Valeria Nikolaenko

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US Citizen

Areas of expertise: blockchain cryptography, byzantine and fault-tolerant systems.

EDUCATION

Sep 2011 – Jun 2017 **Stanford University**, USA
Doctor of Philosophy in Computer Science, GPA: 4.0/4.0
Scientific advisor Prof. Dan Boneh

Sep 2009 – Jun 2011 **University of the Russian Academy of Sciences**, Russia
Department of Mathematical and Informational Technologies
Master of Science with Honors, GPA 4.0/4.0

Sep 2005 – May 2009 **St. Petersburg State Polytechnical University**, Russia
Department of Applied Mathematics and Informatics
Bachelor of Science with Honors, GPA 3.9/4.0

EXPERIENCE

Feb 2018 – present **Research Scientist, Facebook / Novi Research / Diem Research, USA**
Light clients. Randomness beacons. VDFs. Distributed key generation. Threshold signatures, Schnorr/EdDSA signatures: security, malleability, half-aggregation. Long-range attack. Elliptic-curve cryptography. NFTs. Smart contracts development.

Aug 2017 – July 2018 **Family cycling expedition through South America**
Travel blog: holoholotales.com/en

Sep 2011 – Jun 2017 **Research Assistant, Stanford University, USA**
First “Fully Key-Homomorphic Encryption” construction (based on random lattices). Secure protocol for accountable warrants execution. Quantum-secure cryptography. Privacy preserving data-mining and Multi-Party Computations.

Jun 2015 – Sep 2015 **Software Engineer Intern, Google, Mountain View, USA**
Developed Frodo, a key exchange algorithm for TLS based on random lattices. Implementation. Co-authoring NIST proposal for post-quantum standard: frodokem.org

Jun 2012 – May 2013 **Intern, Technicolor Research, Palo Alto, USA**
Privacy preserving data-mining (ridge regression and matrix factorization) on massive datasets (>100,000,000 entries). Java implementation. 7 US patents applications.

Sep 2008 – Jun 2011 **Software Engineer, JetBrains/SwiftTeams, St. Petersburg, Russia**
Team: IntelliJ IDEA, Php/Web-Storm, supporting ColdFusion, PHPUnit, CFUnit, MXUnit

Dec 2009 – Jun 2011 **Research Assistant, Laboratory of Mathematical Logic at PDMI RAS, Russia**
Heuristic decision algorithms, constructing optimal algorithm for injective functions.

Nov 2006 – Feb 2008 **Software Engineer, Transas, St. Petersburg, Russia**
Real-time computer graphics for marine and aviation training. Sea surface rendering, projective grid, underwater effects, stereo, volumetric clouds. C++, OpenGL, Cg.

Sep 2008 – Dec 2009 **Research Assistant, Laboratory of Representation Theory at PDMI RAS, Russia**
Permutation binomials over finite fields and their applications to cryptography.

SKILLS

- Blockchain cryptography: light clients, randomness beacons, VDFs, distributed key generation, threshold signatures, long-range attacks, post-quantum protection, smart contract development.
- Secure multi-party computations (secret sharing, garbled circuits), privacy preserving data mining
- Post-quantum cryptography: secure key exchange, encryption, signatures; lattice based cryptography
- Advanced cryptography: computations on encrypted data, attribute-based encryption
- Java, C, C++, Rust, HTML, CSS

PUBLICATIONS

Threshold Schnorr with Stateless Deterministic Signing from Standard Assumptions
F.Garillot, Y.Kondi, P.Mohassel, V.Nikolaenko. **CRYPTO 2021**

Non-interactive half-aggregation of EdDSA and variants of Schnorr signatures
K.Chalkias, F.Garillot, Y.Kondi, V.Nikolaenko. **CT-RSA 2021**

Taming the many EdDSAs
K. Chalkias, F.Garillot, V.Nikolaenko. **SSR 2020**

Winkle: Foiling Long-Range Attacks in Proof-of-Stake Systems
S.Azouvi, G.Danezis, V.Nikolaenko. **ACM AFT 2020**

Lattice-based DAPS and generalizations: Self-enforcement in signature schemes
D.Boneh, S.Kim, V.Nikolaenko. **ACNS 2017**

Frodo: Take off the ring! Practical, Quantum-Secure Key Exchange from LWE (cited by 116)
J.Bos, C.Costello, L.Ducas, I.Mironov, M.Naehrig, V.Nikolaenko, A.Raghunathan, D.Stebila. **CCS 2016**

Fully Key-Homomorphic Encryption, Arithmetic Circuit ABE, Compact Garbled Circuits (cited by 179)
D.Boneh, C.Gentry, S.Gorbunov, S.Halevi, V.Nikolaenko, G.Segev, V.Vaikuntanathan, D.Vinayagamurthy. **EUROCRYPT 2014**

Privacy Preserving Matrix Factorization (cited by 121)
V.Nikolaenko, S.Ioannidis, U.Weindberg, M.Joye, N.Taft, D.Boneh. **CCS 2013**

Privacy-Preserving Ridge Regression on Hundreds of Millions of Records (cited by 149)
V.Nikolaenko, U.Weindberg, S.Ioannidis, M.Joye, D.Boneh, N.Taft. **IEEE SSP 2013**

Optimal heuristic algorithms for the image of an injective function
E.Hirsch, D.Itsykson, V.Nikolaenko, A.Smal. Zapiski nauchnyh seminarov POMI (2012)

PhD Thesis: “Studies in secure computation: post-quantum, attribute-based and multi-party”
Advisor Prof. Dan Boneh. Reading committee: Prof. Moses Charikar, Prof. Omer Reingold

MSc Thesis: “Optimal Deterministic Heuristic Algorithm for the Image of an Injective Function”
Advisor Prof. Dmitry Itsykson

BSc Thesis: “Enumeration of Permutation Binomials over Finite Fields”
Advisor Prof. Nikolai Vasiliev

PROGRAM COMMITEE

SBC 2021, ACM CCS 2021, SBC 2022, ACM CCS 2022

OPENSOURCE PROJECTS

Ristretto255-js: github.com/novifinancial/ristretto255-js
Java-script implementation of arithmetic for co-factor free elliptic-curve group ristretto255.

FrodoKEM: frodokem.org
"Round 3 alternate candidate" in the NIST Post-Quantum Cryptography Standardization project.

Ed25519-speccheck: github.com/novifinancial/ed25519-speccheck
Methodology to check conformance of EdDSA implementations across blockchain clients.

OTHER

Languages: English, Russian
I am a big fan of cross-country skiing, bicycle touring, sailing, mountaineering, illustrating and sketching.