Sacha Ben-Arous

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Education

July 2024 **Undergraduate degree in Mathematics** (Licence renforcée), University Paris-Saclay, ENS Paris-Saclay.

July 2023 **Undergraduate degree in Computer Science** (Licence renforcée), University Paris-Saclay, ENS Paris-Saclay.

July 2022 **École Normale Supérieure Paris-Saclay**, admission to the competitive national entrance exam.

Internships

04/25 - 08/25 **Self-similar singularity formation in fluids**, supervised by Tristan Buckmaster, Courant Institute.

- Computer assisted proof in the context of self-similar singularity formation in fluids.

04/24 - 06/24 **Paradifferential K.A.M theory**, supervised by Thomas Alazard, ENS Paris-Saclay.

- Simplified approach of K.A.M-like theorems using the theory of paradifferential operators.

06/23 - 07/23 **The MP-LWE problem**, supervised by Alice Pellet-Mary, University of Bordeaux.

- Study of the Learning With Errors (LWE) problem and reduction of some of its polynomial variants.

Projects

Go language compiler

- Developed a compiler of a simplified version of the Go language to ASMx86-64.
- Tools Used: OCaml, ASMx86-64, Menhir, Yacc.

Automatic proofs of first order predicates

- Implemented the method of semantic tableaux to constructively prove or refute a first order predicate.
- Tools Used: OCaml, Menhir, Yacc.

Minimal computer

- Emulated, in a custom framework, a simple computer with a cpu and ram, only using logic gates.
- Tools Used: Assembly x86-64.

Custom shell

- Wrote my own shell for Unix OS.
- Tools Used: Bash, C, Menhir, Yacc.

Syntactic analyzer

- Wrote a syntactic analyzer for a toy language that checks if a program is syntactically correct, then pretty print it and performs random specification tests.
- Tools Used: C, Flex.

Awards

Mathematics Olympiads, Martinique (1st): Ranked 1st among high school students in the department of Martinique, France.

Technologies

Languages: Python, TEX, Sagemath, OCaml, C, Bash, Assembly x86-64.