Curriculum Vitae

Viktor Nikitin

Assistant physicist at the X-ray Science Division, Advanced Photon Source, Argonne National Laboratory.

Primary responsibilities: operation of then micro and nano tomography instruments at beamline 2-BM and 32-ID of the Advanced Photon Source, scientific software development for image analysis and tomographic reconstruction.

Main research interests: inverse problems in tomography and ptychography, high-performance computing (HPC) with multi-GPU systems.

Professional history

2020-current Assistant physicist at the Imaging group of X-ray Science Division, Advanced Photon Source, Argonne National Laboratory. Group leader: Dr. Francesco De Carlo

2017-2020 International postdoctoral researcher at Max IV laboratory, Sweden, with joint appointment at the Advanced Photon Source, USA (visiting period *2018-2020*).
Supervisors: Dr. Rajmund Mokso and Dr. Doga Gursoy
Project: Streaming synchrotron tomographic processing of geomaterials

2016-2017 Postdoctoral researcher at Max IV laboratory, Sweden.
Supervisor: Dr. Rajmund Mokso
Project: Time-resolved reconstruction of synchrotron-based tomography data

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Education

2016 Ph.D. in Mathematics, Center for Mathematical Sciences, Lund University, Sweden
Thesis: "Fast Radon Transforms and Reconstruction Techniques in Seismology", supervised by prof. Fredrik Andersson

2012 M.Sc. in Information Technology, Novosibirsk State University, Russia

2011 B.Sc. in Information Technology, Novosibirsk State University. Russia

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Professional Service

I have served as a peer-reviewer in the following journals:

IEEE: Transactions on Computational Imaging

OSA: Optics Express journal

OSA: journal of Applied Optics

Elsevier: Digital Signal Processing journal

Wiley: journal of Applied Crystallography

Qualifications

Programming languages: C/C++, Python, Java, Matlab

Technical tools for HPC computing: CUDA Toolkit, PGI, OpenMP, MPI

Tools for control systems: EPICS

7 years experience of software development for processing synchrotron tomography data

5 years experience of conducting experiments at synchrotron beamlines

Developed software

Real-time streaming reconstruction of tomography data
`https://github.com/nikitinvv/tomostream`

Tomographic data reconstruction with compensation for sample drifting and radiation damage
`https://github.com/nikitinvv/tomoalign`

Fast reconstruction of tomography measurements by the log-polar based method
`https://github.com/nikitinvv/lprec`

Four-dimensional tomographic reconstruction by time domain decomposition
`https://github.com/nikitinvv/rectv_gpu`

Merits and awards

Impact Argonne Award for Covid-19 contributions in x-ray imaging study of alternative materials for N95 medical masks (Argonne National Laboratory), 2020

Selected paper for APS Science Highlights (Argonne National Laboratory), 2020

Certificate of NVidia CUDA developer (Novosibirsk), 2013

Finalist of the selection competition for the Young Scientists Conference "High Performance Computing and Simulation" (Amsterdam, The Netherlands), 2012

Presidential Scholarship, Novosibirsk State University, 2012

Winner of the research project competition "Effective use of GPUs for solving computationally intensive problems" (T-platforms and Moscow State University), 2011

Presentations

[1] "A log-polar-based method for fast tomographic reconstruction". In: 3rd International Conference on Tomography of Materials and Structures: Lund, Sweden, June 26–30, 2017.

[2] "Benchmarking GPU implementations of fast algorithms for the Radon transform and the back-projection operator". In: CAMERA Workshop: Algorithms and Software for Tomographic Reconstruction for Beamlines, Lawrence Berkeley National Laboratory: Berkeley, CA, USA, November 8-10, 2017.

[3] "Fast log-polar based reconstruction of parallel-beam tomography data". In: Meeting on Tomography, Applications-Discrete Tomography, Neuroscience, and Image Reconstruction: Milan, Italy, May 15-17, 2017.

[4] "Fast reconstruction in dynamic tomography". In: Inverse problems in X-ray phase retrieval and tomography: Lund, Sweden, April 4, 2019.

[5] "Four-dimensional tomographic reconstruction by time domain decomposition". In: CAMERA Workshop: Algorithms and Software for Tomographic Reconstruction for Beamlines, Lawrence Berkeley National Laboratory: Berkeley, CA, USA, October 31 - November 2, 2018.

[6] "High-speed and Large FOV Ptychographic Imaging at the APS". In: Ptycho Developer Workshop, Lawrence Berkeley National Laboratory: Berkeley, CA, USA, June 3-5, 2019.

[7] "Parallel algorithm of seismic data decomposition: implementation and optimization for GPU". In: International Scientific Conference - Parallel computational technologies (PCT): Novosibirsk, Russia, March 26-30, 2012.

[8] "Parallel algorithm of seismic data decomposition: implementation and optimization for GPU". In: International Young Scientists Conference – High Performance Computing and Simulation: Amsterdam, The Netherlands, April 2-6, 2012.

[9] "Reconstruction with nonrigid alignment in tomography and 3D ptychography". In: SPIE Optics + Photonics: San Diego, CA, USA, August 1-5, 2021.

[10] "The exponential Radon Transform by using unequally spaced fast Laplace transforms". In: 7th International Conference Inverse Problems and Simulations: Fethiye, Turkey, May 26–31, 2014.

[11] "Time-resolved CT data reconstruction by time domain decomposition". In: 4th International Conference on Tomography of Materials and Structures: Cairns, Australia, July 22–26, 2019.

[12] "Tomography at the Advanced Photon Source". In: Virtual workshop on X-ray Tomography at Synchrotron Facilities - Pipeline for data acquisition and reduction: Trieste, Italy (Virtual), February 22-26, 2021.

[13] "TomoScan and TomoStream integration". In: InterCAT Technical Working Group (TWG) Meeting: Chicago, IL (Virtual), May 20, 2021.

[14] "TomoStream: Streaming analysis of tomographic data". In: 5 Light Source (5LS) Remote Experiment Forum Series: Chicago, IL, USA (Virtual), June 2, 2021.

Publications

[1] **Viktor V. Nikitin**, Alexey A. Romanenko, Anton A. Duchkov, and Fredrik Andersson. "3D Wave-packet decomposition implemented on GPUs". In: *Expanded abstracts of SEG Annual Meeting.* San Antonio, 2011, pp. 3409–3413.

[2] **Viktor V. Nikitin**, Anton A. Duchkov, and Fredrik Andersson. "Parallel algorithm of 3D wave-packet decomposition of seismic data: implementation and optimization for GPU". In: *Journal of Computational Science* 3.6 (2012), pp. 469–473.

[3] Fredrik Andersson and **Viktor V. Nikitin**. "Fast inversion of the exponential Radon transform by using fast Laplace transforms". In: *Proceedings of the Project Review, Geo-Mathematical Imaging Group.* Vol. 1. West Lafayette IN, Purdue University, 2013, pp. 65–73.

[4] **Viktor V. Nikitin**, Alexey A. Romanenko, Anton A. Duchkov, and Fredrik Andersson. "Parallel implementation of 3D-wave package decomposition on GPU and its application in geophysics". In: *Vestnik of NSU. IT series (In Russian)* 11.1 (2013), pp. 93–104.

[5] Fredrik Andersson, Marcus Carlsson, and **Viktor V. Nikitin**. "Fast algorithms and efficient GPU implementation for the Radon transform and the back-projection operator represented as convolution operators". In: *SIAM Journal on Imaging Sciences.* 9.2 (2016), pp. 637–664.

[6] Sergey V. Nikitin, **Viktor V. Nikitin**, Ivan I Oleynik, Irina V Oleynik, and Elena G Bagryanskaya. "Activity of phenoxy-imine titanium catalysts in ethylene polymerization: A quantum chemical approach". In: *Journal of Molecular Catalysis A: Chemical* 423 (2016), pp. 285–292.

[7] **Viktor V. Nikitin**, Fredrik Andersson, Marcus Carlsson, and Anton Duchkov. "Fast hyperbolic Radon transform by log-polar convolutions". In: *SEG Technical Program Expanded Abstracts 2016.* Society of Exploration Geophysicists, 2016, pp. 4534–4539.

[8] Fredrik Andersson, Adriana Citlali Ramırez, Torgeir Wiik, and **Viktor V. Nikitin**. "Directional interpolation of multicomponent data". In: *Geophysical Prospecting* 65.5 (2017), pp. 1246–1263.

[9] **Viktor V. Nikitin**, Fredrik Andersson, Marcus Carlsson, and Anton A Duchkov. "Fast hyperbolic Radon transform represented as convolutions in log-polar coordinates". In: *Computers & Geosciences* 105 (2017), pp. 21–33.

[10] **Viktor V. Nikitin**, Anton A. Duchkov, and Fredrik Andersson. "Acceleration of seismic data processing with wave-packet decomposition using NVidia CUDA". In: *Vychislitel'nye Metody i Programmirovanie (In Russian)* 18.3 (2017), pp. 293–311.

[11] Fredrik Andersson, Marcus Carlsson, and **Viktor V. Nikitin**. "Fast Laplace transforms for the exponential Radon transform". In: *Journal of Fourier Analysis and Applications* 24.2 (2018), pp. 431–450.

[12] Selin Aslan, **Viktor V. Nikitin**, Daniel J Ching, Tekin Bicer, Sven Leyffer, and Doğa Gürsoy. "Joint ptycho-tomography reconstruction through alternating direction method of multipliers". In: *Optics express* 27.6 (2019), pp. 9128–9143.

[13] Daniel Ching, Selin Aslan, **Viktor V. Nikitin**, and Doğa Gürsoy. "Time-coded aperture for x-ray imaging". In: *Optics Letters* 44.11 (2019), pp. 2803–2806.

[14] **Viktor Nikitin**, Selin Aslan, Yudong Yao, Tekin Biçer, Sven Leyffer, Rajmund Mokso, and Doğa Gürsoy. "Photon-limited ptychography of 3D objects via Bayesian reconstruction". In: *OSA Continuum* 2.10 (2019), pp. 2948–2968.

[15] **Viktor V. Nikitin**, Marcus Carlsson, Fredrik Andersson, and Rajmund Mokso. "Four-dimensional tomographic reconstruction by time domain decomposition". In: *IEEE Transactions on Computational Imaging* 5.3 (2019), pp. 409–419.

[16] Tekin Bicer, **Viktor Nikitin**, Selin Aslan, Doğa Gürsoy, Rajkumar Kettimuthu, and Ian T Foster. "Tomographic Reconstruction of Dynamic Features with Streaming Sliding Subsets". In: *2020 IEEE/ACM 2nd Annual Workshop on Extreme-scale Experiment-in-the-Loop Computing (XLOOP).* IEEE. 2020, pp. 8–15.

[17] **Viktor V. Nikitin**, Geser A. Dugarov, Anton A. Duchkov, Mikhail I. Fokin, Arkady N. Drobchik, Pavel D. Shevchenko, Francesco De Carlo, and Rajmund Mokso. "Dynamic in-situ imaging of methane hydrate formation and self-preservation in porous media". In: *Marine and Petroleum Geology* 115 (2020), p. 104234.

[18] Vincent De Andrade, **Viktor Nikitin**, Michael Wojcik, et al. "Fast X-ray Nanotomography with Sub-10 nm Resolution as a Powerful Imaging Tool for Nanotechnology and Energy Storage Applications". In: *Advanced Materials* (2021), 2008653(1–11).

[19] **Viktor Nikitin**, Vincent De Andrade, Azat Slyamov, Benjamin J Gould, Yuepeng Zhang, Vandana Sampathkumar, Narayanan Kasthuri, Doğa Gürsoy, and Francesco De Carlo. "Distributed optimization for nonrigid nanotomography". In: *IEEE Transactions on Computational Imaging* 7 (2021), pp. 272–287.

[20] **Viktor V. Nikitin**, Mikhail I Fokin, Geser A Dugarov, Arkady N Drobchik, Vincent De Andrade, Pavel D Shevchenko, Andrey Yu Manakov, and Anton A Duchkov. "Dynamic in situ imaging of methane hydrate formation in coal media". In: *Fuel* 298 (2021), p. 120699.

[21] Sridhar Niverty, Hamid Torbatissaraf, **Viktor Nikitin**, Vincent De Andrade, S. Niauzorau, A. Tekawade, Francesco De Carlo, and Nikhilesh Chawla. "Computational imaging in 3D X-ray microscopy: reconstruction, image segmentation, and time-evolved experiments". In: *Materiasl of 2021 IEEE International Conference on Image Processing* (2021), pp. 1–5.

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