Pierre-Louis Roman

Blockchain research scientist

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Research interests

My research tackles the security and efficiency of blockchains from a distributed systems perspective. I have contributed to dissemination protocols, consensus protocols, privacy-enhancing protocols, hardware/software co-designed systems, and storage systems for both blockchains and distributed systems at large.

Keywords: Blockchains, Distributed systems, Operating systems, Security.

Employment

10.2021–09.2023 (2 y) **Postdoctoral researcher**, *EPFL*, Lausanne, Switzerland
- Scalable systems for cryptocurrencies.

08.2019–07.2021 (2 y) **Postdoctoral researcher**, *USI Lugano*, Switzerland
- Secure and efficient data center systems, and languages for distributed systems.

06.2016–08.2016 (3 m) **Visiting doctoral researcher**, *VU Amsterdam*, The Netherlands
- Blockchain light clients and decentralized aggregation protocols.

10.2014–12.2018 (4 y 2 m) **Doctoral researcher**, *IRISA - Inria*, Rennes, France
- Blockchain light clients, scalable dissemination protocols and weak consistency criteria.

04.2013–08.2013 (5 m) **Software engineer intern**, *Trustelem*, Paris, France
- Authentication and proxy services in Go.

07.2012–08.2012 (2 m) **Research intern**, *LIP6*, Paris, France
- Distributed caches for opportunistic mobile networks.

Education

12.2018 **PhD in Computer Science**, *Université de Rennes*, France
- Thesis: Exploring heterogeneity in loosely consistent decentralized data replication. [record] [pdf]
- Supervisors: François Taïani, Davide Frey.
- Committee: Dick Epema (reviewer), Pascal Felber (reviewer), Emmanuelle Anceaume, Davide Frey, Pascal Molli, François Taïani, Gaël Thomas, Spyros Voulgaris.

09.2013 **MSc in Computer Science**, *Sorbonne Université*, Paris, France

06.2011 **BSc in Computer Science**, *Sorbonne Université*, Paris, France

Prizes, awards and fellowships

02.2020 **Facebook Distributed Systems research award**, 50k USD
Project: Towards hybrid asynchronous/synchronous distributed systems.
Co-PIs: Patrick Eugster (USI Lugano), Patrick Jahnke (TU Darmstadt).

05.2016 **Université Bretagne Loire mobility grant**, 3k EUR
Funding for a summer visit at VU Amsterdam.

Research projects

04.2023-03.2027 **Swiss NSF project**, *#200021_215383*, 600k CHF
Project: Broker-Accelerated Cryptocurrencies.
PI: Rachid Guerraoui (EPFL).

01.2022–12.2022 **Hasler Foundation small project**, *#21084*, 50k CHF
Project: Verifiable random topologies for large-scale distributed ledgers.
Sole PI.

Publications

Peer-reviewed international journals

IEEE TPDS '23 [J3] **Differentiated consistency for worldwide gossips.**
D. Frey, A. Mostefaoui, M. Perrin, P.-L. Roman, F. Taïani *(alphabetical)*.
IEEE Transactions on Parallel and Distributed Systems, Volume 34, Issue 1, 15 pages. Extends [C3].
[doi] [pdf] [code]

ACM TOPS '23 [J2] **Secure and Reliable Network Updates.**
J. Lembke, S. Ravi, P.-L. Roman, P. Eugster.
ACM Transactions on Privacy and Security, Volume 26, Issue 1, 41 pages. Extends [C6].
[doi] [pdf] [code]

ACM TOS '22 [J1] **DEFUSE: An Interface for Fast and Correct User-Space File-System Access.**
J. Lembke, P.-L. Roman, P. Eugster.
ACM Transactions on Storage, Volume 18, Issue 3, 29 pages.
[doi] [pdf] [code]

Peer-reviewed international conferences

OSDI '24 [C8] **Chop Chop: Byzantine Atomic Broadcast to the Network Limit.**
M. Camaioni, R. Guerraoui, M. Monti, P.-L. Roman, M. Vidigueira, G. Voron *(alphabetical)*.
The 18th USENIX Symposium on Operating Systems Design and Implementation, 18 pages, Jul 2024.
[arXiv preprint]

ATC '21 [C7] **Live in the Express Lane.**
P. Jahnke, V. Riesop, P.-L. Roman, P. Chuprikov, P. Eugster.
The 2021 USENIX Annual Technical Conference, 15 pages, Jul 2021.
[bib] [pdf]

Middleware '20 [C6] **Consistent and Secure Network Updates Made Practical.**
J. Lembke, S. Ravi, P.-L. Roman, P. Eugster.
The 21st ACM/IFIP International Middleware Conference, 14 pages, Dec 2020.
[doi] [pdf] [code]

OOPSLA '20 [C5] **Scalable and Serializable Networked Multi-actor Programming.**
B. Sang, P. Eugster, G. Petri, S. Ravi, P.-L. Roman.
The 2020 ACM SIGPLAN International Conference on Object-Oriented Programming Systems, Languages, and Applications, 30 pages, Nov 2020.
[doi] [pdf] [web]

EuroSys '20 [C4] **PLASMA: Programmable Elasticity for Stateful Cloud Computing Applications.**
B. Sang, P.-L. Roman, P. Eugster, H. Lu, S. Ravi, G. Petri.
The Fifteenth European Conference on Computer Systems, 15 pages, Apr 2020.
[doi] [pdf] [web]

SRDS '16 [C3] **Speed for the Elite, Consistency for the Masses: Differentiating Eventual Consistency in Large-Scale Distributed Systems.**
D. Frey, A. Mostefaoui, M. Perrin, P.-L. Roman, F. Taïani *(alphabetical)*.
The 35th IEEE Symposium on Reliable Distributed Systems, 10 pages, Sep 2016.
[doi] [pdf] [code]

DAIS '15 [C2] **Similitude: Decentralised Adaptation in Large-Scale P2P Recommenders.**
D. Frey, A.-M. Kermarrec, C. Maddock, A. Mauthe, P.-L. Roman, F. Taïani *(alphabetical)*.
The 15th IFIP International Conference on Distributed Applications and Interoperable Systems, 15 pages, Jun 2015.
[doi] [pdf] [code]

iThings '12 [C1] **Towards a Geocentric Mobile Syndication System.**
A. Debrie, P. Eberhart, P.-L. Roman, C. Le Pape, O. Marin.
The 2012 IEEE International Conference on Internet of Things, 8 pages, Nov 2012.
[doi] [pdf]

Short papers in international peer-reviewed venues

Demo VLDB '19 [S2] **Dietcoin: Hardening Bitcoin Transaction Verification Process For Mobile Devices.**
D. Frey, M. X. Makkes, P.-L. Roman, F. Taïani, S. Voulgaris *(alphabetical)*.
Proceedings of the Very Large Data Bases Endowment, 4 pages, Aug 2019.
[doi] [pdf] [code]

ARM '16 [S1] **Bringing secure Bitcoin transactions to your smartphone.**
D. Frey, M. X. Makkes, P.-L. Roman, F. Taïani, S. Voulgaris *(alphabetical)*.
The 15th Workshop on Adaptive and Reflective Middleware, 6 pages, Dec 2016.
[doi] [pdf]

Research reports

arXiv:2210.13242 [R1] **SurferMonkey: A Decentralized Anonymous Blockchain Intercommunication System via Zero Knowledge Proofs.**
M. Díaz Montiel, R. Guerraoui, P.-L. Roman *(alphabetical)*.
arXiv:2210.13242, Oct 2022.
[arXiv]

Patents

Patent [P1] **Rapidly Verifiable Aggregate Signatures.**
M. Camaioni, R. Guerraoui, M. Monti, P.-L. Roman, M. Vidigueira, G. Voron *(alphabetical)*.
Patent pending.

Supervision

PhD students

09.2019–03.2021 **James Lembke**, *Purdue University*
- Thesis: Practical Cloud Computing Infrastructure.
- Principal supervisor: Patrick Eugster.
- External member of the PhD committee.

MSc students

Spring '23 **Mehdi Berrada**, *MSc Computer Science EPFL*
Xiaoyu Chen, *MSc Cybersecurity ETHZ/EPFL*
Giovanni Igowa, *MSc Computer Science EPFL*
Kilian Schneiter, *MSc Cybersecurity ETHZ/EPFL*
Badr Taddist, *MSc Computer Science EPFL*

Fall '22 **Zhentao Liu**, *MSc Cybersecurity ETHZ/EPFL*
Minh Tri Pham, *MSc Computer Science EPFL*
Mauro Staver, *MSc Computer Science EPFL*

Spring '22 **Miguel Díaz Montiel**, *MSc Computer Science EPFL & Polytechnic University of Catalonia*

BSc students

Spring '23 **Alberto Centonze**, *BSc in Communication Systems*
Aidas Venckunas, *BSc in Communication Systems*

Fall '22 **Antoine Mouran**, *BSc in Communication Systems*

Summer '22 **Dariia Kharytonova**, *Summer@EPFL program (National Technical University of Ukraine)*
Jana Toljaga, *Summer@EPFL program (University of Belgrade)*

Teaching duties

Guest lecturer

Fall '19, '20 — Two lectures on distributed ledgers, MSc Distributed Systems course, USI Lugano.

Spring '20 — One lecture on distributed ledgers, MSc Information Security course, Mid Sweden University.

Local responsabilities

01.2021–present — Maintainer of the PhD thesis LaTeX template used in Brittany. [git]

06.2019–12.2020 — Maintainer of the PhD thesis LaTeX template used in Brittany for Computer Science. [git]

01.2016–12.2017 — PhD student representative in the centre committee of Inria Rennes.

01.2016–12.2017 — PhD student representative in the training committee of Inria Rennes.

Reviewing activities

Journal reviewer

IEEE TNSM '22 — IEEE Transactions on Network and Service Management.

IEEE TDSC '20 — IEEE Transactions on Dependable and Secure Computing.

IEEE TMC '20 — IEEE Transactions on Mobile Computing.

Program committee member

SPC EuroSys '21 — Shadow PC, European Conference on Computer Systems.

DASC '18 — IEEE International Conference on Dependable, Autonomic and Secure Computing.

SOCA '17, '18 — IEEE International Conference on Service-Oriented Computing and Applications.

SC2 '16, '17, '18 — IEEE International Symposium on Cloud and Service Computing.

External reviewer

SRDS '23 — International Symposium on Reliable Distributed Systems.

ICDCS '20 — IEEE International Conference on Distributed Computing Systems.

WWW '20 — The Web Conference.

SERIAL '17 — Workshop on Scalable and Resilient Infrastructures for Distributed Ledgers.

OPODIS '16 — International Conference on Principles of Distributed Systems.

DCC '16 — International Workshop on Distributed Cloud Computing.

Invited presentations

2023 — **Broker-Accelerated Cryptocurrencies.**
05.2023: Efficient and Robust Distributed Systems group seminar, Grenoble, France.

2020 — **MasterKRaft: Dusting off your commodity hardware with several Mops(/s) for SMR.**
10.2020: Facebook Core Systems Annual Faculty Summit, Zoom, Cyberspace.

2016–2018 — **Shortcutting the Bitcoin verification process for your smartphone.**
11.2018: Master Workshop Layer 1 Solutions, Amsterdam, The Netherlands.
11.2018: Decentralized and Distributed Systems group seminar, EPFL, Switzerland.
09.2017: Distributed Systems group seminar, TU Delft, The Netherlands.
11.2016: Inria/Technicolor workshop on big data and analytics (WOS6), Rennes, France.

Popularization and media

06.2019 — **Blockchains and distributed ledgers.** (in French)
Club Bretagne Communication 35, Rennes, France.

11.2018 — **Blockchains, distributed ledgers, and their notarial use.** (in French)
E-novation exhibition organized by the notaries of Brittany, Rennes, France.

12.2017 **Demystifying the blockchain and its utility for notaries.** (in French)
Regional council of notaries of Brittany, Rennes, France.