

# Daniel Escudero

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## Curriculum Vitae

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### Current Position

Sep. 2021 – Present **Research Scientist**, *JP Morgan AI Research*, New York, USA.

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### Education

May. 2017 – Aug. 2021 **PhD in Computer Science**, *Aarhus University*, Aarhus, Denmark.

May. 2017 – Apr. 2019 **Master in Mathematics**, *Aarhus University*, Aarhus, Denmark.

Jan. 2017 – Dec. 2018 **Master in Mathematics**, *Universidad Nacional de Colombia*, Medellín, Colombia.

Aug. 2012 – Dec. 2016 **Bachelor in Mathematics**, *Universidad Nacional de Colombia*, Medellín, Colombia.

### Short Duration Courses

Jun. 2019 **2nd Summer School on Cryptology Crypto-CO**, Medellín, Colombia.

Feb. 2019 **Winter School on Zero Knowledge**, Bar Ilan University, Israel.

Jul. 2017 **Summer School on Post-Quantum Cryptography**, Eindhoven, The Netherlands.

Sep. 2016 **Cryptography**, Online course offered by University of Maryland, College Park, Coursera.

Jul. 2016 **1st Summer School on Cryptology Crypto-CO**, Bogotá, Colombia.

May 2016 **Usable security**, Online course offered by University of Maryland, College Park, Coursera.

Oct. 2015 **Summer School on Mathematical and Practical Aspects of Fully Homomorphic Encryption and Multi-Linear Maps**, Paris, France.

May 2015 **Encuentro Colombiano de Computación Cuántica**, Bogotá, Colombia.

Sep. 2014 **Cryptography 1**, Online course offered by Stanford university, Coursera.

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### Theses

**PhD Thesis** (Aarhus University, Aug. 2021)

Title *Secure Multiparty Computation over  $\mathbb{Z}/2^k\mathbb{Z}$*

Supervisors Ivan Damgård and Peter Scholl

### Master Thesis (UNAL, Feb. 2019)

Title *Cubic Multivariate Cryptosystems Based on the Big-Field Idea and Their Vulnerability to a Min-Rank Attack*

Supervisor Daniel Cabarcas Jaramillo

### Bachelor Thesis (UNAL, Dec. 2016)

Title *Groebner Bases and Applications to the Security of Multivariate Public Key Cryptosystems*

Supervisor Daniel Cabarcas Jaramillo

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## Previous Experience

### Teaching

- Jul. 2020 **Invited lecturer**, *Shanghai Jiao Tong University*, Shanghai, China.  
Crash Course on Secure Multiparty Computation
- Jan. 2020 – Dec. 2020 **Teaching assistant**, *Aarhus University*, Aarhus, Denmark.  
Teaching assistant in Computer Architecture, Operating Systems and Networks
- Aug. 2020 – Present **Teaching assistant**, *Aarhus University*, Aarhus, Denmark.  
Teaching assistant in Machine Learning
- Jan. 2019 – May 2019 **Teaching assistant**, *Aarhus University*, Aarhus, Denmark.  
Teaching assistant in Computer Architecture, Operating Systems and Networks
- Aug. 2018 – Dec. 2018 **Teaching assistant**, *Aarhus University*, Aarhus, Denmark.  
Teaching assistant in Distributed Systems and Security
- Feb. 2018 – Jun. 2018 **Teaching assistant**, *Aarhus University*, Aarhus, Denmark.  
Teaching assistant in Computability and Logic
- Feb. 2016 – May. 2019 **Virtual tutor**, *Tutor.com*, USA.  
Virtual tutor in Calculus, Linear Algebra, Finite Mathematics and Discrete Mathematics
- Aug. 2017 – Dec. 2017 **Teaching assistant**, *Aarhus University*, Aarhus, Denmark.  
Teaching assistant in Machine Learning
- Aug. 2016 – Dec. 2016 **Teaching assistant**, *Universidad Nacional de Colombia*, Medellín, Colombia.  
Teaching assistant in Vector and Analytic Geometry
- Aug. 2014 – Jul. 2015 **Virtual tutor Ticaademia**, *Universidad Nacional de Colombia*, Medellín, Colombia.  
Virtual tutor in Basic Mathematics, Ticaademia virtual platform
- Jan. 2014 – Jul. 2014 **Teaching assistant**, *Universidad Nacional de Colombia*, Medellín.  
Teaching assistant in Linear Algebra

### Visits and Internships

- Aug. 2019 – Sep. 2019 **CWI**, Amsterdam, The Netherlands.  
Research visit
- Jun. 2019 **Visa Research**, Palo Alto, USA.  
Short Research Visit

- Feb. 2019 **Bar Ilan University**, Ramat Gan, Israel.  
Short Research Visit
- Jun. 2018 – Jul. 2018 **Bar Ilan University**, Ramat Gan, Israel.  
Internship on implementation of Multiparty Computation
- Apr. 2018 **CWI**, Amsterdam, The Netherlands.  
Research visit
- Nov. 2016 **Aarhus University**, Aarhus, Denmark.  
Research visit
- Oct. 2015 **Pierre and Marie Curie University**, Paris, France.  
Research visit
- Industry**
- Oct. 2019 – Dec. 2019 **External consulting**, *Alpha, Telefonica*, Barcelona, Spain.  
Consultancy services on Privacy Preserving Machine Learning, Multi-Party Computation and related technologies
- Jun. 2018 – Feb. 2019 **External consulting**, *OFF-THE-GRID*, New York, USA.  
Consultancy services on Multi-Party Computation and related technologies
- Jul. 2017 – Aug. 2017 **External consulting**, *DNI Developers*, Bogotá, Colombia.  
Analysis and C# Implementation of digital signatures to provide authenticity in the project MiCertific@doDigital
- Community Service**
- Nov. 2023 **Program committee**, *FC'24*.  
Program committee member for the conference Financial Cryptography and Data Security 2023
- Oct. 2023 **Program committee**, *AsiaCCS'24*.  
Program committee member for the conference AsiaCCS 2024
- Oct. 2023 **Program committee**, *Eurocrypt'24*.  
Program committee member for the conference Eurocrypt 2024
- Sep. 2023 **Reviewer**, *JCS*.  
Reviewer for the Journal of Computer Security 2023
- Sep. 2023 **Reviewer**, *TDSC*.  
Reviewer for the Transactions on Dependable and Secure Computing 2023
- Jun. 2023 **Program committee**, *Latincrypt'23*.  
Program committee member for the conference Latincrypt 2023
- May. 2023 **Program committee**, *CCS'23*.  
Program committee member for the ACM Conference on Computer and Communications Security (CCS) 2023
- Mar. 2023 **Reviewer**, *JoC*.  
Reviewer for the Journal of Cryptology 2023
- Jan. 2023 **External Reviewer**, *CRYPTO'23*.  
External Reviewer for the conference CRYPTO 2023
- Jan. 2023 **External reviewer**, *PKC'23*.  
Reviewer for the conference on Public Key Cryptography (PKC) 2023

Oct. 2022 **Reviewer**, *JoC*.  
Reviewer for the Journal of Cryptology 2022

Oct. 2022 **External reviewer**, *PKC'22*.  
External reviewer for the conference on Public Key Cryptography (PKC) 2022

Jun. 2022 **Reviewer**, *TIFS*.  
Reviewer for the IEEE Transactions on Information Forensics & Security 2022

Jun. 2022 **External Reviewer**, *Asiacrypt*.  
Reviewer for the conference Asiacrypt 2022

Apr. 2022 **Program committee**, *CFAIL*.  
Program committee member for The Fourth Conference for Failed Approaches and Insightful Losses in Cryptology 2022

Mar. 2022 **External Reviewer**, *CRYPTO'22*.  
External Reviewer for the conference CRYPTO 2022

Feb. 2022 **Reviewer**, *TDSC*.  
Reviewer for the IEEE Transactions on Dependable and Secure Computing 2022

Nov. 2021 **External Reviewer**, *EC'22*.  
External Reviewer for the conference Eurocrypt 2022

Aug. 2021 **Reviewer**, *TDS*.  
Reviewer for the Transactions on Data Science 2021

Aug. 2021 **Reviewer**, *TCS*.  
Reviewer for Theoretical Computer Science 2021

Jun. 2021 **External Reviewer**, *CCS'21*.  
External Reviewer for the conference CCS 2021

Mar. 2021 **External Reviewer**, *CRYPTO'21*.  
External Reviewer for the conference CRYPTO 2021

Feb. 2021 **External Reviewer**, *FC'21*.  
External Reviewer for the conference Financial Cryptography 2021

Jul. 2020 **External Reviewer**, *TCC'20*.  
External Reviewer for the Theory of Cryptography Conference 2020

Jun. 2020 **External Reviewer**, *AC'20*.  
External Reviewer for the conference Asiacrypt 2020

Feb. 2020 **External Reviewer**, *CRYPTO'20*.  
External Reviewer for the conference CRYPTO 2020

Feb. 2020 **External Reviewer**, *CCS'20*.  
External Reviewer for the ACM Conference on Computer and Communications Security 2020

Feb. 2020 **External Reviewer**, *TDSC'20*.  
External Reviewer for the Transactions on Dependable and Secure Computing 2020

Apr. 2019 **External Reviewer**, *IWSEC'19*.  
External Reviewer for the International Workshop on Security 2019

- March. 2019 **External Reviewer**, *CRYPTO'19*.  
External Reviewer for the conference CRYPTO 2019
- Dec. 2018 **External Reviewer**, *PQC'19*.  
External Reviewer for the conference Post-Quantum Crypto 2019
- Nov. 2018 **External Reviewer**, *EC'18*.  
External Reviewer for the conference Eurocrypt 2018
- Jun. 2018 **External Reviewer**, *BCS'18*.  
External Reviewer for the conference BalkanCryptSec 2018
- Nov. 2017 **External Reviewer**, *PKC'18*.  
External Reviewer for the conference Public Key Cryptography 2018

### Others

- Aug. 2015 – Dec. 2016 **Research assistant**, *Colciencias*, Medellín, Colombia.  
Research project on Multivariate Public Key Cryptography

## Languages

- Spanish Native  
English Fluent  
Danish Beginner

## Computer Skills

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|------------|-----------------------|-------------|-----------------------|
| OS         | Linux, Windows, MacOX | Typography  | LaTeX                 |
| Scientific | Magma, SageMath       | Programming | Python, C++, Java, Go |

## Software

- TurboPack **TurboPack: Honest Majority MPC with Constant Online Communication.**  
<https://github.com/deescuderoo/turbopack>
- corrOT **Correlated Oblivious Transfer.**  
<https://github.com/deescuderoo/corrOT>

### Partial Contribution

- FRN **Fast Fully Secure Multi-Party Computation Over Any Ring with Two-Thirds Honest Majority (CCS'22).**  
<https://github.com/anderspkd/ccs-DEN22>

## Awards

- Apr. 2019 **Tesis de Maestria Laureada**, *Universidad Nacional de Colombia*, Medellín.
- Apr. 2017 **Best Bachelor Thesis in Mathematics**, *Universidad Nacional de Colombia*, Medellín.

Aug. 2012 - Aug. 2016 **Best Grade Average**, *Universidad Nacional de Colombia*, Medellín.

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## Talks

- Oct. 2023 **On Fully-Secure Honest Majority MPC without  $n^2$  Round Overhead**, *Latincrypt 2023*, Quito, Ecuador.
- Aug. 2023 **Panelist at Crypto meets AI - GHTC**, *Affiliated event at CRYPTO'23*, Santa Barbara (CA), United States.
- Jun. 2023 **Phoenix: Secure Computation in an Unstable Network with Dropouts and Comebacks**, *ITC 2023*, Aarhus, Denmark.
- Nov. 2022 **TurboPack: Honest Majority MPC with Constant Online Communication**, *NYU Crypto seminar*, New York City, United States.
- Nov. 2022 **TurboPack: Honest Majority MPC with Constant Online Communication**, *CCS 2022*, Los Angeles (CA), United States.
- Aug. 2022 **More Efficient Dishonest Majority Secure Computation over  $\mathbb{Z}_{2^k}$  via Galois Rings**, *CRYPTO 2022*, Santa Barbara (CA), United States.
- May 2022 **Fast Fully Secure Multi-Party Computation over Any Ring with Two-Thirds Honest Majority (Invited Talk)**, *International Conference on Coding and Cryptography (ICCC) 2022*, Virtual Conference 2021.
- Dec. 2021 **Improved single-round secure multiplication using regenerating codes**, *ASIACRYPT*, Virtual Conference 2021.
- Nov. 2021 **Information-theoretically secure MPC against mixed dynamic adversaries**, *TCC*, Raleigh, U.S.A. (Hybrid Conference) 2021.
- Oct. 2021 **Honest majority MPC with abort with minimal online communication**, *Latincrypt*, Virtual Conference 2021.
- Aug. 2021 **Fantastic Four: Honest-Majority Four-Party Secure Computation With Malicious Security**, *USENIX*, Virtual Conference 2021.
- Sep. 2020 **PRIMAL: A Framework for Secure Evaluation of Neural Networks**, *OpenMined Privacy Conference*, Virtual Conference 2020.
- Sep. 2020 **Efficient Protocols for Oblivious Linear Function Evaluation from Ring-LWE**, *SCN 2020: 12th Conference on Security and Cryptography for Networks*, Virtual Conference.
- Jun. 2020 **Efficient Protocols for Oblivious Linear Function Evaluation from Ring-LWE**, *TPMPC 2020: Theory and Practice of Multi-Party Computation Workshops*, Virtual Conference.
- Jun. 2019 **New Primitives for Actively-Secure MPC over Rings with Applications to Private Machine Learning**, *TPMPC 2019: Theory and Practice of Multi-Party Computation Workshops*, Ramat Gan, Israel.
- May. 2019 **New Primitives for Actively-Secure MPC over Rings with Applications to Private Machine Learning**, *IEEE Security & Privacy 2019*, San Francisco, United States.

- Aug. 2018 **SPDZ2k: Efficient MPC mod  $2^k$  for Dishonest Majority**, *CRYPTO 2018*, Santa Barbara, United States.
- May. 2018 **SPDZ2k: Efficient MPC mod  $2^k$  for Dishonest Majority**, *TPMPC 2018: Theory and Practice of Multi-Party Computation Workshops*, Aarhus, Denmark.
- Apr. 2018 **Rank Analysis of Multivariate Cryptosystems**, *PQC 2018: Post-Quantum Cryptography*, Fort Lauderdale, USA.
- Nov. 2017 **Secure Multiparty Computation**, *ICAMI 2017: International Conference on Applied Mathematics and Informatics*, San Andrés, Colombia.
- Jul. 2016 **Algebraic attacks on MPK cryptosystems**, *Crypto-CO: Summer school on Cryptography*, Bogotá, Colombia.

## Publications

1. Daniel Escudero, Hongqing Liu, Chaoping Xing, and Chen Yuan. Degree-d reverse multiplication-friendly embeddings: Constructions and applications. *Asiacrypt*, 2023.
2. Daniel Escudero and Serge Fehr. On fully-secure honest majority mpc without  $n^2$  round overhead. *Latincrypt*, 2023.
3. Daniel Escudero, Vipul Goyal, Antigoni Polychroniadou, Yifan Song, and Chenkai Weng. SuperPack: Dishonest majority MPC with constant online communication. *Eurocrypt*, 2023.
4. Ivan Damgård, Daniel Escudero, and Antigoni Polychroniadou. Phoenix: Secure computation in an unstable network with dropouts and comebacks. *Information Theoretic Cryptography*, 2023.
5. Daniel Escudero Alexander Bienstock and Antigoni Polychroniadou. On linear communication complexity for (maximally) fluid mpc. *CRYPTO*, 2023.
6. Thomas Attema, Ignacio Cascudo, Ronald Cramer, Ivan Damgård, and Daniel Escudero. Vector commitments over rings and compressed sigma-protocols. *TCC*, 2022.
7. Daniel Escudero, Chaoping Xing, and Chen Yuan. More efficient dishonest majority secure computation over  $\mathbb{Z}_{2^k}$  via galois rings. *CRYPTO*, 2022.
8. Anders Dalskov, Daniel Escudero, and Ariel Nof. Fast fully secure multi-party computation over any ring with two-thirds honest majority. *CCS*, 2022.
9. Daniel Escudero, Vipul Goyal, Antigoni Polychroniadou, and Yifan Song. TurboPack: Honest majority MPC with constant online communication. *CCS*, 2022.

10. Mark Abspoel, Ronald Cramer, Daniel Escudero, Ivan Damgård, and Chaoping Xing. Improved single-round secure multiplication using regenerating codes. *Asiacrypt*, 2021.
11. Ivan Damgård, Daniel Escudero, and Divya Ravi. Information-theoretically secure mpc against mixed dynamic adversaries. *TCC*, 2021.
12. Diego F. Aranha, Anders Dalskov, Daniel Escudero, and Claudio Orlandi. Improved threshold signatures, proactive secret sharing, and input certification from LSS isomorphisms. *Latincrypt*, 2021.
13. Anders Dalskov and Daniel Escudero. Honest majority MPC with abort with minimal online communication. *Latincrypt*, 2021.
14. Anders Dalskov, Daniel Escudero, and Marcel Keller. Fantastic four: Honest-majority four-party secure computation with malicious security. *USENIX*, 2021.
15. Mark Abspoel, Daniel Escudero, and Nikolaj Volgushev. Secure training of decision trees with continuous attributes. *PoPETs*, 2021.
16. Mark Abspoel, Anders Dalskov, Daniel Escudero, and Ariel Nof. An efficient passive-to-active compiler for honest-majority mpc over rings. *ACNS*, 2021.
17. Carsten Baum, Daniel Escudero, Alberto Perouzo-Ulloa, Peter Scholl, and Juan Ramón Troncoso-Pastoriza. Efficient protocols for oblivious linear function evaluation from ring-lwe. *SCN*, 2020.
18. Mark Abspoel, Ronald Cramer, Ivan Damgård, Daniel Escudero, Matthieu Rambaud, Chaoping Xing, and Chen Yuan. Asymptotically good multiplicative lss over galois rings and applications to mpc over  $\mathbb{Z}/p^k\mathbb{Z}$ . *Asiacrypt*, 2020.
19. Daniel Escudero, Satrajit Ghosh, Marcel Keller, Rahul Rachuri, and Peter Scholl. Improved primitives for mpc over mixed arithmetic-binary circuits. *CRYPTO*, 2020.
20. Anders P. K. Dalskov, Daniel Escudero, and Marcel Keller. Secure evaluation of quantized neural networks. *PoPETs*, 2020.
21. Mark Abspoel, Ronald Cramer, Ivan Damgård, Daniel Escudero, and Chen Yuan. Efficient information-theoretic secure multiparty computation over  $\mathbb{Z}/p^k\mathbb{Z}$  via galois rings. *Theory of Cryptography Conference, TCC*, 2019.
22. I. Damgård, D. Escudero, T. Frederiksen, M. Keller, P. Scholl, and N. Volgushev. New primitives for actively-secure mpc over rings with applications to private machine learning. *IEEE Symposium on Security and Privacy (SP)*, 2019.



23. Ronald Cramer, Ivan Damgård, Daniel Escudero, Peter Scholl, and Chaoping Xing. Spdz2k: Efficient MPC mod  $2^k$  for dishonest majority. CRYPTO, 2018.
24. John Baena, Daniel Cabarcas, Daniel E. Escudero, Karan Khathuria, and Javier A. Verbel. Rank analysis of cubic multivariate cryptosystems. PQCrypto, 2019.
25. John B. Baena, Daniel Cabarcas, Daniel E. Escudero, Jaiberth Porras-Barrera, and Javier A. Verbel. Efficient zhfe key generation. PQCrypto, 2018.