Alexis Ghyselen

Doctor in computer science

Main Research Interests

Properties by Types	Variants of Linear Logic, Sized Types, Refinement Types, Intersection Types
Effect	Probabilistic programs, Concurrency, Monads
Logic	Linear logic, Lambda calculus
Semantic	Models, Game semantics, Category Theory

Education

2018-2021 **PhD Thesis with Patrick Baillot**, *ENS Lyon*, France.

2017-2018 **Long Internship with Ugo Dal Lago**, *University of Bologna*, Italy.

2015-2017 **Master's degree in computer science : MPRI**, *ENS Cachan*, France.

2014-2015 **Bachelor's degree in computer science**, *ENS Cachan*, France.

Experience

2021– **Post-Doc**, *University of Bologna*.
Post-Doc that should lat two years, within the DIAPASoN project. The main thematics are relational logics and reinforcement learning.

2018-2021 **PhD Thesis**, *ENS Lyon*.
3 year PhD thesis with Patrick Baillot. The first goal was to continue the work that began in the five-months internship, and then the focus was on,size types, that are usually used for the complexity of functional programs, in a process calculus. During the thesis, I also gave some computer science tutorials to college students, on programming theory, logic, proof assistants, probabilities and formal languages.

2017-2018 **Internship**, *University of Bologna*.
Ten-months internship with Ugo dal Lago. We worked mainly on how to extend the methodology of linear dependent types and refinement types to the probabilistic case, in order to have a type-based complexity analysis of probabilistic higher-order programs.

2017 **Internship**, *ENS Lyon*.
Five-months internship with Patrick Baillot. The goal was to combine ideas from two approaches in implicit complexity to lessen their drawbacks: the use of modalities like in linear logic to control iteration, and the use of indexes to keep track of the sizes of values in programs.

2016 **Internship**, *University of Oxford*.
Two-months and an half internship with Luke Ong. We worked on how to express the links between differential lambda-calculus and plays in some game semantics, using previous work on resource lambda-calculus and non-idempotent intersection types by Tsukada-Ong.

2015 **Internship**, *IRCCyN*, Nantes.
Two-months internship in bioinformatics with Olivier Roux. We aimed to design an algorithm for finding sets of stable states in large graphs by using small hypergraph representations.

Languages

French Native
English Advanced
Italian Elementary
Japanese Elementary
Espagnol Elementary

Programming skills

LaTeX, Ocaml, Coq, Python

Publications

International Conference Proceedings with Peer-Reviews

- Patrick Baillot and Alexis Ghyselen. Combining Linear Logic and Size Types for Implicit Complexity. In *27th EACSL Annual Conference on Computer Science Logic (CSL 2018)*, volume 119 of *Leibniz International Proceedings in Informatics (LIPIcs)*, pages 9:1–9:21, 2018
- Martin Avanzini, Ugo Dal Lago, and Alexis Ghyselen. Type-based complexity analysis of probabilistic functional programs. In *34th Annual ACM/IEEE Symposium on Logic in Computer Science, LICS 2019, Vancouver, BC, Canada, June 24-27, 2019*, pages 1–13. IEEE, 2019
- Patrick Baillot and Alexis Ghyselen. Types for complexity of parallel computation in pi-calculus. In *Programming Languages and Systems - 30th European Symposium on Programming, ESOP 2021*, volume 12648 of *Lecture Notes in Computer Science*, pages 59–86. Springer, 2021
- Patrick Baillot, Alexis Ghyselen, and Naoki Kobayashi. Sized types with usages for parallel complexity of pi-calculus processes, 2021

Peer-Reviewed Scientific Journal

- Patrick Baillot and Alexis Ghyselen. Combining linear logic and size types for implicit complexity. *Theor. Comput. Sci.*, 813:70–99, 2020
- Patrick Baillot and Alexis Ghyselen. Types for complexity of parallel computation in pi-calculus. Long Version (50p). To appear on TOPLAS.

Conferences and Scientific Events

Talk in Conferences/Workshop

- Developments in Implicit Computational Complexity (DICE 2018) - Workshop at ETAPS 2018, in Thessaloniki, Greece - Combining linear logic and size types for implicit complexity
- Developments in Implicit Computational Complexity (DICE 2018) - Workshop at ETAPS 2018, in Thessaloniki, Greece - On linear dependent types and probabilistic termination
- Computer Science Logic (CSL 2018), in Birmingham, United Kingdom - Combining linear logic and size types for implicit complexity
- Workshop on Probabilistic Interactive and Higher-Order Computation (PIHOC 2019), in Bologna, Italy - Type-Based Complexity Analysis of Probabilistic Functional Programs

- Logic in Computer Science (LICS 2019) - Type-Based Complexity Analysis of Probabilistic Functional Programs
- NII Shonan Meeting (Japan): Higher Order Complexity Theory and its Applications, 2019 - Sized Types for Parallel Complexity
- European Symposium on Programming (ESOP 2021) (Online) - Types for Complexity of Parallel Computation in Pi-Calculus
- Conference on Concurrency Theory (CONCUR 2021) (Online) - Sized Types with Usages for Parallel Complexity of Pi-Calculus Processes

Other Events

- Logic in Computer Science (LICS 2017) - Logic Mentoring Workshop + Conference
- Caleidoscope : Complexity as a Kaleidoscope - Research School in Computational Complexity, Paris, 2019

Reviews

I did some reviews for ESOP 2019, PPDP 2020, LICS 2020, CSL 2021, LICS 2021.