

# Curriculum Vitae

Carmit Hazay

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## Contact Information

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## Current Position

Associate Professor in the Faculty of Engineering in Bar-Ilan University, Israel.

## Research Interests

I am interested in the field of Cryptography, with a focus on secure protocols and their efficiency. This research concentrates on the problem of constructing secure protocols that are both highly efficient and have rigorous proofs of security. In my research I consider different adversarial models and definitions of security, with the aim of obtaining high efficiency and security. My focus is on both theoretical and practical efficiency as well as understanding the bottlenecks in the design of secure protocols.

## Education

- 11/2004 - 2/2009: *Bar-Ilan University (Ramat Gan, Israel).*  
**Ph.D. in Computer Science**  
With Highest Distinction  
Field of Research: Cryptography  
Thesis: Efficient Two-Party Computation with Simulation Based Security.  
Advisor: Yehuda Lindell
- 9/2002 - 8/2004: *Bar-Ilan University (Ramat Gan, Israel).*  
**M.Sc. in Computer Science**  
Field of Research: Algorithms in Pattern Matching  
Thesis: Parameterized Matching.  
Advisor: Moshe Lewenstein
- 9/1998 - 8/2001: *Bar-Ilan University (Ramat Gan, Israel).*  
**B.Sc. in Computer Science and Mathematics**  
Magna Cum Laude

## Employment History

### Academic:

- |                 |                          |   |
|-----------------|--------------------------|---|
| 8/2010 - 8/2012 | Post-Doctoral Researcher | Department of Computer Science,<br>Aarhus University, Aarhus, Denmark.                                  |
| 9/2009 - 8/2010 | Post-Doctoral Researcher | Department of Computer Science and Applied Mathematics,<br>Weizmann Institute & IDC, Herzeliya, Israel. |
| 6/2008 - 7/2008 | Summer Intern            | IBM T. J. Watson Research Center, Hawthorne, NY.  |

### Industrial:

- |                 |            |                 |
|-----------------|------------|-----------------|
| 9/2000 - 2/2002 | Programmer | Amdocs, Israel. |
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## Awards

Dean's award, 2002 and 2003, Department of Computer Science and Mathematics, Bar-Ilan University, Ramat Gan, Israel.

## Fellowships

- Eshkol fellowship, 2006 - 2009, Ministry of Science and Technology, Israel.
- President's fellowship, 2005 - 2009, Department of Computer Science and Mathematics, Bar-Ilan University, Ramat Gan, Israel.

## Research Grants

- More Efficient MPC with Malicious Security, Israel Science Foundation, 880,000 NIS (approximately \$243,000). Principle investigator, *October 2018-September 2022*.
- Cryptography for Secure Digital Interaction, ICT COST Action IC1306. Management committee member, *April 2014 - March 2018*.
- The Study of Efficient Delegatable Computation, Israel Ministry of Science and Technology of Infrastructures, 1,127,000 NIS (approximately \$325,000). Principle investigator, *December 2013-November 2016*.

## Book

- **C. Hazay** and Y. Lindell. Efficient Secure Two-Party Protocols – Techniques and Constructions. Springer-Verlag, 2010.

## Journal Publications

1. **C. Hazay** and M. Venkatasubramanian. On the Power of Secure Two-Party Computation. To appear in the Journal of Cryptology.
2. **C. Hazay** and M. Venkatasubramanian. What Security Can We Achieve within 4 Rounds? In the Journal of Cryptology 32(4): 1200-1262 (2019).
3. **C. Hazay** and A. Yanay. Constant-Round Maliciously Secure Two-Party Computation in the RAM Model. In the Journal of Cryptology 32(4): 1144-1199 (2019).

4. **C. Hazay** and M. Venkitasubramaniam. On Black-Box Complexity of Universally Composable Security in the CRS model. In the *Journal of Cryptology* 32(3): 635-689 (2019).
5. **C. Hazay**, G. L. Mikkelsen, T. Rabin, T. Toft and A. A. Nicolosi. Efficient RSA Key Generation and Threshold Paillier in the Two-Party Setting. In the *Journal of Cryptology* 32(2): 265-323 (2019).
6. **C. Hazay**. Oblivious Polynomial Evaluation and Secure Set-Intersection from Algebraic PRFs. In the *Journal of Cryptology* 31(2): 537-586 (2018).
7. S. Faust, **C. Hazay** and D. Venturi. Outsourced Pattern Matching. In the *International Journal of Information Security* 17(3): 327-346 (2018).
8. **C. Hazay** and A. Patra. One-Sided Adaptively Secure Two-Party Computation. In the *Journal of Cryptology* 30(1): 321-371 (2017).
9. G. Asharov, R. Canetti and **C. Hazay**. Towards a Game Theoretic View of Secure Computation. In the *Journal of Cryptology* 29(4): 879-926 (2016).
10. S. Faust, **C. Hazay**, J. B. Nielsen, P. S. Nordholt and A. Zottarel. Signature Schemes Secure against Hard-to-Invert Leakage. In the *Journal of Cryptology* 29(2): 422-455 (2016).
11. **C. Hazay**, A. Lopez-Alt, H. Wee and D. Wichs. Leakage-Resilient Cryptography from Minimal Assumptions. In the *Journal of Cryptology* 29(3): 514-551 (2016).
12. M. J. Freedman, **C. Hazay**, K. Nissim and B. Pinkas. Efficient Set Intersection with Simulation-Based Security. In the *Journal of Cryptology* 29(1): 115-155 (2016).
13. R. Cole, **C. Hazay**, M. Lewenstein and D. Tsur. Two Dimensional Parameterized Matching. In *ACM Transactions on Algorithms* 11(2): 12:1-12:30 (2014).
14. R. Gennaro, **C. Hazay** and J. Sorensen. Automata Evaluation and Text Search Protocols with Simulation Based Security. In the *Journal of Cryptology* 29(2): 243-282 (2016).
15. **C. Hazay** and T. Toft. Computationally Secure Pattern Matching in the Presence of Malicious Adversaries. In the *Journal of Cryptology* 27(2): 358-395 (2014).
16. **C. Hazay**, A. Jagmohan, D. Klinc, H. Krawczyk and T. Rabin. On Compressing Data Encrypted with Block Ciphers. In *IEEE Transactions on Information Theory* 58(11): 6989-7001 (2012).
17. **C. Hazay** and K. Nissim. Efficient Set Operations in the Presence of Malicious Adversaries. In the *Journal of Cryptology* 25(3): 383-433 (2012).
18. D. Gordon, **C. Hazay**, J. Katz and Y. Lindell. Complete Fairness in Secure Two-Party Computation. In the *Journal of ACM* 58(6): 24 (2011).
19. **C. Hazay** and Y. Lindell. Efficient Protocols for Set Intersection and Pattern Matching with Security Against Malicious and Covert Adversaries. In the *Journal of Cryptology* 23(3): 422-456, 2010.
20. **C. Hazay**, M. Lewenstein and D. Sokol. Approximate Parameterized Matching. In *ACM Transactions on Algorithms* 3(3): 15, 2007.

## Publications in Refereed Conferences

1. **C. Hazay**, A. Marcedone, Y. Ishai, M. Venkatasubramanian. **LevioSA: Lightweight Secure Arithmetic Computation**. In the ACM Conference on Computer and Communications Security (ACM CCS), pages 327-344 2019.
2. M. Byali, **C. Hazay**, A. Patra and S. Singla. **Fast Actively Secure Five-Party Computation with Security Beyond Abort**. In the ACM Conference on Computer and Communications Security (ACM CCS), pages 1573-1590 2019.
3. **C. Hazay**, E. Orsini, P. Scholl and E. Soria-Vazquez. **Concretely Efficient Large-Scale MPC with Active Security (or, TinyKeys for TinyOT)**. In ASIACRYPT, Springer-Verlag (LNCS 11274), pages 86-117, 2018.
4. **C. Hazay** and M. Venkatasubramanian. **Round-Optimal Fully Black-Box Zero-Knowledge Arguments from One-Way Permutations**. In TCC, Springer-Verlag (LNCS 11239), pages 263-285, 2018.
5. S. Halevi, **C. Hazay**, A. Polychroniadou and M. Venkatasubramanian. **Round-Optimal Secure Multi-Party Computation**. In CRYPTO, Springer-Verlag (LNCS 10993), pages 488-520, 2018.
6. **C. Hazay**, E. Orsini, P. Scholl and E. Soria-Vazquez. **TinyKeys: A New Approach to Efficient Multi-Party Computation**. In CRYPTO, Springer-Verlag (LNCS 10993), pages 3-33, 2018.
7. **C. Hazay**, Y. Ishai, M. Venkatasubramanian. **Actively Secure Garbled Circuits with Constant Communication Overhead in the Plain Model**. In the Theory of Cryptography Conference (TCC), Springer-Verlag (LNCS 10678), pages 3-39, 2017.
8. **C. Hazay**, P. Scholl and E. Soria-Vazquez. **Low Cost Constant Round MPC Combining BMR and Oblivious Transfer**. In ASIACRYPT, Springer-Verlag (LNCS 10624), pages 598-628, 2017.
9. S. Ames, **C. Hazay**, Y. Ishai, M. Venkatasubramanian. **Ligero: Lightweight Sublinear Arguments Without a Trusted Setup**. In the ACM Conference on Computer and Communications Security (ACM CCS), pages 2087-2104 2017.
10. **C. Hazay** and M. Venkatasubramanian. **Scalable Multi-Party Private Set-Intersection**. In Public Key Cryptography (PKC), Springer-Verlag (LNCS 10174), pages 175-203, 2017.
11. **C. Hazay**, A. Polychroniadou and M. Venkatasubramanian. **Constant-Round Adaptively Secure Protocols in the Tamper-Proof Hardware Model**. In Public Key Cryptography (PKC), Springer-Verlag (LNCS 10175), pages 428-460, 2017.
12. **C. Hazay** and A. Yanay. **Constant-Round Maliciously Secure Two-Party Computation in the RAM Model**. In the Theory of Cryptography Conference (TCC-B), Springer-Verlag (LNCS 9985), pages 521-553, 2016.
13. **C. Hazay** and M. Venkatasubramanian. **Composable Adaptive Secure Protocols without Setup under Polytime Assumptions**. In the Theory of Cryptography Conference (TCC-B), Springer-Verlag (LNCS 9985), pages 400-432, 2016.
14. **C. Hazay**, A. Polychroniadou and M. Venkatasubramanian. **Composable Security in the Tamper-Proof Hardware Model under Minimal Complexity**. In the Theory of Cryptography Conference (TCC-B), Springer-Verlag (LNCS 9985), pages 367-399, 2016.
15. **C. Hazay** and M. Venkatasubramanian. **What Security Can We Achieve within 4 Rounds?** In SCN, pages 486-505, 2016.

16. **C. Hazay** and H. Zarosim. The Feasibility of Outsourced Database Search in the Plain Model. In SCN, pages 313-332, 2016.
17. **C. Hazay** and M. Venkitasubramaniam. On the Power of Secure Two-Party Computation. In CRYPTO, Springer-Verlag (LNCS 9815), pages 397-429, 2016.
18. **C. Hazay**, A. Patra and B. Warinschi. Selective Opening Security for Receivers. In ASIACRYPT, Springer-Verlag (LNCS 9453), pages 443-469, 2015.
19. **C. Hazay** and M. Venkitasubramaniam. On Black-Box Complexity of Universally Composable Security in the CRS model. In ASIACRYPT, Springer-Verlag (LNCS 9453), pages 183-209, 2015.
20. **C. Hazay**, Y. Lindell and A. Patra. Adaptively Secure Computation with Partial Erasures. In PODC, pages 291-300, 2015.
21. **C. Hazay**. Oblivious Polynomial Evaluation and Secure Set-Intersection from Algebraic PRFs. In the Theory of Cryptography Conference (TCC), Springer-Verlag (LNCS 9015), pages 90-120, 2015.
22. **C. Hazay** and A. Patra. One-Sided Adaptively Secure Two-Party Computation. In the Theory of Cryptography Conference (TCC), Springer-Verlag (LNCS 8349), pages 368-393, 2014.
23. S. Faust, **C. Hazay** and D. Venturi. Outsourced Pattern Matching. In ICALP, Springer-Verlag (LNCS 7966), pages 545-556, 2013.
24. **C. Hazay**, A. Lopez-Alt, H. Wee and D. Wichs. Leakage-Resilient Cryptography from Minimal Assumptions. In EUROCRYPT, Springer-Verlag (LNCS 7658), pages 160-176, 2013.
25. S. Faust, **C. Hazay**, J. B. Nielsen, P. S. Nordholt and A. Zottarel. Signature Schemes Secure against Hard-to-Invert Leakage. In ASIACRYPT, Springer-Verlag (LNCS 7658), pages 98-115, 2012.
26. A. Akavia, S. Goldwasser and **C. Hazay**. Distributed Public Key Schemes Secure against Continual Leakage. In PODC, pages 155-164, 2012.
27. I. Damgård, S. Faust and **C. Hazay**. Secure Two-Party Computation with Low Communication. In the Theory of Cryptography Conference (TCC), Springer-Verlag (LNCS 7194), pages 54-74, 2012.
28. **C. Hazay**, G. L. Mikkelsen, T. Rabin and T. Toft. Efficient RSA Key Generation and Threshold Paillier in the Two-Party Setting. In CT-RSA, Springer-Verlag (LNCS 7178), pages 313-331, 2012.
29. G. Asharov, R. Canetti and **C. Hazay**. Towards a Game Theoretic View of Secure Computation. In EUROCRYPT, Springer-Verlag (LNCS 6632), pages 426-445, 2011.
30. **C. Hazay** and T. Toft. Computationally Secure Pattern Matching in the Presence of Malicious Adversaries. In ASIACRYPT, Springer-Verlag (LNCS 6477), pages 195-212, 2010.
31. R. Gennaro, **C. Hazay** and J. Sorensen. Text Search Protocols with Simulation Based Security. In Public Key Cryptography (PKC), pages 332-350, 2010.
32. **C. Hazay** and K. Nissim. Efficient Set Operations in the Presence of Malicious Adversaries. In Public Key Cryptography (PKC), pages 312-331, 2010.
33. **C. Hazay**, A. Jagmohan, D. Klinc, H. Krawczyk and T. Rabin. On Compressing Data Encrypted with Block Ciphers. In Data Compression Conference, 213-222, 2009.
34. **C. Hazay** and Y. Lindell. Constructions of Truly Practical Secure Protocols using Standard Smartcards. In the ACM Conference on Computer and Communications Security (ACM CCS), pages 491-500 2008.

35. D. Gordon, **C. Hazay**, J. Katz and Y. Lindell. Complete Fairness in Secure Two-Party Computation. In the ACM Symposium on the Theory of Computing (STOC), pages 413-422, 2008.
36. **C. Hazay** and Y. Lindell. Efficient Protocols for Set Intersection and Pattern Matching with Security Against Malicious and Covert Adversaries. In the Theory of Cryptography Conference (TCC), Springer-Verlag (LNCS 4948), pages 155-175, 2008.
37. **C. Hazay**, J. Katz, C.Y. Koo and Y. Lindell. Concurrently-Secure Blind Signatures without Random Oracles or Setup Assumptions. In the Theory of Cryptography Conference (TCC), Springer-Verlag (LNCS 4392), pages 323-341, 2007.
38. **C. Hazay**, M. Lewenstein and D. Tzur. Faster Algorithm for 2D parameterized Matching. In the Symposium on Combinatorial Pattern Matching (CPM). pages 266-279, 2005.
39. **C. Hazay**, M. Lewenstein and D. Sokol. Approximate parameterized matching. In the European Symposium on Algorithms (ESA), pages 414-425, 2004.

## Technical Reports

1. **C. Hazay** and Y. Lindell. A Note on Zero-Knowledge Proofs of Knowledge and the ZKPOK Ideal Functionality. Cryptology ePrint Archive, Report #2010/552, 2010.
2. **C. Hazay** and Y. Lindell. A Note on the Relation between the Definitions of Security for Semi- Honest and Malicious Adversaries. Cryptology ePrint Archive, Report #2010/551, 2010.
3. **C. Hazay** and Y. Lindell. Efficient Oblivious Polynomial Evaluation with Simulation-Based Security. Cryptology ePrint Archive, Report #2009/459, 2009.

## Other Publications

- **C. Hazay**. Secure Two-Party Computation. Galileo Magazine, Bar-Ilan University, February 2010.

## Patents

- **C. Hazay**, A. Jagmohan, D. Klinc, H. Krawczyk and T. Rabin. Compressing encrypted data without the encryption key. US patent 20110103580, May 2011.

## Professional Activities

### Program Committee Membership:

1. The International Conference on the Theory and Applications of Cryptographic Techniques (EURO-CRYPT), 2020.
2. ACM Conference on Computer and Communications Security (ACM CCS), 2019.
3. The International Cryptography Conference (CRYPTO), 2019.
4. The International Symposium on Cyber Security Cryptography and Machine Learning (CSCML), 2018.
5. The Conference on Security and Cryptography for Networks (SCN), 2018.
6. The International Conference on Practice and Theory in Public Key Cryptography (PKC), 2018.
7. The International Conference on Cryptology in India (Indocrypt), 2017.
8. Theory of Cryptography Conference (TCC), 2017.

9. The International Conference on Practice and Theory in Public Key Cryptography (PKC), 2017.
10. The International Conference on Cryptology in India (Indocrypt), 2016.
11. The International Conference on Information Theoretic Security (ICITS), 2016.
12. The International Cryptography Conference (CRYPTO), 2015.
13. The International Conference on Practice and Theory in Public Key Cryptography (PKC), 2015.
14. The International Conference on Practice and Theory in Public Key Cryptography (PKC), 2013.
15. The Nordic Conference on Secure IT Systems (NordSec), 2012.
16. The International Conference on Practice and Theory in Public Key Cryptography (PKC), 2011.
17. The International Cryptography Conference (CRYPTO), 2010.

**Workshop Organization:**

- Workshop on Secure Computation Theory and Applications. Aarhus University, Denmark, June 2012.

**Graduate Students**

**Current:**

- Rishabh Bhaduria. **Ph.D.** expected to graduate October 2022.
- Efrat Cohen. **M.Sc.** expected to graduate October 2021.

**Graduated:**

- Mor Lilintal. **M.Sc.** graduated February 2019.
- Avishay Yanay. **Ph.D.** (joint with Yehuda Lindell), graduated July 2019.
- Raviv Moses. **M.Sc.** graduated September 2019.