Last updated on March 23, 2020

Viktor Khristenko

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- *Github* https://github.com/vkhristenko
- ***Languages*** Russian(native) • English(native fluency) • French(B1)

Professional Activities

Software Engineer 2017 Sep - Current

CERN - *European Organization for Nuclear Research, Geneva, Switzerland*

- ***DEEP-EST*** Project Member - EU initiative to build a modular supercomputing architecture for ***exascale*** combining best of Big Data and HPC worlds. Following the co-design approach, contributed to the development and validation of one of the applications, ***CMS Experiment data processing***. Formalized application requirements (e.g. existing benchmarks, overall application design, etc...) and provided technical feedback to system architects to select and/or build/assemble hardware/software components that allow applications make efficient use of the system.
- ***Large Scale HEP Data Processing with Apache Spark***. `https://www.youtube.com/watch?v=JTMdkSmw0Kc` Implemented Apache Spark's Data Source for ROOT file format. The data source was successfully used processing TBs+ datasets in various environments (e.g. cloud and HPC resources)
- ***Heterogeneous Computing for CMS Experiment***. Modern HPC facilities draw enormous computing power from various accelerators. Within the DEEP-EST project, CMS Hadron and Electromagnetic Calorimeters workflows (CPU only) were ported to CUDA and optimized to target Nvidia V100 GPUs. Minimal viable reproducer was also ported to OpenCL (with FPGA specific extensions) and evaluated using Intel Arria 10 FPGA.
- ***Employing various HPC resources*** (e.g. JSC, Flatiron Institute) for HEP data processing

Group Lead - CMS Hadron Calorimeter Data Quality Monitoring Group 2014-2017

CERN - *European Organization for Nuclear Research, Geneva, Switzerland*

- Designed and Implemented Critical ***Data-driven Quality Control Applications***
- Tuned the runtime performance of applications to target Online CMS/LHC data taking conditions (40MHz collision rate)

Deputy Coordinator - CMS Hadron Calorimeter Operations Group 2015-2016

CMS - *Compact Muon Solenoid Experiment @CERN, Geneva, Switzerland*

- "CMS 2015 Achievement Award"
- Responsible for Operational Aspects of all the Components of the ***Calorimeter*** System
- Coordination ⇒ Installation ⇒ Debugging ⇒ DataTaking ⇒ Status Report ⇒ Collaboration ⇒ Training Newcomers

Graduate Research Assistant 2014-Current

CMS *Experiment* ***@CERN***, *Geneva, Switzerland* • *The University of Iowa, Iowa City, IA, USA*

- ***Big Data*** Analyses, e.g. ***Higgs Boson*** Searches. Employed various HPC and HTC facilities (e.g. Fermilab, UI, CERN)
- Design, construction and analysis of ***Monte Carlo*** Simulations of Particle Detectors using ***Geant4***
- Data Analysis and Operations Support for ***Fermilab*** T-1041 "CMS Forward Calorimetry R&D" Experiment

Education

PhD in Physics 2012-2017

The University of Iowa, Iowa City, IA, USA

- Thesis Title, "Search for the Standard Model Higgs Boson in the $\mu^+\mu^-$ decay channel in pp collisions at $\sqrt{s} = 13$ TeV in CMS, Calibration of CMS Hadron Forward Calorimeter and Simulations of Modern Calorimeter Systems"

BA Physics and Mathematics; Cum Laude 2009-2012

Coe College, Cedar Rapids, IA, USA

- ***Minor in Computer Science***
- Dean's List Spring 2010 & Fall 2010

Department of Cybernetics 2008-2009

Moscow Engineering Physics Institute, Moscow, Russia

Programming Skills

Languages/etc - Experienced
C/C++/STL/Boost/OpenMP/MPI/tbb/CUDA/pthreads/OpenCL/SYCL • Scala • Python • SQL •bash
Languages/etc - Familiar
asm • Java • Go • Rust • php • Exilir/Erlang
Version Control
git/mercury
Big Data/Machine Learning
Apache Spark/MapReduce • HDFS • ROOT • TensorFlow/Keras/Scikit-Learn/Graphlab
Hardware Design/FPGAs - Familiar
Verilog/HLS • Xilinx Vivado/Cadence Xcelium • OpenCL

Athletic Activities

Volunteer Assistant Tennis Coach 2013-2014
The University of Iowa Hawkeyes Men's Tennis Team, NCAA Division 1

Student Athlete 2009-2012
Coe College, Varsity Men's Tennis Team, NCAA Division 3
- IIAC Team Champion (2012)
- NCAA Regionally Ranked in Singles (2011, 2012)
- IIAC All-Conference (2009, 2011, 2012)
- IIAC Conference Champion (2009, 2010, 2011, 2012)
- Team Captain (2011, 2012)

Publications & Presentations

- "CMS Hcal Reconstruction with GPUs"
  "CMS HCAL DPG Meeting", CERN, Nov. 2019, ***presentation link***
- "CMS Ecal Reconstruction with GPUs"
  "CMS ECAL DPG Meeting", CERN, Oct. 2019, ***presentation link***
- "HEP Data Processing with Apache Spark"
  "Spark Summit", London, Oct. 2018, ***youtube talk/presentation***
- "Integrating ROOT I/O with Apache Spark"
  "ROOT Users' Workshop", Sarajevo, Sep 2018, ***presentation link***
- "spark-root: ROOT I/O for JVM and Applications for Apache Spark"
  "ROOT I/O Workshop", CERN, Feb 2017
- "10B NMR Powder Pattern Optimized for Distribution of the Quadrupole Parameters"
  "Borate 2011: 7th International Conference on Borate Glasses, Crystals and Melts" Halifax, NS Canada
- A.M. Sirunyan, ..., V. Khristenko et al., "Search for the Higgs Boson Decaying to Two Muons in Proton-Proton Collisions at $\sqrt{s} = 13$ TeV", Physical Review Letters, 14 January 2019, `https://doi.org/10.1103/PhysRevLett.122.021801`
- V. Khristenko et al., "SpectraFit: A New Program to Simulate and Fit Distributed 10B Powder Patterns: Application to Symmetric Trigonal Borons.", Phys. Chem. Glasses: Eur. J. Glass Sci Technol. B, June 2012, 53 (3), 121-127.
- U. Akgun, ..., V. Khristenko et al., "Characterization of 1800 Hamamatsu R7600-M4PMTs for CMS HF Calorimeter upgrade", Journal of Instrumentation, 2014 JINST 9 T06005
- M. Dettmann, ..., V. Khristenko et al., accepted for publication, "Radiation Hard Plastic Scintillators for a New Generation of Particle Detectors", JINST_023P_0716
- U. Akgun, ..., V. Khristenko et al., "Quartz Plate Calorimeter Prototype with Wavelength Shifting Fibers", Journal of Instrumentation, JINST 002P 0412, 2012
- A. Albayrak-Yetkin, ..., V. Khristenko "Secondary Emission Calorimetry: Fast and Radiation-Hard", Snowmass White Paper, arXiv: 1307.8051.