Erwann Loulergue

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OBJECTIVE

PhD student in theoretical computer science, focusing on automata theory and formal languages. Experienced in algorithmic complexity, and various types of automata and their applications. I am eager to further explore these themes, contribute to teaching, share my expertise as it expands, and develop new theoretical insights with practical implications in computer science.

EDUCATION

- **LMF / IRIF** *2025–2028*
  PhD, supervised by Benedikt Bollig and Peter Habermehl Saclay / Paris, France
  - In September 2025 I started my PhD on the subject "Learning of extended automata and applications", under the supervision of Benedikt Bollig and Peter Habermehl.

- **Ecole Normale Supérieure Paris-Saclay** *2021–2025*
  Bachelor and master degree Gif-sur-Yvette, France
  - MPRI (Master Parisien de Recherche en Informatique) : received *magna cum laude* (*mention bien*) both years.
  - Third year of double bachelor of computer science and mathematics

- **Lycée du Parc** *2019–2021*
  Preparatory classes Lyon, France
  - Two years of intensive study which act as a preparatory course for entrance exams to the french *"grandes écoles"*. Equivalent to the first two years of bachelor.
  - Admitted to ENS Paris-Saclay through the X-ENS exam

RESEARCH EXPERIENCE

My main research interest is the theory of formal languages, especially automata theory, and its applications to verification. Computability and complexity theory are both very useful and very interesting to me. I also have a particular interest in algorithmics, graph theory, and theoretical mathematics, such as algebra and group theory.

Internships :

- **Complementation of unambiguous automata** *October 2024 - July 2025*
  IMDEA, supervised by Pierre Ganty Madrid, Spain
  - Unambiguous automata are somewhere between deterministic and non-deterministic. Using graph theory techniques, we are trying to improve the upper bound on the complexity of complementing them.

- **Passive learning of symbolic automata** *March - July 2024*
  IRIF, supervised by Peter Habermehl Paris, France
  - We defined a novel algorithm for passive learning of *symbolic* automata, that recognize worlds over alphabets either infinite or too large to be handled. This algorithm improves upon previous state of the art, giving better theoretical bounds and practical properties.

- **Free rotations in packing** *March - July 2023*
  UU, supervised by Tillmann Miltzow Utrecht, Netherlands
  - I studied optimization problems where one tries to find a tightly packed layout of pieces inside a container, in the particular case where continuous rotations are allowed. This problem is $\exists\mathbb{R}$-complete, thus intractable in practice. We defined an approximation algorithm and improved the asymptotic complexity.

- **Expressivity of symmetric and finite-state keyboards** *June - July 2022*
  LaBRI, supervised by V.Penelle and C.Mascle Bordeaux, France
  - I studied a new language model, *keyboards*, and some extensions of the model that give it more expressivity, comparing these models to classical finite automata and pushdown automata.

TEACHING

- **Mathematics and computer science lessons** *2022–ongoing*
  Institut Fibonacci Paris and surroundings
  - I give private lessons in mathematics and computer science to students in preparatory classes for french *"grandes écoles"*.

OTHER SKILLS AND INTERESTS

Programming languages: Python, OCaml
Interests : Drumming, Music, Bouldering, Philosophy, Litterature, Stategy games
Languages spoken : French (native), English (C2), German (B1), Spanish (A1)