

# Curriculum Vitae

## Maher Mallem

7 November 1997 (28 y.o.)

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**Current position:** Postdoctoral researcher at Grenoble INP. GROG team in G-SCOP.

**Research topics:** algorithm design, parameterized complexity theory, scheduling, graph theory.

**Web page:** <https://mahermallem.github.io>

### Education

#### Ph.D. student at LIP6, Sorbonne Université

Paris, France

Oct. 2021 - Oct. 2024

- Dates: from 1 October 2021 to 11 October 2024 (three years).
- **Title:** *Parameterized Complexity and New Efficient Enumerative Schemes for RCPSP*.
- Advisor: Claire Hanen (Université Paris Nanterre & LIP6, Sorbonne Université)
- Three-year contract with Sorbonne Université via EDITE.
- Ph.D. defended on 11 October 2024.
  - Jury president: Bruno Escoffier - Professor.
  - Reviewers: Nadia Brauner - Professor, Imed Kacem - Professor.
  - Examiners: Hans L. Bodlaender - Professor, Michael Lampis - Associate Professor.
  - Ph.D. advisor: Claire Hanen - Professor.
- PGMO Ph.D. Award 2025.

#### Student at École normale supérieure Paris-Saclay

Cachan, France

Sept. 2016 - August 2021

- School diploma obtained in May 2022.
- Master's degree obtained in September 2019. MPRI: Parisian Master of Research in Computer Science.

#### CPGE student at Lycée Saint-Louis

Paris, France

Sept. 2014 - August 2016

- CPGE are 'higher school preparatory classes' in France.

### Experience

#### G-SCOP, Grenoble INP

Grenoble, France

May. 2026 - Now

- Postdoctoral contract (projected for twelve months).
- Subject: Charging scheduling of a fleet of electric buses, taking into account battery degradation
- Supervisors: Marie-Laure Espinouse - Professor, Margaux Nattaf - Assistant Professor, Pierre-Xavier Thivel - Associate Professor (Université Grenoble Alpes).

#### LIP, École Normale Supérieure de Lyon

Lyon, France

Nov. 2024 - April 2026

- Postdoctoral contract (eighteen months).
- Subject: Scheduling radio-astronomical observations
- Supervisors: Frédéric Vivien - Research Director (Inria), Anne Benoit - Professor (ENS de Lyon).

#### LIP6, Sorbonne Université

Paris, France

Oct. 2021 - Oct. 2024

- Three-year doctoral contract.
- Subject: Parameterized Complexity and New Efficient Enumerative Schemes for RCPSP
- Advisor : Claire Hanen - Professor (Université Paris Nanterre & LIP6, Sorbonne Université).

(Gap year. Looking for a Ph.D. opportunity.)

Oct. 2020 - Sept. 2021

#### DIRO, Université de Montréal

Montréal, Canada

Oct. 2019 - July 2020

- ARPE: Full year doing research abroad. Part of my training at ENS Paris-Saclay.
- Subject: Inclusion of horizontal transfers in DL-Super Reconciliation
- Supervisor: Nadia El-Mabrouk - Professor.

#### LRI, Université Paris-Sud/CNRS

Gif-sur-Yvette, France

March 2019 - August 2019

- M2 internship (four months and a half).

- Subject: RNA constrained design by local search: neighborhood and ergodicity of the sequence space
- Supervisors: Alain Denise - Professor (LRI), Yann Ponty - Research Director (LIX, CNRS/École polytechnique).

#### **DIMAI, Università degli Studi di Firenze**

Florence, Italy  
March 2018 - July 2018

- M1 internship (four months and a half).
- Subject: Sorting permutations with the DI-machine
- Supervisor: Luca Ferrari - Associate Professor.

#### **LACIM, Université du Québec à Montréal**

Montréal, Canada  
June 2017 - August 2017

- L3 internship (six weeks).
- Subject: Finding (distinct square factor)-dense infinite words
- Supervisor: Srećko Brlek - Professor.

## **Teaching**

#### **Université Claude Bernard Lyon 1**

Lyon, France  
Sept. 2025 - Now

- Temporary worker. 46.5 hours planned during the first semester.
- Courses: LIFAPSD (algorithms and C++ programming), BDW (databases and web programming).

#### **Polytech Sorbonne**

Paris, France  
Oct. 2021 - Sept. 2024

- 64 hours a year as part of my Ph.D. contract. Mostly practical work, with a few hours of tutorials occasionally.
- Courses:
  - C language: arrays, pointers, linked lists, structures.
  - Algorithms: sorting algorithms, stacks and queues, hash tables, binary search trees, recursion.
  - Tools for Computer Programming: Git, Linux shell, Makefile.

| Year    | Course                                | Level | Number of hours |      |       |
|---------|---------------------------------------|-------|-----------------|------|-------|
|         |                                       |       | TD              | TP   | Total |
| 2025-26 | Algo., prog. et structures de données | L2    | 0               | 24   | 24    |
|         | Base de données et programmation web  | L2    | 0               | 22.5 | 22.5  |
| 2023-24 | Langage C                             | L3    | 0               | 24   | 24    |
|         | Outils pour l'informatique            | L3    | 0               | 15   | 15    |
|         | Algorithmique élémentaire             | L3    | 0               | 14   | 14    |
| 2022-23 | Informatique 1 : langage C            | L3    | 0               | 27   | 27    |
|         | Informatique algorithmique            | L3    | 0               | 16   | 16    |
|         | Informatique langage C                | L3    | 0               | 16   | 16    |
|         | Algorithmique élémentaire             | L3    | 8               | 14   | 22    |
| 2021-22 | Informatique langage C                | L3    | 0               | 16   | 16    |
|         | Informatique algorithmique            | L3    | 0               | 16   | 16    |
|         | Algorithmique élémentaire             | L3    | 14              | 12   | 26    |
| -       | -                                     | -     | -               | -    | 238.5 |

## **Research**

My research mainly consists in designing efficient algorithms for scheduling problems and studying the computational complexity of these problems.

### **Motivation**

Most scheduling problems are strongly NP-hard and have required intricate heuristics to be solved in practice. While yielding results short term, such heuristics rarely help to identify what fundamentally makes these problems difficult. Such analysis would uncover the similarities between seemingly different problems and facilitate strategy transfers. This would also prove useful whenever one would like to enrich a problem - for example by adding precedence relations or going from equal-length tasks to tasks of arbitrary time length.

One way to gather such knowledge is to go beyond classical complexity theory and consider parameterized complexity theory. Given a problem  $\mathcal{P}$  we choose parameter  $k$  as some property of the input like the number of machines or the width of the precedence graph (if there is one). Depending on problem  $\mathcal{P}$  and parameter  $k$  either we design algorithms which are *fixed-parameter tractable* with respect to  $k$  (i.e. which operate in time  $f(k) \times \text{poly}(n)$  with  $f$  an arbitrary computable function), or we show that  $\mathcal{P}$  remains hard even when  $k$  is small (typically via a reduction from a well-known difficult parameterized problem like  $k$ -CLIQUE or  $k$ -COLORING).

Then the set of parameters for which problem  $\mathcal{P}$  is *fixed-parameter tractable* can be interpreted as a footprint. By comparing it to the set of working parameters from another NP-hard problem  $\mathcal{P}'$ , one could infer whether  $\mathcal{P}$  is 'equivalent' to  $\mathcal{P}'$ , 'strictly harder' than  $\mathcal{P}'$ , or if both problems are difficult for different reasons.

**Current position: postdoctoral researcher at G-SCOP, Grenoble INP**

Grenoble, France

- Planned duration: eighteen months (i.e., until April 30, 2026).

May 2026 - Now

- *Subject : Charging scheduling of a fleet of electric buses, taking into account battery degradation*

During this postdoctoral research project supervised by Marie-Laure Espinouse, Margaux Nattaf and Pierre-Xavier Thivel, we study the scheduling of charging a fleet of battery electric buses. In particular, we focus on modeling and taking into account battery degradation in the corresponding optimization problems.

**Previous position: postdoctoral researcher at LIP, École Normale Supérieure de Lyon** Lyon, France

- Duration: eighteen months.

Nov. 2024 - April 2026

- *Subject : Scheduling radio-astronomical observations*

During this postdoctoral research project supervised by Frédéric Vivien and Anne Benoit, we study the scheduling of radio-astronomical observations. Because the Earth revolves around itself, for a ground-based observer the height of a celestial body in the sky changes over time periodically with a (roughly) twenty-four hour long period. Although one can set a minimum altitude threshold to mitigate the impact of Earth's atmosphere on observation quality, this defines a daily availability window for each celestial body. While scheduling problems featuring collections of availability windows have historically been difficult to optimize and even to approximate, the periodicity of these time windows could play a role in making the problem easier.

This work is done in collaboration with astrophysicists from the ECLAT laboratory, who have shared scheduling data from the NenuFAR radio-telescope over several weeks. During the first few months of this project, we studied the computational complexity - both classic and parameterized - of a non-preemptive model of the problem. This has led to the design of several algorithms - both exact and approximation algorithms - and heuristics. These procedures are currently being implemented and confronted to the NenuFAR data. In the near future, meetings with ECLAT members are planned to discuss the model and find the best compromise between observation quality and makespan minimization.

**Formerly: Ph.D. student at LIP6, Sorbonne Université**

Paris, France

- Duration : three years.

Oct. 2021 - Oct. 2024

- *Subject : Parameterized complexity and new efficient enumerative schemes for RCPSP*

During my Ph.D. thesis supervised by Claire Hanen, I tackled the inclusion of job time windows and precedence delays to RCPSP and its subproblems. With precedence delays we considered parameter  $\ell_{max}$  - i.e. the maximum delay value appearing in the input - in the case of minimum delays, exact delays and the lesser studied maximum delays. For all delay types it was shown that scheduling unit-time jobs on a single machine with a single available delay value is hard even with small  $\ell_{max}$ . In the case of minimum delays we also showed that the parameterized problem remains hard with chains and two distinct available delay values. This suggests that another property of the problem has to be bounded in order to deal with precedence delays.

With job time windows we considered several parameters describing their structure. Notably *slack*  $\sigma$  - i.e. the maximum difference between the time window length of a job and its processing time -, and *pathwidth*  $\mu$  - i.e. the maximum number of job time windows which can include the same time unit - which have shown recent success in the literature. We showed that scheduling unit-time coupled tasks on a single machine with time windows is para-NP-hard with respect to either parameter.

While this rules out any hope for a *fixed-parameter tractable* algorithm with precedence delays and these parameters alone, the reduction techniques that we used hint at the underlying reason. Indeed unbounded delay values are used to circumvent the job time window restrictions put by these parameters. And fittingly

we showed that the problem becomes *fixed-parameter tractable* if you combine them with maximum delay value  $\ell_{max}$ . In fact we can even have general precedence with any number of distinct delay values, either on parallel machines or with arbitrary processing times. With multiple machines and arbitrary processing times the problem becomes hard again, and you would have to add an extra parameter - like the maximum processing time - to get a *fixed-parameter tractable* algorithm.

Finally with job time windows and no precedence delays we introduced a new parameter called the *proper level pl*. Parameter *pl* is defined as the maximum number of job time windows which can strictly include - on both ends - another job time window. On single machine scheduling with job time windows we proposed a new dominance rule which generalizes the *Earliest Deadline* rule and leads to a *fixed-parameter tractable* number of dominant schedules with respect to *pl*. The resulting makespan algorithm is quasi-linear in the input size with a single exponential dependency on *pl*, which gives it a good chance to be competitive in future applications.

For this work, I received the PGMO Ph.D. Award 2025.

## Publications

Google Scholar page. DBLP page. All preprints are available in this page.

### International journals

- *Theoretical Computer Science* April 2026
  - **Title:** *Coupled-task Scheduling with Time Windows, Bounded Pathwidth and Bounded Slack is para-NP-complete*
  - Authors: Maher Mallem, Claire Hanen and Alix Munier-Kordon (LIP6).
  - Regular paper (20 pages). [DOI](#).
- *Journal of Combinatorial Optimization* March 2026
  - **Title:** *Single Machine Scheduling with Precedence Constraints and Bounded Maximum Delay Value*
  - Authors: Maher Mallem, Claire Hanen and Alix Munier-Kordon (LIP6).
  - Regular paper (32 pages). [DOI](#).

### International conferences with program committees and proceedings

- IWOCA 2026 Clermont-Ferrand, France
  - **Title:** *The Parameterized Complexity of Scheduling with Precedence Delays: Shuffle Product and Directed Bandwidth* June 2026
  - Authors: Hans L. Bodlaender (Utrecht University) and Maher Mallem.
  - Regular paper (25 pages). [DOI](#).
- FUN 2026 Porquerolles, France
  - Full name: International Conference on Fun with Algorithms May 2026
  - **Title:** *Finding Shortest Paths in Kuru Kuru Kururin*
  - Authors: Mickaël Laurent (Charles University) and Maher Mallem.
  - Regular paper (19 pages). [DOI](#).
- ISCO 2024 Tenerife, Canary Islands, Spain
  - Full name: International Symposium on Combinatorial Optimization May 2024
  - **Title:** *A New Structural Parameter on Single Machine Scheduling with Release Dates and Deadlines*
  - Authors: Maher Mallem, Claire Hanen and Alix Munier-Kordon (LIP6).
  - Regular paper (15 pages). [DOI](#).
- IPEC 2022 Potsdam, Germany
  - Full name: International Symposium on Parameterized and Exact Computation Sept. 2022
  - **Title:** *Parameterized Complexity of a Parallel Machine Scheduling Problem*
  - Authors: Maher Mallem, Claire Hanen and Alix Munier-Kordon (LIP6).
  - Regular paper (21 pages). [DOI](#).

## Other international conferences

- PMS 2026 Toulouse, France
  - Full name: International Workshop on Project Management and Scheduling April 2026
  - **Title:** *Notes on Scheduling Radio-astronomical Observations* (accepted)
  - Authors: Maher Mallem, Frédéric Vivien (LIP).
  - Extended abstract (4 pages).
- MAPSP 2022 Oropa (Biella), Italy
  - Full name: Workshop on Models and Algorithms for Planning and Scheduling June 2022
  - **Title:** *Parameterized Complexity of a Single Machine Scheduling Problem with Precedence, Release Dates and Deadlines*
  - Authors: Claire Hanen, Maher Mallem and Alix Munier-Kordon (LIP6).
  - Extended abstract (3 pages).

## National conferences

- ROADEF 2026 Tours, France
  - Full name: Congrès annuel de la Société Française de Recherche Opérationnelle et d'Aide à la Décision Feb. 2026
  - **Title:** *Computational Complexity of Radio-astronomical Observation Scheduling*
  - Authors: Maher Mallem, Frédéric Vivien (LIP).
  - Abstract (2 pages).
- ROADEF 2024 Amiens, France
  - Full name: Congrès annuel de la Société Française de Recherche Opérationnelle et d'Aide à la Décision March 2024
  - **Title:** *Parameterized Complexity: a Two-Dimensional Approach to Study Scheduling Problems*
  - Authors: Maher Mallem, Claire Hanen and Alix Munier-Kordon (LIP6).
  - Abstract (2 pages).
- ROADEF 2022 Lyon, France
  - Full name: Congrès annuel de la Société Française de Recherche Opérationnelle et d'Aide à la Décision Feb. 2022
  - **Title:** *Parameterized Complexity of a Single Machine Scheduling Problem*
  - Author: Maher Mallem.
  - Abstract (2 pages).
- SeqBIM 2019 Marne-la-Vallée, France
  - Theme: Sequences in Bioinformatics, Computer Science and Mathematics Dec. 2019
  - **Title:** *Forbidden Substrings and the Connectivity of the Hamming Graph of RNA Sequences: Partial Disconnectivity Tests*
  - Authors: Maher Mallem, Alain Denise (LRI) and Yann Ponty (LIX, CNRS/École polytechnique).
  - Extended abstract (6 pages).

## Submitted papers

- *INFORMS Journal on Computing* Submitted in Nov. 2024
  - **Title:** *Kernelization Algorithms on Single Machine Scheduling with Time Windows* (under minor revision)
  - Authors: Maher Mallem, Claire Hanen and Alix Munier-Kordon (LIP6).

## In preparation

- *Discrete Applied Mathematics* Writing in progress
  - **Title:** *Scheduling with Precedence Constraints, Time Windows and Bounded Proper Level*
  - Authors: Maher Mallem, Claire Hanen and Alix Munier-Kordon (LIP6).

## Recent workshop presentations

- GOTHA/AGaPe working group day Paris, France
  - *Title:* *The parameterized complexity of scheduling with precedence delays: Shuffle Product and Directed Bandwidth* June 2026

- **Scientific council of GdR ROD** Paris, France  
     – *Title: Parameterized complexity in scheduling* June 2026
- **AS2M department seminar (FEMTO-ST)** Besançon, France  
     – *Title: Single machine scheduling of low-frequency radio-astronomical observations* May 2026
- **ACRO team seminar (LIS)** Marseille, France  
     – *Title: Graph parameters for single machine scheduling with time windows* April 2026
- **Graph theory seminar (IRIF)** Paris, France  
     – *Title: Graph parameters for single machine scheduling with time windows* April 2026
- **DISC department seminar (FEMTO-ST)** Besançon, France  
     – *Title: Notes on scheduling radio-astronomical observations* March 2026
- **Scheduling for large-scale systems workshop** Fréjus, France  
     – *Title: Notes on scheduling radio-astronomical observations* March 2026
- **MoMA 2025 school-workshop** Aussois, France  
     – Full name: Modern Optimization Methods and Models in Algorithm Design. Nov. 2025  
     – *Title: Scheduling astronomical observations*
- **ROMA team seminar (LIP)** Lyon, France  
     – *Title: Introduction to fixed-parameter tractability: Single machine scheduling with release dates and deadlines* Nov. 2025
- **Temporary member seminar series (LIP)** Lyon, France  
     – *Title: An introduction to scheduling: The case of astronomical observations* Nov. 2025
- **PGMO 2025 Ph.D. prize ceremony** Palaiseau, France  
     – *Title: Parameterized complexity and new efficient enumerative schemes for RCPSP* Nov. 2025
- **“Algorithms and Complexity” group seminar at Utrecht University** Utrecht, The Netherlands  
     – *Title: Scheduling with release dates and deadlines: going beyond the pathwidth* Nov. 2025

## Skills & Interests

**Programming:** Experienced: C, Python. Intermediate: OCaml, C++. Basic: Gallina (Rocq), Javascript, Lua.

**Language:** French (mother), English (C1 - almost bilingual).

**Interests:**

- Tool-Assisted Speedrunning 2019 - Now
- Speedrunning 2016 - Now
- Recreational mathematics 2014 - Now