019.
- [6] Nathalie Aubrun, Sebastián Barbieri, and Mathieu Sablik. A notion of effectiveness for subshifts on finitely generated groups. *Theoretical Computer Science*, 661:35–55, 2017.

### Conference Proceedings

- [7] Nathalie Aubrun, Sebastián Barbieri, and Etienne Moutot. The Domino Problem is Undecidable on Surface Groups. In *44th International Symposium on Mathematical Foundations of Computer Science (MFCS 2019)*, volume 138 of *Leibniz International Proceedings in Informatics (LIPIcs)*, pages 46:1–46:14, 2019.
- [8] Sebastián Barbieri, Jarkko Kari, and Ville Salo. The group of reversible Turing machines. In *Cellular Automata and Discrete Complex Systems*, pages 49–62. Springer International Publishing, 2016.
- [9] Sebastián Barbieri and Mathieu Sablik. The domino problem for self-similar structures. In *Pursuit of the Universal*, pages 205–214. Springer International Publishing, 2016.

## Book Chapters

- [10] Nathalie Aubrun, Sebastián Barbieri, and Emmanuel Jeandel. About the domino problem for subshifts on groups. In *Sequences, Groups, and Number Theory*, pages 331–389. Springer International Publishing, 2018.

## Preprints

- [11] Sebastián Barbieri, Felipe García-Ramos, and Hanfeng Li. Markovian properties of continuous group actions: algebraic actions, entropy and the homoclinic group. *arXiv:1911.00785 [math]*, 2019.
- [12] Sebastián Barbieri. On the entropies of subshifts of finite type on countable amenable groups. *arXiv:1905.10015 [math]*, 2019.

## Thesis and Memoires

- [13] Sebastián Barbieri. *Shift spaces on groups : computability and dynamics*. Theses, Université de Lyon, June 2017.
- [14] Sebastián Barbieri. Subshifts generados por sustituciones multidimensionales. *Memoria Ingeniería Universidad de Chile*, 2014.
- [15] Sebastián Barbieri. Tilings on different structures: exploration towards two problems. *Memoire M2 ENS de Lyon*, 2014.

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## Teaching

### Lectures:

- 2018-1 **MATH200**, *Calculus III*, Sep 04 - Nov 30, 3h weekly, University of British Columbia.
- 2018-1 **MATH104**, *Differential Calculus with Applications to Commerce and Social Sciences.*, Sep 04 - Nov 30, 3h weekly, University of British Columbia.
- 2018-3 **MATH253**, *Multivariable Calculus*, May 14 - Jun 21, 7h weekly, University of British Columbia.
- 2017-1 **MATH253**, *Multivariable Calculus*, Sep 05 - Dec 01, 3h weekly, University of British Columbia.

### Teaching Assistantships

- 2019-1 **Coloration Informatique**, *TPL1, 40h French*, Université de Bordeaux.
- 2017-1 **Logic**, *TDL3, 32h French*, ENS de Lyon.
- 2016-2 **LIFAP1 Programming on C++**, *TPL1, 24h French*, Université Lyon 1.
- 2016-1 **Foundations of Informatics**, *TDL3, 32h French*, ENS de Lyon.
- 2016-1 **Optimization**, *TDM1, 28h English*, ENS de Lyon.
- 2015-2 **Computer architecture**, *TPL2, 22h French*, Université Lyon 1.
- 2015-2 **ACM**, *TPL3 48h French*, ENS de Lyon.
- 2013-2 **Dinámica simbólica**, *21h Spanish*, Universidad de Chile.
- 2013-1 **Teoría de la información**, *21h Spanish*, Universidad de Chile.
- 2013-1 **Combinatoria**, *21h Spanish*, Universidad de Chile.
- 2012-2 **Teoría de juegos**, *21h Spanish*, Universidad de Chile.
- 2011-1 **Ecuaciones diferenciales ordinarias**, *42h Spanish*, Universidad de Chile.
- 2010-2 **Álgebra lineal**, *21h Spanish*, Universidad de Chile.

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## Awards and scholarships

- 2013 **Honorable Mention in ACM IPCP world finals**, *Saint Petersburg, Russia*.
- 2012 **First place in ACM IPCP - Latin America Programming Contest Chile**, *Valparaíso*.

- 2008-2012 **Outstanding student**, *Universidad de Chile*, 2008, 2009, 2010, 2011, 2012.  
2007 **Andrés Bello scholarship for the best admission score in the national selection test in Engineering**, *Universidad de Chile*.

## Responsibilities

- 2019 **Co-organizer of the EJCIM school**, [\[webpage\]](#) .  
2017 **Co-organizer of the EJCIM school**, [\[webpage\]](#) .  
2015–2017 **Organizer of the MC2 seminar in the LIP of ENS de LYON**, [\[webpage\]](#).  
2016 **Co-organizer of the SDA2 group workshop**, [\[webpage\]](#).

## Mini courses

- 01/2018 **UNAM, Mexico**, *Winter school on dynamics and groups*, Symbolic dynamics on groups, [\[webpage\]](#),[\[PDF1\]](#),[\[PDF2\]](#),[\[PDF3\]](#),[\[PDF4\]](#).

## Talks with slides or videos

- 05/2019 **Symbolic Dynamical Systems, Oaxaca**, *Topological entropies of subshifts of finite type in countable amenable groups*, [\[PDF\]](#)[\[VIDEO\]](#).  
12/2018 **Conference on Computability, Complexity and Randomness**, *The domino problem for word-hyperbolic groups*, [\[PDF\]](#).  
03/2018 **Algorithmic questions in dynamical systems, Toulouse**, *A strongly aperiodic SFT in the Grigorchuk group*, [\[PDF\]](#).  
06/2017 **Pingree Park, Colorado**, *A strongly aperiodic SFT in the Grigorchuk group*, [\[PDF\]](#).  
06/2017 **PhD defense, ENS de Lyon**, *Shift spaces on groups: computability and dynamics*, [\[PDF\]](#).  
06/2017 **Workshop dyadisc, Amiens**, *Realizability of non-expansive dynamics and applications*, [\[PDF\]](#).  
05/2017 **Séminaire Automata IRIF, Paris**, *Symbolic dynamics and simulation theorems*, [\[PDF\]](#).  
04/2017 **Séminaire Ernest, Marseille**, *Strongly aperiodic subshifts in countable groups*, [\[PDF\]](#).  
03/2017 **Séminaire de combinatoire et théorie des nombres, Lyon**, *Strongly aperiodic subshifts in countable groups*, [\[PDF\]](#).  
03/2017 **Wroclaw**, *The torsion problem for the automorphism group of a full  $\mathbb{Z}^d$ -shift and its topological fullgroup*, [\[PDF\]](#).  
12/2016 **CMM, Santiago**, *The group of reversible Turing machines and the torsion problem for  $\text{Aut}(\mathcal{A}^{\mathbb{Z}^d})$  and related topological fullgroups*, [\[PDF\]](#).  
06/2016 **CIE, Paris**, *The domino problem for self-similar structures*, [\[PDF\]](#).  
06/2016 **AUTOMATA, University of Zurich**, *The group of reversible Turing machines*, [\[PDF\]](#).  
05/2016 **Interactions, ENS de Lyon**, *Une courte preuve de l'existence des subshifts fortement aperiodiques sur les groupes dénombrables*, [\[PDF\]](#).  
03/2016 **Séminaire de la détente mathématique, ENS de Lyon**, *Que pensent les mosaïques de la monotonie ?*, [\[PDF\]](#).  
01/2016 **Séminaire LAMA, Chambéry**, *A short proof of the existence of non-empty strongly aperiodic subshifts over  $\{0, 1\}$  in countable groups*, [\[PDF\]](#).  
12/2015 **Séminaire LAMFA, Amiens**, *A short proof of the existence of non-empty strongly aperiodic subshifts over  $\{0, 1\}$  in countable groups*, [\[PDF\]](#).  
11/2015 **Séminaire LACL, Paris-est Creteil**, *The domino problem for structures between  $\mathbb{Z}$  and  $\mathbb{Z}^2$* , [\[PDF\]](#).

- 10/2015 **Turku Seminar**, *The domino problem for structures between  $\mathbb{Z}$  and  $\mathbb{Z}^2$* , [\[PDF\]](#).
- 10/2015 **Séminaire Combinatoire et Algorithmes de Rouen**, *Subshifts in groups: From square-free words on graphs to aperiodic subshifts*, [\[PDF\]](#).
- 04/2015 **Journées Calculabilités Fontainebleau**, *Effectiveness and aperiodicity of subshifts*, [\[PDF\]](#).
- 04/2015 **EJCIM**, *Effective subshifts in finitely generated groups*, [\[PDF\]](#).
- 11/2014 **LIAFA**, *Effectiveness in finitely generated groups*, [\[PDF\]](#).

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## Other

- 2019 I was interviewed (audition) in the "concours CNRS section 41/04"
- 2018–2022 French "qualification MCF" in sections 25 and 27.
- 2015–present I contribute problems each year for the Chilean computer science Olympiads, [\[LINK\]](#).
- 2014–2017 I participated in MATH.en.JEANS to encourage research in young people.

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## Languages

Spanish (native), English (fluent), French (fluent) and Italian (intermediate).  
C, C++, Java, Python, Sage.

Last updated: January 10, 2020