Pierre Tholoniat

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Education

Columbia University — New York, NY
Ph.D. in Computer Science — Advisor: Pr. Roxana Geambasu — Jan 2021–Oct 2025 (anticipated)
M.S. in Computer Science — Sep 2019–Dec 2020

École Polytechnique — Palaiseau, FR
M.S. in Engineering (*Ingénieur Diplômé*) — Computer Science — Sep 2018–Aug 2019
B.S. in Engineering (*Gradué en Ingénierie*) — Sep 2016–Aug 2018

Lycée Sainte-Geneviève — Versailles, FR
Undergraduate program in Mathematics and Physics (*Prépa MPSI/MP**) — Sep 2014–Aug 2016

Experience

Columbia University · Graduate Research Assistant — New York, NY · Jan 2021–present
- Designed and implemented systems for differential privacy with Pr. Asaf Cidon and Pr. Roxana Geambasu.
- Published research at top systems conferences: OSDI '21 [1], SOSP '23 [2], SOSP '24 [3] and EuroSys '25 [4].
- Participated in industry working groups and contributed to W3C private ads measurement standard draft.
- Optimized distributed private training on National Laboratory supercomputers, upstreamed code to PyTorch.

Google · Research Intern — New York, NY · May 2024–Aug 2024
- Implemented and evaluated a large-scale secure aggregation protocol for federated learning and private analytics.
- Securely integrated homomorphic encryption and zero-knowledge primitives with Rust/C++ interoperability.

Cloudflare · Research Intern — San Francisco, CA (remote) · May 2023–Aug 2023
- Improved privacy standards by formalizing differential privacy in the IETF Distributed Aggregation Protocol [5].
- Contributed to open-source implementations (Libprio-rs, Daphne) and evaluated private telemetry use-cases.

Microsoft Research · Research Intern — Redmond, WA (remote) · May 2022–Aug 2022
- Designed private training algorithms for mixture-of-experts LLMs, presented at the PPAI '24 workshop [6].
- Implemented and evaluated my algorithms with PyTorch and Fairseq on 2.4-billion-parameter transformers.

École Normale Supérieure, Paris · Research Intern — Paris, FR (remote) · Jun 2020–Sep 2020
- Developed privacy-preserving deep learning protocols with Function Secret Sharing, published at PETS '22 [7].
- Implemented as an open-source Rust library integrated with the OpenMined PySyft framework.

The University of Sydney · Visiting Researcher — Sydney, AU · Apr 2019–Aug 2019
- Researched formal verification of fault-tolerant distributed algorithms, published at DISC '22 and PODC '22 [8].
- Designed cross-chain protocols for blockchain scalability, published at SPAA '20 and DC '23 [9].

Muvee Technologies · Software Engineering Intern — Singapore, SG · Jun 2018–Aug 2018
- Applied machine learning to face recognition in automated photobooks using Tensorflow.
- Implemented and customized recent clustering algorithms in C++ to group images on Android.

Selected publications

Full list available on Google Scholar.

Peer-reviewed Conference and Journal Proceedings

[1] T. Luo, M. Pan, **P. Tholoniat**, A. Cidon, R. Geambasu, and M. Lécuyer, "Privacy budget scheduling", in *15th USENIX Symposium on Operating Systems Design and Implementation (OSDI 21)*, USENIX Association, Jul. 2021, pp. 55–74, ISBN: 978-1-939133-22-9.

[2] K. Kostopoulou, **P. Tholoniat**, A. Cidon, R. Geambasu, and M. Lécuyer, "Turbo: Effective Caching in Differentially-Private Databases", in *Proceedings of the 29th Symposium on Operating Systems Principles*, ser. SOSP '23, New York, NY, USA: Association for Computing Machinery, Oct. 23, 2023, pp. 579–594, ISBN: 9798400702297. DOI: 10.1145/3600006.3613174.

[3] **P. Tholoniat**, K. Kostopoulou, P. McNeely, P. S. Sodhi, A. Varanasi, B. Case, A. Cidon, R. Geambasu, and M. Lécuyer, "Cookie monster: Efficient on-device budgeting for differentially-private ad-measurement systems", in *Proceedings of the ACM SIGOPS 30th Symposium on Operating Systems Principles*, ser. SOSP '24, Austin, TX, USA: Association for Computing Machinery, 2024, pp. 693–708, ISBN: 9798400712517. DOI: 10.1145/3694715.3695965.

[4] **P. Tholoniat**, K. Kostopoulou, M. Chowdhury, A. Cidon, R. Geambasu, M. Lécuyer, and J. Yang, "DPack: Efficiency-Oriented Privacy Budget Scheduling", *To appear at EuroSys '25.*, 2025. DOI: 10.48550/arXiv.2212.13228.

[7] T. Ryffel, **P. Tholoniat**, D. Pointcheval, and F. Bach, "Ariann: Low-interaction privacy-preserving deep learning via function secret sharing", *Proceedings on Privacy Enhancing Technologies*, vol. 2022, no. 1, pp. 291–316, 2022. DOI: doi:10.2478/popets-2022-0015.

[8] N. Bertrand, V. Gramoli, I. Konnov, M. Lazić, **P. Tholoniat**, and J. Widder, "Holistic Verification of Blockchain Consensus", in *36th International Symposium on Distributed Computing (DISC 2022)*, C. Scheideler, Ed., ser. Leibniz International Proceedings in Informatics (LIPIcs), vol. 246, Dagstuhl, Germany: Schloss Dagstuhl – Leibniz-Zentrum für Informatik, 2022, 10:1–10:24, ISBN: 978-3-95977-255-6. DOI: 10.4230/LIPIcs.DISC.2022.10.

[9] R. van Glabbeek, V. Gramoli, and **P. Tholoniat**, "Cross-chain payment protocols with success guarantees", *Distributed Computing*, vol. 36, no. 2, pp. 137–157, Jun. 2023, ISSN: 1432-0452. DOI: 10.1007/s00446-023-00446-0.

Workshop Papers and Blogposts

[5] **P. Tholoniat**. "Have your data and hide it too: An introduction to differential privacy", The Cloudflare Blog. (Dec. 22, 2023), [Online]. Available: https://blog.cloudflare.com/have-your-data-and-hide-it-too-an-introduction-to-differential-privacy.

[6] **P. Tholoniat**, H. Inan, J. Kulkarni, and R. Sim, "Differentially Private Training of Mixture of Experts Models", in *The 5th AAAI Workshop on Privacy-Preserving Artificial Intelligence (PPAI 2024)*, Feb. 2024. DOI: 10.48550/arXiv.2402.07334.

Skills and languages

- **Programming:** Main languages: Rust, Python, C++. Also confident in Go, Java, C, Bash, SQL.
- **Machine Learning & Data:** PyTorch, Opacus, Fairseq, Ray, MLflow, Kubeflow, Gurobi, PostgreSQL.
- **Systems & Cloud:** Linux, SLURM, MPI, Kubernetes, Docker, Google Cloud, Azure ML.
- **Languages:** French (native), English (fluent), Spanish (intermediate), Mandarin & Korean (beginner).