Agathe Herrou, Ph.D.

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https://github.com/aherrou/

Research Interests

- Computer music
- Digital signal processing
- Programming languages theory
- Non-linear optimisation
- Computational geometry

Professional Experience

- **Post-doctoral researcher,** Grame CNCM/Inria, Lyon, France. (Oct. 2022 – April 2024)
  - Fixed-point precision computation for optimisation of Faust programs on FPGAs
  - Implementation of a precision inference system in the Faust compiler
  - Mentoring a GSoC project: *Integration of autodifferentiation in the Faust Compiler*
  - Organising the Journée Live Coding, the first French conference on the topic of live-coding
- **Teaching Assistant,** Université Claude Bernard Lyon 1, Lyon, France. (Sept. 2018 – Oct. 2022)
  Courses taught:
  - C++ programming: beginner and advanced level
  - Functional programming (scheme): beginner and advanced level
  - Computer architecture
  - Classical logic and computer languages theory
  - Advanced databases
- **Ph.D. in Computer Science, Université Claude Bernard Lyon 1 (France)** (Sept. 2018 – Oct. 2022)
  Thesis title: *Symmetrised semi-discrete optimal transport for mesh interpolation*
- **Research Internship, Loria, Nancy (France)** (Jan. 2018 – June 2018)
  Subject: *Symmetrised semi-discrete optimal transport*
- **Research Internship, Università di Bologna (Italy)** (Sept. 2017 – Dec. 2017)
  Subject: *Markovian decision processes*
- **Master Research Internship, Université Claude Bernard Lyon 1 (France)** (Jan. 2017 – Aug. 2017)
  Subject: *An iterative algorithm for symmetrised semi-discrete optimal transport*
- **Bachelor Research Internship, Université Claude Bernard Lyon 1 (France)** (June 2016 – July 2016)
  Subject: *Implementation of completion and homotopic reduction of word rewriting systems in Coq.*
- **Master Research Internship, Università di Bologna (Italy)** (April 2015 – Aug. 2015)
  Subject: *Reducibility and termination in probabilistic extensions of system T.*
- **Bachelor Research Internship, Université Paris 13 (France)** (June 2014 – July 2014)
  Subject: *Formalisation in Coq of the proof of strong normalisation for substitution calculus.*

Education

2018 – 2022 **Ph.D. in Computer Science**, Université Claude Bernard Lyon 1 (France)

2014 – 2017 **M.Sc. Computer Science**, ENS de Lyon (France)

2015 – 2016 **B.Sc. Mathematics**, ENS de Lyon (France)

2013 – 2014 **B.Sc. Computer Science**, ENS de Lyon (France)

Research Publications

Journal Articles

1. A. Herrou, F. de Dinechin, S. Letz, Y. Orlarey, and A. Volkova, "Towards Fixed-Point Formats Determination for Faust Programs," *Journées d'Informatique Musicale*, 2024. URL: https://inria.hal.science/hal-04489647.
2. F. Breuvart, U. D. Lago, and A. Herrou, "On Higher-Order Probabilistic Subrecursion," *CoRR*, vol. abs/1701.04786, 2017. arXiv: 1701.04786. URL: http://arxiv.org/abs/1701.04786.

Preprints

1. A. Herrou, "Jazz-inspired improvisation in TidalCycles," Submitted to ICLC 2025, 2025.
2. A. Herrou, B. Lévy, V. Nivoliers, N. Bonneel, and J. Digne, "Symmetrised semi-discrete optimal transport," 2022. arXiv: 2206.04529 [math.OC]. URL: https://arxiv.org/abs/2206.04529.

Scientific communications

1. A. Herrou, *Better Jazz Improvisation with TidalCycles*, Journée Live Coding, 2024.
2. A. Herrou, *Symmetrised semi-discrete optimal transport*, Groupe de Travail en Modélisation Géométrique, 2022.
3. A. Herrou, *Introduction to TidalCycles and music live-coding*, Programmable Audio Workshop, 2019.

Software contributions

Faust — **Functional language for audio programming**, contributor
Integration of a fixed-point precision determination algorithm to the compiler, C++
https://faust.grame.fr
https://github.com/grame-cncm/faust

Graphite — **3D modelling software**, contributor
Implementation of a fixed-point algorithm and a Newton algorithm for computation of coupled semi-discrete transport plans *(not merged yet)*, C++ and Lua
https://github.com/BrunoLevy/GraphiteThree

Skills

Programming languages	C++, Python, Lua, Bash, Haskell, OCaml, Coq, LaTeX
Formal techniques	Non-linear optimisation, formal proof
Audio/Music languages	Faust, TidalCycles, SuperCollider
Software	GNU/Linux, Emacs, git
Languages	French (native language), English (complete proficiency), Russian (fluent), Dutch (intermediate)

Miscellaneous

Certification

2021 — **CLES Russian Language Certification (B1 Level)**. Official language certification of the French Higher Education Ministry.

Miscellaneous (continued)

2014 **CLES English Language Certification (B2 Level)**. Official language certification of the French Higher Education Ministry.

Science popularisation

2018-2020 **Maths en Jeans**. Introduction to mathematical research for high-school students.

2018, 2019 **Fête de la Science**. Talk about optimal transport for an audience of high-school students.

2018 **Rencontre des Jeunes Mathématiciennes**. Mathematics research workshop for female high-school students.

2017, 2018 **Girls Can Code**. Initiation to computer programming for female high-school students.

Hobbies

Music Clarinet (played in an amateur jazz band for two years), electric bass, live-coding

Languages learning Currently learning Dutch; previously studied Italian and Czech

Crafts Knitting, sewing, crochet

References

Available on Request