

## About

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# Benoît Viguier

PHD. · SOFTWARE ENGINEER

I am passionate about symmetric cryptography, formal methods, and beautiful code.  
I am also a competitive ballroom dancer and a photographer.

## Language

**French** ★★★★★  
**English** ★★★★★  
**Dutch** ★★★★★  
**German** ★★★★★  
**Spanish** ★★★★★  
**Japanese** ★★★★★

## OS Preference

**Debian** ★★★★★  
**WSL** ★★★★★  
**MacOs** ★★★★★  
**Windows** ★★★★★

## Activities

**Ballroom Dancing**  
**Photography**  
**Sailing**

## Education

### PhD in Cryptography & Formal Methods

RADBOUD UNIVERSITEIT

*Nijmegen, The Netherlands*

*Sept. 2016 – Dec. 2021*

### Software Engineer

INSA (NATIONAL INSTITUTE OF APPLIED SCIENCES)

*Rennes, France*

*Sept. 2014 – 2016*

### MRes. in Computer Science

UNIVERSITY RENNES 1

*Rennes, France*

*Sept. 2015 – 2016*

### MSc. in Mathematics

UNIVERSITY RENNES 1

*Rennes, France*

*Sept. 2006 – 2011*

## Skills

**Programming** Java, PHP, TypeScript, SQL, Python, C/C++, Coq, RISC-V asm, ARM Asm,  $\LaTeX$   
**Dev. Env.** Visual Studio Code, IntelliJ IDEA, Git

## Experience

### Information Security Expert – DevOps Eng. Crypto.

ABN AMRO BANK

*Amsterdam, The Netherlands*

*Apr. 2021 – current*

- Member of the Crypto Services team.
- Member of the Secure Coding team.
- Member of the Quality Assurance board.
- Member of the Cryptographic Working Group.
- Design & implementation of the Registration Authority (RA) for the bank Public Key Infrastructure (PKI)
- Certificate Authority migration from Single-tier CA to Two-tier CA..
- Standardization of best practices in cryptography.
- Standardization of best practices in software Development.

*Java, PKI, Python, Ts, Git, Agile & Scrum, CICD*

### PhD Researcher

RADBOUD UNIVERSITEIT

*Nijmegen, The Netherlands*

*Sep. 2016 – Feb. 2021*

- Designing and breaking symmetric cryptography algorithm.
- Writing optimized implementation for lightweight schemes.
- Using formal methods to verify cryptographic C implementations.

*Coq, Formal Approaches, Cryptanalysis, C, Assembly*

### Internship : Software Engineer & Researcher

STMICROELECTRONICS

*Brussels, Belgium*

*Feb. – Jun. 2016*

- Verification of the truncated tree search using Formal Methods.
- Application to differential and linear trail search.

*Coq, C++, Cryptanalysis, Hash functions*

### Mathematics Teacher

LYCÉE D'ESTOURNELLES DE CONSTANT & COLLÈGE LA MADELEINE

*France*

*2011 – 2014*

- Junior Highschool and Highschool

*Teamwork, teaching skills, formalism*

# Publications

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## KangarooTwelve and TurboSHAKE

IRTF — CFRG

INTERNET-DRAFT — RFC

In review

- This document defines the TurboSHAKE128, TurboSHAKE256, KT128 and KT256 extendable Output Functions (XOF), i.e., a hash function generalization that can return an output of arbitrary length. Both TurboSHAKE128 and TurboSHAKE256 are based on a Keccak-p permutation specified in [FIPS202] and have a higher speed than the SHA-3 and SHAKE functions.

## A Panorama on Classical Cryptography

Nijmegen, The Netherlands

PHD THESIS

Dec. 2021

Designing, Implementing, Breaking, Verifying, and Standardizing Cryptography

- *In this thesis we cover a large part of the classical cryptography world: we examine the design of new symmetric primitive; we explore implementation strategies of lightweight schemes; we analyze a new high performance algorithm; we use formal verification to prove the correctness of Elliptic Curve Cryptography implementations; and finally we describe one of the way algorithms are standardized.*

## A Coq proof of the correctness of X25519 in TweetNaCl

Dubrovnik, Croatia

34TH IEEE COMPUTER SECURITY FOUNDATIONS SYMPOSIUM

Jun. 2021

- We formally prove that the C implementation of the X25519 key-exchange protocol in the TweetNaCl library correctly implements the protocol from Bernstein's 2006 paper, as standardized in RFC 7748, as well as the absence of undefined behavior. We also formally prove that X25519 is mathematically correct, i.e., that it correctly computes scalar multiplication on the elliptic curve Curve25519. The proofs are all computer-verified using Coq.

## Assembly or Optimized C for Lightweight Cryptography on RISC-V?

Vienna, Austria

CRYPTOLOGY AND NETWORK SECURITY

Dec. 2020

- In this work, we studied the general impact of optimizing symmetric-key algorithms in assembly and in plain C on RISC-V architectures. Additionally, we present optimized implementations of NIST's lightweight candidates, with speed-ups of up to 81% over available implementations, and discuss general implementation strategies.

## Cryptanalysis of MORUS

Brisbane, Australia

ADVANCES IN CRYPTOLOGY – ASIACRYPT 2018, LNCS

Dec. 2018

- We present a linear correlation in the keystream of full MORUS, which can be used to distinguish its output from random and to recover some plaintext bits in the broadcast setting.

## KangarooTwelve: fast hashing based on Keccak-p

Leuven, Belgium

APPLIED CRYPTOGRAPHY AND NETWORK SECURITY – ACNS 2018, LNCS

July 2018

- KangarooTwelve, a fast and secure arbitrary output-length hash function aiming at a higher speed than the FIPS 202's SHA-3 and SHAKE functions.

## Gimli: A Cross-Platform Permutation

Taipei, Taiwan

CRYPTOGRAPHIC HARDWARE AND EMBEDDED SYSTEMS – CHES 2017, LNCS

Sept. 2017

- Gimli, a 384-bit permutation designed to achieve high security with high performance across a broad range of platforms.

# Extra Activities

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## LycheeOrg — Lychee.

The Netherlands

LEAD DEV. & TEAM ADMIN

Aug. 2018 - PRESENT

Lychee is a privacy-friendly self-hosted photo gallery with a simple look & feel.

- Full rewrite of the PHP core server with Laravel.
- Adopt best industry practices with PHP.
- Support of WebAuthn and OAuth.
- Full rewrite of front-end from JQuery to Livewire & Alpine in TypeScript.

## Landscapes & Ballroom Photography

The Netherlands

PHOTOGRAPHER

Jul. 2018 - PRESENT

- Landscapes & Astrophotography
- Ballroom Photography – WDSF, NADB, NTDS, ETDS
- Events – PhD Defenses
- Portraiture

## Standard Ballroom & Formation Dancer

*The Netherlands*

MEMBER OF DSV SWAY OF LIFE

*Mar. 2018 - PRESENT*

- 2023 — **1<sup>st</sup> place** — Dutch Championship in Formation Dancing — Rotterdam
- 2023 — **3<sup>rd</sup> place** — Dutch Championship in couple A-class Standard — Steenwijk
- 2022 — **1<sup>st</sup> place** — Dutch Championship in Formation Dancing — Dalfsen
- 2022 — **5<sup>th</sup> place** — World Championship in Formation Dancing — Braunschweig
- 2022 — **3<sup>rd</sup> place** — European Championship in Formation Dancing — Nürnberg
- 2022 — **Semi-Finalist** — Dutch Championship in couple A-class Standard — Steenwijk
- 2021 — **2<sup>nd</sup> place** — Dutch Championship in couple C-class Standard — Dalfsen
- 2021 — **1<sup>st</sup> place** — Dutch Championship in Formation Dancing — Rotterdam
- 2020 — **4<sup>th</sup> place** — Dutch Championship in couple C-class Standard — Dalfsen
- 2019 — **1<sup>st</sup> place** — Dutch Championship in Formation Dancing — Almere
- 2019 — **Finalist** — World Championship in Formation Dancing — Moskow
- 2018 — **1<sup>st</sup> place** — Dutch Championship in Formation Dancing — Almere