

Kwing Hei Li

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Third-year PhD student specializing in *formal verification* of security-related infrastructure.

EDUCATION

- **Aarhus University** Aarhus, Denmark
Ph.D. in Computer Science (in progress) 2023 – 2027
- **University of Cambridge** Cambridge, UK
M.Phil in Advanced Computer Science, Pass with Distinction 2022 – 2023
- **University of Cambridge** Cambridge, UK
B.A. Hons. in Computer Science with Mathematics, 1st class 2019 – 2022

PUBLICATIONS

- **Modular Reasoning about Error Bounds for Concurrent Probabilistic Programs** ICFP 2025
- **Approximate Relational Reasoning for Higher-Order Probabilistic Programs** POPL 2025
- **Tachis: Higher-Order Separation Logic with Credits for Expected Costs** OOPSLA 2024
- **Error Credits: Resourceful Reasoning about Error Bounds for Higher-Order Probabilistic Programs** ICFP 2024
Distinguished Paper Award
- **Secure Aggregation for Federated Learning in Flower** DistributedML 2021

EXPERIENCE

- **Separation Logics for Probability, Concurrency, and Security** Aarhus, Denmark
Supervised by Lars Birkedal 2023 – 2027
 - Develop higher-order *separation logic* for reasoning about *concurrent probabilistic* programs
 - Logics implemented in the separation logic framework **Iris** and the proof assistant **Rocq**
 - Verified various complex algorithms and data structures, e.g. Merkle trees, Bloom filter, rejection sampling schemes
- **Wait-Free Task Solvability of Asynchronous Distributed Models** Cambridge, UK
Supervised by Marcelo Fiore 2022 – 2023
 - Developed a unified mathematical framework for reasoning about two incompatible distributed models
 - Proved a new result that shows that the two models are equivalent in task solvability
 - Masters thesis [\[pdf\]](#)
- **Multi-Language Program Verification for Closures** Saarbrücken, Germany
Supervised by Michael Sammler and Derek Dreyer 2022
 - Internship on extending **DimSum**, a decentralized approach to multi-language semantics and verification
 - Extended DimSum to reason about modules written in a functional language that supports closures
- **Type Systems for Functional Reactive Programming** Cambridge, UK
Supervised by Alan Mycroft 2021 – 2022
 - Designed a functional reactive programming language **Eva**, inspired by the **Lively RaTT** calculus
 - Type-checked Eva programs has strong guarantees, e.g. non-space-leaking and generativity
 - Bachelor thesis [\[pdf\]](#)
- **Secure Aggregation for Federated Learning in Flower** Cambridge, UK
Supervised by Pedro Porto Buarque de Gusmao and Nicholas Lane 2021
 - Extended the federated machine-learning framework **Flower** to support secure aggregation protocols
 - Implemented the **SecAgg(+)** protocols with a flexible API

SKILLS

Software: Rocq, Iris, Haskell, C++, Java, OCaml, Python, Eva

Languages: English (fluent), Cantonese (fluent), Mandarin (conversational)

Interests: automated reasoning, concurrency, distributed systems, formal methods, formal verification, probability, program logics, security, type system