

# Dr. Suren A. Chilingaryan

## Data Processing and Performance Expert | Lead of Cloud Computing

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I do research in high-performance and heterogeneous computing and apply it to architect online systems for scientific instrumentation. With improvements in detector technology, I believe new approaches are required to keep pace with the increasing data rates. Codesign of hardware, software, and analysis algorithms is often a key to successful projects. Currently, I lead an effort to adopt cloud technologies for data acquisition and control systems.

## AREAS OF EXPERTISE

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High performance computing  
Distributed data acquisition and control systems  
Performance analysis and software optimization techniques  
Parallel algorithms and parallel hardware architectures  
Low-latency communication in heterogeneous systems  
Cloud-based data management and visualization

## TECHNICAL SKILLS

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<b>Programming System Programming</b>	C/C++, IPC, TCP/IP, CUDA/OpenCL, SSE/Altivec, OpenMP/NPTL POSIX, Linux Internals, PCI Drivers, DMA, GPUDirect/DirectGMA
<b>Networking</b>	Ethernet/Infiniband, Sockets/MPI/OMQ, RDMA (ROCe), LibVMA
<b>Software Analysis</b>	gdb, perf/operf, nvvp/nvprof, vtune, valgrind, systap, tcpdump
<b>Scientific Computing</b>	MATLAB, Python/SciPy, ROOT, BLAS/LAPACK
<b>Data Management Orchestration</b>	Brokers, Databases (SQL/NOSQL), XML & Co, Web Development Ansible, OpenShift, Docker, LibVirt/KVM, Infiniband, GlusterFS

## EMPLOYMENT

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Since 2020	<b>Leader of CloudDAQ project</b> at Karlsruhe Institute of Technology: Research on cloud technologies for control and data acquisition applications
2013 – 2020	<b>Data processing and performance expert</b> at KIT: high-performance instrumentation for large-scale scientific experiments
2007 – 2012	<b>Postdoctoral researcher</b> at KIT: data management & software optimization
2005 – 2007	<b>Software engineer</b> at Yerevan Physics Institute: data acquisition systems
2002 – 2005	<b>Associate researcher</b> at Forschungszentrum Karlsruhe
2001 – 2002	<b>Software engineer</b> at Yerevan Physics Institute

## EDUCATION

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July 2006	PhD in Computer Engineering “Data Exchange Solution for Distributed Data Acquisition Systems and its application for Cosmic Ray Monitor Networks”, National Academy of Science, Armenia
1996 – 2001	MSc in Mathematics “Data Processing using Neural Networks”, Moscow State University, Russia

## PERSONAL DATA

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<b>Nationality</b>	Armenian, Russian Federation, residence permit in Germany
<b>Languages</b>	English, Armenian, Russian

# PROJECTS

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- Ongoing** | **Cloud technologies for heterogeneous control systems**
- › Responsible for operation of the Kaas platform
  - › Prepare the KATRIN infrastructure for new high-speed detectors
- 2018 – 2020** | **Katrin-as-a-Service Cloud Platform**
- › Proposed, built, and maintain the KaaS cloud platform for the KATRIN experiment
  - › Coordinated migration of the KATRIN services to the KaaS platform
  - › Made a distributed and scalable version of the ADEI data management system
  - › Supervised development of online monitoring framework for the ADEI ecosystem
- 2017 – 2020** | **Research of undocumented aspects in GPU architectures**
- › Investigated performance imbalances and hidden parallelism in GPU architectures
  - › Developed method to exploit intra-SM parallelism (up to 30% speed-up)
  - › Evaluated methods of approximate computing for tomography (quality vs. speed-up)
  - › Applied these techniques to speed-up tomographic reconstruction by extra 4-6 times via performance modeling and rebalancing of hardware usage [s11554-019-00883-w]
- 2010 – 2018** | **Coordinated student exchange program with Tomsk Polytechnic University**
- 2012 – 2017** | **Data Acquisition Platform for UFO ecosystem**
- › Developed a driver platform for fast prototyping of PCIe-based electronics with a modular (user-space) DMA engine (up to 12 GB/s) and scripting/debugging support
  - › Implemented drivers for in-house electronics, e.g. camera (*in use at KIT and Desy*)
  - › Used RDMA and GPUDirect/DirectGMA to intercommunicate detectors with GPUs
  - › Participated in a case study on applications of GPUs for CMS track trigger, decision on acceptance of a track candidate was made within 6  $\mu$ s (data transfer + analysis)
  - › GPUs allowed to utilize a more precise algorithm than was possible with classic designs
- 2015 – 2016** | **Cloud platform for collaborative analysis of tomographic data**
- › Led development of web-visualization for large and time-resolved volumes
- 2011 – 2015** | **UFO: Ultrafast tomography with online monitoring and image-based control**
- › Proposed a scalable architecture for pipelined processing of image streams
  - › Coordinated software development with a team in KIT and 3 Russian universities
  - › Supervised development of fast reconstruction algorithms (up to 6 GB/s per node)
  - › Supervised development of regularized reconstruction methods to compensate low SNR and/or undersampling in case of high-speed tomography
  - › Since 2016, the developed system is installed at the KIT synchrotron and enables both high-speed (5 volumes/second) and high-throughput (1000 samples/week) operation
- 2011 – 2014** | **ADEI: Advanced Data Extraction Infrastructure**
- › Helped to secure funding and initiated collaboration between KIT and YerPhI
  - › Supervised a cross-university team of researchers and engineers
  - › Developed a platform for exploration and analysis of time-series in terascale archives
  - › System is in operation in YerPhI, the SEVAN network, and 7 major facilities at KIT
- 2009 – 2013** | **Parallel algorithms and software optimization**
- › Developed parallel algorithms for  $\mu$ PIV (micro-particle velocimetry)
  - › Leveraged the PoweXCell architecture for a MRSES feature selection algorithm
  - › Optimized performance of PyHST (ESRF tomographic framework)
  - › Implemented a digital image correlation and tracking algorithm for GPUs
- 2002 – 2008** | **Distributed systems for data acquisition and slow control**
- › Stabilized a slow control system of the KATRIN experiment for production use (*in use*)
  - › Built a distributed data acquisition system for ASEC particle detector networks (*in use*)
  - › Developed drivers for PCI neuro-accelerator and evaluated it for control applications

## EXPERIMENTS AND COLLABORATIONS

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### Current

Since 2020	PANDA: antiProton ANnihilation in Darmstadt, Germany ( <i>Member</i> )
Since 2013	BESS: Battery Technology Center at <i>KIT</i> , Germany
Since 2008	KARA: Karlsruhe Research Accelerator, <i>KIT</i> , Germany
Since 2007	KATRIN: Karlsruhe Tritium Neutrino Experiment, Germany ( <i>Member</i> )
Since 2006	SEVAN: Space Environment Viewing and Analysis Network; coordinated by <i>YerPhi</i>
Since 2001	ASEC: Aragats Space Environmental Center, Armenia ( <i>Member</i> )

### Past

2020 – 2021	CCPi: Collaborative Computational Project for Imaging; led by UoM and STFC
2014 – 2018	HZG: Helmholtz-Zentrum Geesthacht, Germany
2010 – 2018	TPU: Tomsk Polytechnic University, Russia
2016 – 2017	CMS: Compact Muon Solenoid, <i>CERN</i>
2016 – 2017	UFO: German-Russian Collaboration on Ultrafast Tomography
2010 – 2017	SCI: Shubnikov Crystallography Institute, Russia
2009 – 2015	KIT Cube: Integrated atmospheric observation system (operated by <i>KIT</i> )
2009 – 2015	KIT Tower: Meteorological tower at <i>KIT</i> North Campus, Germany
2008 – 2014	TOSKA: Test facility for fusion magnets at <i>KIT</i> , Germany
2008 – 2014	ESRF: European Synchrotron Radiation Facility, France

## FUNDING

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2021	(Author) investments for upgrade of <i>KaaS</i> cluster <i>KATRIN</i> (100 k€) <i>KaaS</i> (2021)
2020	(Contributing author) investments to integrate ROCE protocol in <i>UFO</i> DAQ system <i>KCETA</i> (6 k€) <i>RoCE</i> (2020)
2019	(Technical contribution) to <i>MT-DTS ST2</i> subtopic in <i>Matter and Technologie</i> program <i>Helmholtz</i> <i>MT-DTS</i> (2021 – 2027)
2013, 2016	(Technical contribution) projects on collaborative analysis of tomographic datasets <i>BMBF</i> (750 k€) <i>ASTOR</i> (2013 – 2016) <i>NOVA</i> (2016 – 2020)
2012	(Contributing author) networking grant for cooperation with <i>ASEC</i> <i>BMBF</i> (15 k€) <i>ADEI</i> (2013 – 2015)
2011	(Contributing author) <i>Vaporciyan Multivariate Analysis and Visualization</i> (non-governmental grant by Armenian diaspora) <i>Diaspora</i> (100 k\$) <i>VMAV</i> (2012 – 2014)
2010, 2011	(Contributing author) <i>Ultra Fast X-ray Imaging of Scientific Processes with On-line Assessment and Data-driven Process Control</i> <i>BMBF</i> (2.5 m€) <i>UFO-1</i> (2010 – 2013) <i>UFO-2</i> (2012 – 2015)
2009	(Technical contribution) to <i>HDRI</i> ( <i>High Data Rate Processing and Analysis</i> ) initiative in <i>Helmholtz PNI</i> ( <i>Photons, Neutrons, Ions</i> ) research program <i>Helmholtz</i> <i>HDRI</i> (2010 – 2014)

## LEADERSHIP

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Since 2020	Leading efforts to prepare the <i>KATRIN</i> data infrastructure for the <i>Tristan</i> detector Group: 2 PhD 2 students
2018 – 2020	Led development of the <i>KATRIN</i> cloud platform and migration of services Group: 2 Postdocs PhD 2 students
2013 – 2018	Led volume visualization task force in the <i>ASTOR</i> and <i>NOVA</i> projects Group: PhD 5 students

- 2010 – 2018 | Coordinated a program on stewardship of theses for *TPU* students  
Participation: 3 PhD 12 students
- 2010 – 2016 | Led a collaboration with *ASEC* on online data analysis platform  
Group: Postdoc and PhD in KIT Postdoc and 2 engineers at ASEC 10 students
- 2010 – 2017 | Coordinated a work-package on tomographic software in the *UFO* project  
Group: 3 PhD in KIT 3 PhD in partner universities 5 students

## RESPONSIBILITIES

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### Current

- Since 2018 | Data management cloud at *KATRIN*
- Since 2013 | Data management system for *KIT Battery Technology Center*
- Since 2011 | Software stack of *UFO* data acquisition platform
- Since 2007 | Slow control system at *KATRIN*

### Past

- 2017 – 2018 | Transfer of *UFO* Camera technology to *HZG*
- 2010 – 2017 | Parallel computing cluster for *UFO* project
- 2013 – 2016 | Technology transfer to *ASEC* and *SEVAN* experiments
- 2009 – 2015 | Data portal for *KIT Cube* experiment and *KIT Weather Tower*
- 2008 – 2014 | Maintenance and optimization of *KARA* branch of *PyHST*
- 2008 – 2014 | Data management system at *TOSKA* and *CULTKA* facilities
- 2007 – 2009 | Integration of *KATRIN* components in centralized control system
- 2005 – 2007 | Data acquisition and data management at *ASEC* and *SEVAN*
- 2003 – 2005 | Intercommunication between *KATRIN* DAQ and NI fieldpoint devices
- 2001 – 2002 | IT infrastructure of *ASEC*

## SCIENTIFIC AND OPEN-SOURCE SOFTWARE

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### Maintain

- Since 2018 | KaaS: Katrin-as-a-Service data management platform for *KATRIN*  
ands.suren.me KATRIN
- Since 2015 | Bora: monitoring framework for ADEI ecosystem  
bora.suren.me KATRIN
- Since 2011 | Alps: Linux driver platform for fast prototyping of PCIe-based electronics  
alps.suren.me Camera at HZG Camera at SCI Kapture/Kalypso at KARA
- Since 2008 | ADEI: cloud platform for visualization and analysis of time-series  
adei.info KATRIN KARA ASEC BESS KIT Tower KIT Cube TOSKA
- Since 2005 | ADAS: data acquisition system for *ASEC* detectors  
adas.suren.me ASEC
- Since 2003 | RusXMMS: operations with multilingual strings in non-unicode encodings  
rusxmms.sf.net RedHat OpenSuSE Debian Ubuntu Arch FreeBSD

### Supervised and coordinated

- 2015 – 2018 | WAVE: JavaScript volume rendering library based on WebGL  
wave.suren.me
- 2012 – 2017 | UFO: image-processing framework and a collection of GPU-accelerated algorithms  
ufo-kit.github.io KARA

## Contributions

2020 – 2021	CCPi: Tomographic Imaging Project ( <i>performance optimizations</i> ) <a href="http://www.ccpai.ac.uk">www.ccpai.ac.uk</a>
2008 – 2014	PyHST: ESRF tomography software ( <i>DFI algorithm and performance improvements</i> ) <a href="http://pyhst2.suren.me">pyhst2.suren.me</a> KARA   ESRF

## Obsolete

2010 – 2011	MRSES: feature selection algorithm for Intel and PowerXCell architectures
2009 – 2010	DictHW: CUDA implementation of digital image tracking algorithm
2003 – 2009	XMLBench: XML Benchmarking suite

## RESEARCH AND DEVELOPMENT

While the focus of my research is computing technologies, the developed instrumentation enabled major scientific break-throughs achieved by the KATRIN [4] and ASEC [19] collaborations. Below are referenced selected peer-reviewed publications which are either authored by me and my students or where we made a significant contribution.

Since 2011	High-bandwidth data acquisition and data-driven control
2018 – 2019	Fine-tuning of tomographic reconstruction algorithms through micro-benchmarking and performance modeling [2]   UFO   PyHST
2016 – 2017	Participated in a case study on applications of GPUs in the Level-1 track trigger for the next upgrade of the CMS experiment [8]   CMS
2016 – 2017	Designed a platform for synchrotron imaging beamlines with a possibility of online reconstruction and an image-based feedback loop [7], [15]   UFO
2015 – 2016	Researched low-latency communication mechanisms for data-driven control applications [10]   Alps
2014 – 2015	Implemented fast DMA drivers with GPUDirect / DirectGMA support [12]   Alps
2013 – 2014	Reviewed asymptotically fast methods of tomographic reconstruction well-fitted for GPU architectures [14]   UFO   PyHST
2011 – 2013	Researched software architectures for online processing of image streams [17]   UFO
2011 – 2013	Developed a streaming data acquisition platform for scientific cameras [16]   Alps
Since 2007	Parallel architectures, performance analysis, and software optimization
2020 – 2021	Applied methods of approximate computing to enable reconstruction of large datasets using memory-intensive regularization methods [1]   CCPi
2017 – 2018	Researched performance imbalances and a hidden parallelism in GPU architectures and how they can be exploited to speed-up tomographic reconstruction [6]   PyHST
2014 – 2017	Investigated viable compromises between reconstruction quality and parallelization capabilities of tomographic algorithms [13]   UFO
2013 – 2014	Developed parallel algorithms for $\mu$ PIV (micro-particle velocimetry) [5]   UFO
2010	Leveraged the PowerXCell architecture for an MRSES feature selection algorithm (5000x speed-up compared to a MATLAB prototype)   MRSES
2009 – 2010	Optimized the PyHST tomographic reconstruction framework [18]   PyHST
2009 – 2010	Implemented a digital image correlation and tracking algorithm for GPUs   DictHW
2007 – 2008	Carried out a performance study of open-source XML frameworks [21]   XMLBench

Since 1999	Digitization, data organization, and distributed control systems
Since 2019	Researching cloud technologies for highly heterogeneous control systems in large-scale scientific experiments [in preparation] <span style="float: right;">KaaS</span>
2015 – 2017	Researched remote visualization techniques for large and time-resolved tomographic volumes [3], [9] <span style="float: right;">WAVE</span>
2013 – 2015	Researched emerging web technologies for management and visualization of terabyte-scale archives with time-series <span style="float: right;">ADEI</span>
2011 – 2014	Converted the KATRIN data management system into a full flagged platform for time-series exploration and analysis <span style="float: right;">ADEI</span>
2008 – 2010	Developed data management modules of the KATRIN control system [20] <span style="float: right;">ADEI</span>
2007 – 2008	Stabilized the KATRIN slow control system for production use [11] <span style="float: right;">KATRIN</span>
2005 – 2006	Developed a data acquisition system for particle detector networks [22] <span style="float: right;">ADAS</span>
2002 – 2004	Researched network protocols for heterogeneous slow control systems [23] <span style="float: right;">ADAS</span>
1999 – 2001	Evaluated hardware-accelerated neural networks for trigger applications [24]

## SUPERVISION AND TEACHING

### Supervised PhD students

Since 2020 | 2 PhD on adoption of cloud technologies for data acquisition and control systems

### Co-supervised PhD students

2014 – 2018 | thesis “Big Data Management and Visualisation”  
 2013 – 2017 | work on collaborative tools for analysis of microtomography data  
 2013 – 2017 | work on low-latency communication protocols for distributed data acquisition systems  
 2011 – 2016 | thesis “An Extensible Parallel Computing Framework for Ultra-Fast X-Ray Imaging”

### Supervised MSc and BSc students

2014 – 2018 | 5 MSc theses on remote visualization of archives with tomographic data  
 2013 – 2017 | 4 students working on fast DMA interconnects between FPGA and GPUs  
 2011 – 2016 | 4 MSc and 2 BSc theses on advanced algorithms in tomographic reconstruction  
 2010 – 2015 | 10 internships on web technologies for visualization of time series  
 2014 | 2 MSc theses on GPU-accelerated algorithms for nano-particle tracking

### Courses and seminars

2019 | GPU computing tutorial at ARBRA summer school in Nor-Amberd, Armenia  
 2014 – 2017 | 4 student projects at seminar “Advanced topics in Parallel Programming”  
 2013 | GPU computing tutorial at KSETA graduate school at KIT

## SELECTED PUBLICATIONS

- [1] E. Ametova *et al.*, *Crystalline phase discriminating neutron tomography using advanced reconstruction methods (preprint)*, 2021. arXiv: 2102.06706.
- [2] S. Chilingaryan *et al.*, “Reviewing GPU architectures to build efficient back projection for parallel geometries,” *Journal of Real-Time Image Processing*, vol. 17, pp. 1331–1373, 5 Oct. 2020. DOI: 10.1007/s11554-019-00883-w.
- [3] P. D. Lösel *et al.*, “Introducing Biomedisa as an open-source online platform for biomedical image segmentation,” *Nature Communications*, vol. 11, no. 1, p. 5577, Nov. 2020. DOI: 10.1038/s41467-020-19303-w.
- [4] M. Aker *et al.*, “Improved upper limit on the neutrino mass from a direct kinematic method by KATRIN,” *Phys. Rev. Lett.*, vol. 123, p. 221802, 22 Nov. 2019. DOI: 10.1103/PhysRevLett.123.221802.
- [5] P. Cavadini *et al.*, “Investigation of the flow structure in thin polymer films using 3D  $\mu$ PTV enhanced by GPU,” *Experiments in Fluids*, vol. 59, no. 4, pp. 1–13, Mar. 2018. DOI: 10.1007/s00348-017-2482-z.
- [6] S. Chilingaryan *et al.*, “Balancing load of GPU subsystems to accelerate image reconstruction in parallel beam tomography,” in *Proceedings of the 30th International Symposium on Computer Architecture and High Performance Computing (SBAC-PAD)*, 2018. DOI: 10.1109/CAHPC.2018.8645862.
- [7] A. Kopmann *et al.*, “UFO - a scalable platform for high-speed synchrotron X-ray imaging,” in *Proceedings of the 2016 IEEE NSS/MIC*, 2017. DOI: 10.1109/NSSMIC.2016.8069895.
- [8] H. Mohr *et al.*, “Evaluation of GPUs as a level-1 track trigger for the High-Luminosity LHC,” *Journal of Instrumentation*, vol. 12, no. 04, p. C04019, 2017. DOI: 10.1088/1748-0221/12/04/c04019.
- [9] N. Tan Jerome *et al.*, “WAVE: A 3D online previewing framework for big data archives,” in *Proceedings of the Intl. Conf. on Computer Vision, Imaging, and Computer Graphics Theory and Applications (TVAPP)*, vol. 3, 2017, pp. 152–163.
- [10] M. Vogelgesang *et al.*, “High-throughput data acquisition and processing for real-time x-ray imaging,” in *Proc. SPIE*, vol. 9967, 2016, pp. 996715–996715-9. DOI: 10.1117/12.2237611.
- [11] J. Amsbaugh *et al.*, “Focal-plane detector system for the katrin experiment,” *Nuclear Instruments and Methods in Physics Research Section A: Accelerators, Spectrometers, Detectors and Associated Equipment*, vol. 778, pp. 40–60, 2015. DOI: 10.1016/j.nima.2014.12.116.
- [12] L. Rota *et al.*, “A PCIe DMA architecture for multi-gigabyte per second data transmission,” *IEEE Transactions on Nuclear Science*, vol. 62, no. 3, pp. 972–976, 2015. DOI: 10.1109/TNS.2015.2426877.
- [13] A. Shkarin *et al.*, “An open source GPU accelerated framework for flexible algebraic reconstruction at synchrotron light sources,” *Fundam. Inform.*, vol. 141, no. 2-3, pp. 259–274, 2015. DOI: 10.3233/FI-2015-1275.
- [14] R. Shkarin *et al.*, “GPU-optimized Direct Fourier method for on-line tomography,” *Fundam. Inform.*, vol. 141, no. 2-3, pp. 245–258, 2015. DOI: 10.3233/FI-2015-1274.
- [15] U. Stevanovic *et al.*, “A control system and streaming DAQ platform with image-based trigger for X-ray imaging,” *IEEE Transactions on Nuclear Science*, vol. 62, no. 3, pp. 911–918, 2015. DOI: 10.1109/TNS.2015.2425911.
- [16] M. Caselle *et al.*, “Ultrafast streaming camera platform for scientific applications,” *IEEE Transactions on Nuclear Science*, vol. 60, no. 5, pp. 3669–3677, 2013. DOI: 10.1109/TNS.2013.2252528.
- [17] M. Vogelgesang *et al.*, “UFO: A scalable GPU-based image processing framework for on-line monitoring,” in *Proceedings of The 14th IEEE Conference on High Performance Computing and Communication & The 9th IEEE International Conference on Embedded Software and Systems (HPCC-ICISS)*, ser. HPCC ’12, Liverpool, UK, Jun. 2012, pp. 824–829. DOI: 10.1109/HPCC.2012.116.
- [18] S. Chilingaryan *et al.*, “A GPU-based architecture for real-time data assessment at synchrotron experiments,” *IEEE Transactions on Nuclear Science*, vol. 58, no. 4, pp. 1447–1455, 2011. DOI: 10.1109/TNS.2011.2141686.
- [19] A. Chilingarian *et al.*, “Ground-based observations of thunderstorm-correlated fluxes of high-energy electrons, gamma rays, and neutrons,” *Phys. Rev. D*, vol. 82, p. 043009, 4 Aug. 2010. DOI: 10.1103/PhysRevD.82.043009.
- [20] S. Chilingaryan *et al.*, “Advanced data extraction infrastructure: Web based system for management of time series data,” *Journal of Physics: Conference Series*, vol. 219, no. 4, p. 042034, Apr. 2010. DOI: 10.1088/1742-6596/219/4/042034.
- [21] S. Chilingaryan, “The XMLBench project: Comparison of fast, multi-platform XML libraries,” no. 5667, pp. 21–34, 2009. DOI: 10.1007/978-3-642-04205-8\_4.
- [22] S. Chilingaryan *et al.*, “Advanced data acquisition system for SEVAN,” *Advances in Space Research*, vol. 43, no. 4, pp. 717–720, 2009. DOI: 10.1016/j.asr.2008.10.008.
- [23] W. Eppler *et al.*, “New control system aspects for physical experiments,” *IEEE Transactions on Nuclear Science*, vol. 51, no. 3, pp. 482–488, 2004. DOI: 10.1109/TNS.2004.828633.
- [24] A. Vardanyan *et al.*, “Fast pattern recognition trigger for atmospheric cherenkov telescopes,” in *Proceedings of 27th International Cosmic Ray Conference, Katlenburg-Lindau, Germany*, 2001, pp. 2935–2938.

## SELECTED PRESENTATIONS

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### Conferences

- Oct 2019 (invited) “Accelerating Remote Visualization of Large Tomographic Data Volumes” at Global Innovation Forum, Armenia
- Oct 2018 (talk) “Balancing load of GPU subsystems to accelerate image reconstruction in parallel beam tomography” at SBAC-PAD 2018 conference, Lyon, France
- Okt 2014 (talk) “Computing Infrastructure for Online Monitoring and Control of High-throughput DAQ Electronics” at 10th PCAPAC conference, Karlsruhe, Germany
- Sep 2014 (invited) “UFO – Status and Perspectives of Ultrafast X-Ray Imaging at ANKA” and “Fast Reconstruction Algorithms for Computed Tomography” at SNI 2014, Germany
- Jun 2012 (talk) “A High Throughput Platform for Real-Time X-ray Imaging” and “Advanced Linux PCI Services” at 18th IEEE Real-Time Conference, Berkeley, CA, USA
- May 2012 (talk) “A High Performance Platform for Real-Time X-ray Imaging” at GPU Technology Conference, San Jose, CA, USA
- May 2010 (talk) “A GPU-based Architecture for Real-Time Data Assessment at Synchrotron Experiments” at 17th IEEE Real-Time Conference, Lisbon, Portugal
- Apr 2009 (talk) “Comparison of fast multi-platform XML Libraries: Results for January 2009” at BenchmarX’09 workshop at DASFAA 2009, Brisbane, Australia
- Sep 2007 (talk) “Advanced Data Acquisition System for SEVAN” at SEE 2007 Symposium, Athens, Greece

### Workshops

- Mar 2019 (talk) “UFO Cloud: Data-Acquisition-as-a-Service” at Matter and Technologie program meeting, Germany
- Nov 2018 (talk) “High-Speed Tomography: Fine-tuning back projection for GPU architectures” at CAMERA workshop, Berkeley, CA, USA
- Nov 2017 (invited) “UFO - A platform for high data rate instrumentation with GPUs” at EUCALL GPU/FPGA Workshop at XFEL, Hamburg, Germany
- May 2017 (invited) “SHAPE: Scalable and Highly Available Platform for Scientific Data Portals” at ARBRA Workshop, Nor-Amberd, Armenia
- Apr 2017 (invited) “Tuning tomographic reconstruction for different parallel architectures” at workshop on Real-Time 3D Tomography, CWI, Amsterdam, Netherlands
- Jan 2016 (invited) “Performance-oriented instrumentation for high-speed synchrotron imaging” at workshop on Large Scale Tomography, Szeged, Hungary
- Apr 2012 (invited) “ADEI for Tango” at Tango workshop, MAX-IV, Lund, Sweden
- Mar 2012 (talk) “Practical Experience with GPUs for high throughput computing” at HDRI/PanData workshop
- Mar 2011 (invited) “High Speed Tomography at KIT” at meeting on Tomographic reconstruction software, ESRF
- Sep 2008 (talk) “Advanced Data Extraction Infrastructure” at FORGES 2008 workshop, Nor-Amberd, Armenia

### Seminars

- May 2020 (talk) “Real-time reconstruction for synchrotron tomography” at lunch-and-learn session at University of Manchester, UK
- Oct 2018 (talk) “Balancing load of GPU subsystems to accelerate back projection for synchrotron tomography” at ESRF, Grenoble, France
- Apr 2016 (talk) “ADEI: Intelligent visualization and management of time-series data in scientific experiments” at Instituto de Física, UNAM, Mexico
- May 2015 (talk) “Advanced Algorithms for Tomography” at YerPhI seminar, Yerevan, Armenia
- Sep 2013 (talk) “Ultrafast X-Ray Imaging of Scientific Processes” at SCI and TPU, Russia