## GIULIO MALAVOLTA

(+39) 340 1423761  $\otimes$  giulio.malavolta@hotmail.it

#### **EDUCATION**

Friedrich-Alexander University

Ph.D. in Computer Science (with Distinction)

June 2019

Thesis: "Cryptographic Clocks and Applications"

Advisor: Prof. Dominique Schröder

Saarland University

M.Sc. in Computer Science

December 2016

University of Bologna

M.Sc. in Bioinformatics

July 2012

B.Sc. in Biotechnology

October 2010

Liceo Scientifico Leonardo da Vinci

Maturitá Scientifica July 2007

PROFESSIONAL EXPERIENCE

**Bocconi University** 

Assistant Professor (Tenure-Track) September 2023 - Present

Max Planck Institute for Security and Privacy

Faculty (Tenure-Track) September 2020 - September 2023

University of California, Berkeley

PostDoctoral Fellow (hosted by Prof. Sanjam Garg)

December 2019 - August 2020

Simons Institute for the Theory of Computing

Research Fellow August 2019 - December 2019

Carnegie Mellon University

Research Fellow (hosted by Prof. Vipul Goyal) February 2019 - August 2019

University of California, Berkeley

Research Visitor (hosted by Prof. Sanjam Garg)

August 2017 - October 2017

HONORS AND AWARDS

Heinz Maier-Leibnitz Prize

DFG, German Research Foundation, 2023

**ERC Starting Grant** 

European Research Council, 2022

Staedtler-Stiftung Dissertation Award

Staedtler Foundation, 2020

Simons Research Fellowship

Simons Foundation, 2019

#### RESEARCH GRANTS

ObfusQation (PI)

ERC StG, ≈ 1.500.000€ January 2024 - January 2029

Robust Certification of Quantum Devices (co-PI)

CASA, ≈ 400.000€

June 2023 - June 2026

MIT-Germany Lockheed Martin Seed Funds (co-PI)

MISTI Global Seed Funds.  $\approx 20.000$ \$

May 2023 - January 2025

Cryptography in Light of Quantum Information (co-PI)

CASA, ≈ 200.000€ November 2022 - November 2025

Post-Quantum Vector Commitments (lead PI)

Protocol Labs,  $\approx 50.000$ \$ October 2021 - April 2022

6GEM (co-PI)

BMBF, 1.100.000€ (≈ 300.000€ personal) October 2021 - October 2025

Secure Authentication in Blockchain Environments (lead PI)

CLTC,  $\approx 50.000$ \$ January 2020 - August 2020

#### ACADEMIC SERVICE

#### Workshop Organization:

"KQC: Kyoto Quantum Cryptography" (Kyoto, Japan - 2024)

"TPLC: Theory and Practice of Laconic Cryptography" (Zürich, Switzerland - EUROCRYPT 2024)

"The Multiple Facets of Quantum Proofs" (Rome, Italy - STOC 2022)

#### **Summer School Organization:**

"IACR Summer School in Post-Quantum Cryptography" (Warsaw, Poland - 2024)

## Program Committee Member:

(2024) ITCS, ITC, TCC

(2023) ICALP, TCC, TQC, QCrypt

(2022) ASIACRYPT, EUROCRYPT, PKC, S&P, QCW

(2021) CCS, CVC, PKC

(2020) CRYPTO, CVC, Stanford Blockchain Conference

**Journal Reviews:** IEEE Transactions on Information Forensics and Security (2016), Journal of Cybersecurity (2018), and Journal of Cryptology (2020)

Grant Reviews: European Research Council (2020) and Israeli Science Foundation (2021)

Conference Reviews: ASIACRYPT (2019), CANS (2017), CCS (2015, 2016, 2017, 2019), CRYPTO (2016, 2017, 2019, 2021, 2022), EUROCRYPT (2015, 2016, 2020, 2021), FC (2017), FOCS (2021, 2022), ICTCS (2015), ITCS (2020), IWSEC (2016, 2017), MFCS (2022), PKC (2015, 2016, 2018, 2019), PST (2017), QCrypt (2021), QIP (2023, 2024), SCN (2018), S&P (2018, 2020), STOC (2022, 2024), TCC (2016, 2019, 2020, 2021), UbiComp (2016), and Usenix Security (2018)

## **LECTURES**

Quantum Cryptography	
@ Ruhr University of Bochum (joint with Prof. Michael Walter)	Fall 2022
Zero-Knowledge Proof Systems	
@ Ruhr University of Bochum (joint with Prof. Nils Fleischhacker)	$Summer\ 2022$
@ Ruhr University of Bochum (joint with Prof. Nils Fleischhacker)	Summer 2021
Seminar on Classical Verification of Quantum Computation	
@ CWI Amsterdam	$Summer\ 2022$
@ University of Illinois at Urbana-Champaign	$Summer\ 2022$
Seminar on Homomorphic Encryption	
@ University of Bologna	Fall 2022
@ University of Bologna	Fall 2021
@ University of Bologna	Fall 2020
NVITED TALKS	
Non-Interactive Quantum-Key Distribution	
@ PCMI Workshop	Summer 2023
Post-Quantum Timed Cryptography	
@ Lattices Meet Hashes Workshop	$Summer\ 2023$
Efficient Classical Verification of Quantum Computation	
@ CPT Director Symposium	Fall 2022
@ CISPA-LORIA Workshop	Fall 2022
@ Bocconi University	Fall 2022
Can We Obfuscate Quantum Circuits?	
@ Aalto University	$Fall \ 2022$
@ Milano Theory Workshop	Summer~2022
@ Workshop on Theory and Practice of Multi-Party Computation	Summer~2022
@ QuSoft Seminar	Summer~2022
@ Athecrypt	Fall 2021
Rate-1 Quantum Fully-Homomorphic Encryption	
@ Kyoto Workshop on Quantum Information, Computation, and Foundation	Summer 2021
New Developments in Indistinguishability Obfuscation	
@ Simons Workshop: New Developments in Obfuscation	Fall 2020
@ Matches Made in Heaven: Cryptography and Theoretical Computer Science	Fall 2020
	Fall 2020
@ Ethereum Foundation	
<ul> <li>© Ethereum Foundation</li> <li>© ENS de Lyon/Royal Holloway/CWI</li> <li>© Monash University</li> </ul>	Fall 2020
<ul><li>@ ENS de Lyon/Royal Holloway/CWI</li><li>@ Monash University</li></ul>	Fall 2020
<ul> <li>@ ENS de Lyon/Royal Holloway/CWI</li> <li>@ Monash University</li> <li>Post-Quantum Multi-Party Computation</li> </ul>	Fall 2020 Fall 2020
<ul><li>@ ENS de Lyon/Royal Holloway/CWI</li><li>@ Monash University</li></ul>	Fall 2020 Fall 2020 Fall 2021 Summer 2020

## Multi-Key Fully-Homomorphic Encryption in the Plain Model

@ Simons Institute for the Theory of Computing

Summer 2020

## Rate-1 Fully Homomorphic Encryption

@ Bay Area Crypto Day

Fall 2019

## Homomorphic Time-Lock Puzzles

@ Charles River Crypto Day

Fall 2019

## Concurrency and Privacy in Payment Channel Networks

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Fall 2017
Fall 2017

### **SUPERVISION**

#### **PostDocs**

Pedro Branco (2023 - Present)

Monosij Maitra (2023 - 2024)

Samuel Crew (2023 - 2024)

Hendrik Waldner (2022 - 2023)

Behzad Abdolmaleki (2020 - 2023)

### Ph.D. Students

Alex Kulpe (2024 - Present)

Tianwei Zhang (2023 - Present)

Noemi Gläser (2020 - Present)

Phillip Gajland (2020 - Present)

Ahmadreza Rahimi (2021 - 2024): "Registration-Based Encryption"

## Ph.D. Committee

Justin Raizes, Carnegie-Mellon University

Valerio Cini, TU Vienna

#### Internships

Darya Kaviani, UC Berkeley (2024)

Jesko Dujmovic, CISPA (2023)

Khashayar Barooti, EPFL (2022)

Alper Çakan, Carnegie-Mellon University (2022)

Justin Raizes, Carnegie-Mellon University (2022)

Valerio Cini, TU Vienna (2022)

Xiao Liang, Stony Brook University (2021)

#### REFEREED PUBLICATIONS

## Polynomial Commitments from Lattices:

## Post-Quantum Security, Fast Verification and Transparent Setup

Valerio Cini, Giulio Malavolta, Ngoc Khanh Nguyen, and Hoeteck Wee CRYPTO  $2024\,$ 

## Robust Quantum Public-Key Encryption with Applications to Quantum Key Distribution

Giulio Malavolta and Michael Walter

CRYPTO 2024 (Also presented at QIP 2024)

#### Time-Lock Puzzles from Lattices

Shweta Agrawal, Giulio Malavolta, and Tianwei Zhang CRYPTO  $2024\,$ 

## A Computational Tsirelson's Theorem for the Value of Compiled XOR Games

David Cui, Giulio Malavolta, Arthur Mehta, Anand Natarajan, Connor Paddock, Simon Schmidt, Michael Walter, and Tina Zhang TQC 2024

#### Software with Certified Deletion

James Bartusek, Vipul Goyal, Dakshita Khurana, Giulio Malavolta, Justin Raizes, and Bhaskar Roberts  ${\tt EUROCRYPT~2024}$ 

## Time-Lock Puzzles with Efficient Batch Solving

Rachit Garg, Jesko Dujmovic, and Giulio Malavolta EUROCRYPT 2024

### SWOOSH: Efficient Lattice-Based Non-Interactive Key Exchange

Phillip Gajland, Bor de Kock, Miguel Quaresma, Giulio Malavolta, and Peter Schwabe USENIX 2024 (Also presented at Real-World Crypto 2024)

#### Public-Key Encryption with Quantum Keys

Khashayar Barooti, Alex B. Grilo, Loïs Huguenin-Dumittan, Giulio Malavolta, Or Sattath, Quoc-Huy Vu, and Michael Walter

TCC 2023

#### Weakening Assumptions for Publicly-Verifiable Deletion

James Bartusek, Dakshita Khurana, Giulio Malavolta, Alexander Poremba, and Michael Walter TCC 2023

### Distributed Broadcast Encryption from Bilinear Groups

Dimitris Kolonelos, Giulio Malavolta, and Hoeteck Wee ASIACRYPT 2023

### Registered (Inner-Product) Functional Encryption

Danilo Francati, Daniele Friolo, Monosij Maitra, Giulio Malavolta, Ahmadreza Rahimi, and Daniele Venturi

ASIACRYPT 2023

### Two-Round Concurrent 2PC from Sub-Exponential LWE

Behzad Abdolmaleki, Saikrishna Badrinarayanan, Rex Fernando, Giulio Malavolta, Amit Sahai, and

Ahmadreza Rahimi ASIACRYPT 2023

## Weak Zero-Knowledge via the Goldreich-Levin Theorem

Dakshita Khurana, Giulio Malavolta, and Kabir Tomer ASIACRYPT 2023

## Lattice-Based Timed Cryptography

Russell W. F. Lai and Giulio Malavolta CRYPTO 2023

#### Lattice-Based Succinct Arguments from Vanishing Polynomials

Valerio Cini, Russell W. F. Lai, and Giulio Malavolta CRYPTO 2023

### On Concurrent Multi-Party Quantum Computation

Vipul Goyal, Xiao Liang, and Giulio Malavolta CRYPTO 2023 (Also presented at QCrypt 2023)

#### StoRNA: Stateless Transparent Proofs of Storage-Time

Reyhaneh Rabbaninejad, Behzad Abdolmaleki, Giulio Malavolta, Antonis Michalas, and Amir Nabizadeh ESORICS 2023

## Efficient Registration-Based Encryption

Noemi Gläser, Dimitris Kolonelos, Giulio Malavolta, and Ahmadreza Rahimi CCS 2023

#### Efficient Laconic Cryptography from Learning With Errors

Nico Döttling, Dimitris Kolonelos, Russell W. F. Lai, Chuanwei Lin, Giulio Malavolta, and Ahmadreza Rahimi

EUROCRYPT 2023

## Multi-Key and Multi-Input Predicate Encryption from Learning with Errors

Danilo Francati, Daniele Friolo, Giulio Malavolta, and Daniele Venturi EUROCRYPT 2023 (Also published in the Journal of Cryptology)

#### Laconic Function Evaluation for Turing Machines

Nico Döttling, Phillip Gajland, and Giulio Malavolta PKC 2023

## Transparent Batchable Time-lock Puzzles and Applications to Byzantine Consensus

Shravan Srinivasan, Julian Loss, Giulio Malavolta, Kartik Nayak, Charalampos Papamanthou, and Sri Aravinda Krishnan Thyagarajan

PKC 2023

## Cryptographic Oracle-Based Conditional Payments

Varun Madathil, Sri Aravinda Krishnan Thyagarajan, Dimitrios Vasilopoulos, Lloyd Fournier, Giulio Malavolta, and Pedro Moreno-Sanchez NDSS 2023

## Candidate Trapdoor Claw-Free Functions from Group Actions with Applications to Quantum Protocols

Navid Alamati, Giulio Malavolta, and Ahmadreza Rahimi TCC 2022

## Quantum Rewinding for Many-Round Protocols

Russell W. F. Lai, Giulio Malavolta, and Nicholas Spooner TCC 2022

## Steganography-Free Zero-Knowledge

Behzad Abdolmaleki, Nils Fleischhacker, Vipul Goyal, Abhishek Jain, and Giulio Malavolta TCC 2022

#### Verifiable Timed Linkable Ring Signatures for Scalable Payments for Monero

Sri Aravinda Krishnan Thyagarajan, Giulio Malavolta, Fritz Schmidt and Dominique Schröder ESORICS 2022

### Everlasting UC Commitments from Fully Malicious PUFs

Bernardo Magri, Giulio Malavolta, Dominique Schröder, and Dominique Unruh Journal of Cryptology 2022

## Lattice-Based SNARKs:

## Publicly Verifiable, Preprocessing, and Recursively Composable

Martin Albrecht, Valerio Cini, Russell W. F. Lai, Giulio Malavolta, and Sri Aravinda Krishnan Thyagarajan

CRYPTO 2022

CCS 2022

## Succinct Classical Verification of Quantum Computation

James Bartusek, Yael Kalai, Alex Lombardi, Fermi Ma, Giulio Malavolta, Vinod Vaikuntanathan, Thomas Vidick, and Lisa Yang CRYPTO 2022

## Factoring and Pairings are not Necessary for iO: Circular-Secure LWE Suffices

Zvika Brakerski, Nico Döttling, Sanjam Garg, and Giulio Malavolta ICALP 2022

#### Foundations of Coin Mixing Services

Noemi Gläser, Matteo Maffei, Giulio Malavolta, Pedro Moreno-Sanchez, Erkan Tairi, and Sri Aravinda Krishnan Thyagarajan

#### Sleepy Channels: Bi-directional Payment Channels without Watchtowers

Lukas Aumayr, Sri Aravinda Krishnan Thyagarajan, Giulio Malavolta, Pedro Moreno-Sanchez, Matteo Maffei

CCS 2022 (Also presented at SBC 2023)

#### TiDY: Symbolic Verification of Timed Cryptographic Protocols

Gilles Barthe, Ugo Dal Lago, Giulio Malavolta, Itsaka Rakotonirina CCS 2022

## A Note on the Post-Quantum Security of (Ring) Signatures

Rohit Chatterjee, Kai-Min Chung, Xiao Liang, and Giulio Malavolta PKC 2022

#### Universal Atomic Swaps: Secure Exchange of Coins Across all Blockchains

Sri Aravinda Krishnan Thyagarajan, Pedro Moreno-Sanchez, and Giulio Malavolta S&P 2022

## Algebraic Restriction Codes and their Applications

Divesh Aggarwal, Nico Döttling, Jesko Dujmovic, Mohammad Hajiabadi, Giulio Malavolta, and Maciej Obremski

ITCS 2022 (Also published in Algorithmica)

## Indistinguishability Obfuscation of Null Quantum Circuits and Applications

James Bartusek and Giulio Malavolta ITCS 2022 (Also presented at QIP 2022)

## **Interaction Preserving Compilers for Secure Computation**

Nico Döttling, Vipul Goyal, Giulio Malavolta, and Justin Raizes ITCS  $2022\,$ 

## **Pre-Constrained Encryption**

Prabhanjan Ananth, Abhishek Jain, Zhengzhong Jin, and Giulio Malavolta ITCS 2022

## Rate-1 Quantum Fully-Homomorphic Encryption

Orestis Chardouvelis, Nico Döttling, and Giulio Malavolta TCC 2021

## The Round Complexity of Quantum Zero-Knowledge

Orestis Chardouvelis and Giulio Malavolta TCC 2021

#### Two-Round Maliciously Secure Computation with Super-Polynomial Simulation

Amit Agarwal, James Bartusek, Vipul Goyal, Dakshita Khurana, and Giulio Malavolta TCC 2021

#### How to Build a Trapdoor Function from an Encryption Scheme

Sanjam Garg, Mohammad Hajiabadi, Giulio Malavolta, and Rafail Ostrovsky ASIACRYPT 2021

#### Efficient CCA Timed Commitments in Class Groups

Sri Aravinda Krishnan Thyagarajan, Guilhem Castagnos, Fabien Laguillaumie, and Giulio Malavolta CCS 2021

#### Compact Ring Signatures from Learning with Errors

Rohit Chatterjee, Sanjam Garg, Mohammad Hajiabadi, Dakshita Khurana, Xiao Liang, Giulio Malavolta, Omkant Pandey, and Sina Shiehian CRYPTO 2021

### A Geometric Approach to Homomorphic Secret Sharing

Yuval Ishai, Russell W. F. Lai, and Giulio Malavolta PKC 2021

## Cryptocurrencies with Security Policies and Two-Factor Authentication

Florian Brauer, Vipul Goyal, and Giulio Malavolta

## Post-Quantum Multi-Party Computation

Amit Agarwal, James Bartusek, Vipul Goyal, Dakshita Khurana, and Giulio Malavolta EUROCRYPT 2021

## Unbounded Multi-Party Computation from Learning with Errors

Prabhanjan Ananth, Abhishek Jain, Zhengzhong Jin, and Giulio Malavolta EUROCRYPT 2021

## Lockable Signatures for Blockchains: Scriptless Scripts for all Signatures

Sri Aravinda Krishnan Thyagarajan and Giulio Malavolta S&P 2021

## Constant Ciphertext-Rate Non-Committing Encryption from Standard Assumptions

Zvika Brakerski, Pedro Branco, Nico Döttling, Sanjam Garg, and Giulio Malavolta TCC 2020

## Multi-Key Fully-Homomorphic Encryption in the Plain Model

Prabhanjan Ananth, Abhishek Jain, Zhengzhong Jin, and Giulio Malavolta TCC 2020

## A Combinatorial Approach to Quantum Random Functions

Nico Döttling, Giulio Malavolta, and Sihang Pu ASIACRYPT 2020

#### Multi-Client Oblivious RAM with Poly-Logarithmic Communication

Sherman Chow, Katharina Fech, Russell W. F. Lai, and Giulio Malavolta ASIACRYPT 2020

## **Tight Verifiable Delay Functions**

Nico Döttling, Sanjam Garg, Giulio Malavolta, and Prashant Nalini Vasudevan SCN 2020

### Verifiable Timed Signatures Made Practical

Sri Aravinda Krishnan Thyagarajan, Adithya Bhat, Giulio Malavolta, Nico Döttling, Aniket Kate, and Dominique Schröder CCS 2020

#### Minting Mechanisms for Proof of Stake Blockchains

Dominic Deuber, Nico Döttling, Bernardo Magri, Giulio Malavolta, and Sri Aravinda Krishnan Thyagarajan

**ACNS 2020** 

#### Candidate iO from Homomorphic Encryption Schemes

Zvika Brakerski, Nico Döttling, Sanjam Garg, and Giulio Malavolta EUROCRYPT 2020 (Top-three paper, invited and published in the Journal of Cryptology)

## Statistical Zaps and New Oblivious Transfer Protocols

Vipul Goyal, Abhishek Jain, Zhengzhong Jin, and Giulio Malavolta EUROCRYPT 2020

## Leveraging Linear Decryption: Rate-1 Fully Homomorphic Encryption and Time-Lock Puzzles

Zvika Brakerski, Nico Döttling, Sanjam Garg, and Giulio Malavolta TCC 2019

## Rate-1 Trapdoor Functions from the Diffie-Hellman Problem

Nico Döttling, Sanjam Garg, Mohammad Hajiabadi, Kevin Liu, and Giulio Malavolta ASIACRYPT 2019

## Succinct Arguments for Bilinear Group Arithmetic: Practical Structure-Preserving Cryptography

Russell W. F. Lai, Giulio Malavolta, and Viktoria Ronge CCS 2019

## Laconic Conditional Disclosure of Secrets and Applications

Nico Döttling, Sanjam Garg, Vipul Goyal, and Giulio Malavolta FOCS 2019

## Arithmetic Garbling from Bilinear Maps

Nils Fleischhacker, Giulio Malavolta, and Dominique Schröder ESORICS 2019

#### Homomorphic Time-Lock Puzzles and Applications

Giulio Malavolta and Sri Aravinda Krishnan Thyagarajan CRYPTO 2019

#### Subvector Commitments with Applications to Succinct Arguments

Russell W. F. Lai and Giulio Malavolta CRYPTO 2019

## Trapdoor Hash Functions and their Applications

Nico Döttling, Sanjam Garg, Yuval Ishai, Giulio Malavolta, Tamer Mour, and Rafail Ostrovsky CRYPTO 2019

### **Incremental Proofs of Sequential Work**

Nico Döttling, Russell W. F. Lai, and Giulio Malavolta  ${\tt EUROCRYPT~2019}$ 

#### Efficient Invisible and Unlinkable Sanitizable Signatures

Xavier Bultel, Pascal Lafourcade, Russell W. F. Lai, Giulio Malavolta, Dominique Schröder, and Sri Aravinda Krishnan Thyagarajan PKC 2019

## Anonymous Multi-Hop Locks for Blockchain Scalability and Interoperability

Giulio Malavolta, Pedro Moreno-Sanchez, Clara Schneidewind, Aniket Kate, and Matteo Maffei NDSS 2019 (Finalist for the EU-CSAW competition for applied research)

### My Genome Belongs to Me: Controlling Third Party Computation on Genomic Data

Dominic Deuber, Christoph Egger, Katharina Fech, Giulio Malavolta, Sri Aravinda Krishnan Thyagarajan, Florian Battke, Claudia Durand, and Dominique Schröder PETS 2019

#### Homomorphic Secret Sharing for Low Degree Polynomials

Russell W. F. Lai, Giulio Malavolta, and Dominique Schröder ASIACRYPT 2018

#### **Functional Credentials**

Dominic Deuber, Matteo Maffei, Giulio Malavolta, Max Rabkin, Dominique Schröder, and Mark Simkin PETS 2018

## Efficient Ring Signatures in the Standard Model

Giulio Malavolta and Dominique Schröder ASIACRYPT 2017

## Subset Predicate Encryption and its Applications

Jonathan Katz, Matteo Maffei, Giulio Malavolta, and Dominique Schröder CANS 2017

#### Concurrency and Privacy with Payment-Channel Networks

Giulio Malavolta, Pedro Moreno-Sanchez, Aniket Kate, Matteo Maffei, and Srivatsan Ravi CCS 2017

## Maliciously Secure Multi-Client ORAM

Matteo Maffei, Giulio Malavolta, Manuel Reinert, and Dominique Schröder ACNS 2017

## Switch Commitments: A Safety Switch for Confidential Transactions

Tim Ruffing and Giulio Malavolta BITCOIN 2017

#### SilentWhispers: Enforcing Security and Privacy in Decentralized Credit Networks

Giulio Malavolta, Pedro Moreno-Sanchez, Aniket Kate, and Matteo Maffei NDSS 2017

## Efficient Unlinkable Sanitizable Signatures from Signatures with Re-Randomizable Keys

Nils Fleischhacker, Johannes Krupp, Giulio Malavolta, Jonas Schneider, Dominique Schröder, and Mark Simkin

PKC 2016 (Invited to the Journal of IET Information Security)

#### Privacy and Access Control for Outsourced Personal Records

Matteo Maffei, Giulio Malavolta, Manuel Reinert, and Dominique Schröder S&P 2015 (Also published in the Journal of Computer Security)

# Towards Security and Privacy for Outsourced Data in the Multi-Party Setting (Brief Announcement)

Matteo Maffei, Giulio Malavolta, Manuel Reinert, and Dominique Schröder PODC 2014

#### LANGUAGES

Italian native speaker and fluent in English.