# Vladislav N. Sedov:

## CURRICULUM VITAE

### PERSONAL DATA

Name (First, Mid, Last):        Vladislav N. Sedov
Electrical Engineer
Instrument Data Acquisition and Controls group
Neutron Technologies Division
Oak Ridge National Laboratory
Oak Ridge, 37831-6466 TN, USA
Phone: (865) 599-9105
E-mail: sedovvn@ornl.gov

### EDUCATION

**Dipl. Eng. Degree in Electrical Engineering (U.S. Equivalence: Master degree)**

PB № 577312 (summa cum laude),
Diploma Thesis: "Spectroscopy ADC 1K", Leningrad Nuclear Physics Institute, 1990.

**College Exam**

Leningrad Institute of Motion Picture Engineers, Leningrad, Russia, 1990
Department:    Electronics
Specialization: Radio-Communication, Broadcasting and Television.

### PROFESSIONAL SKILLS

Research, development, simulation and design of different types of electronics systems, modules and PCBs (Printed Circuit Boards):

- low noise front-end electronics for different type of sensors;
- analog and digital signal processing, data acquisition;
- low and high voltage power supplies;
- different interfaces and protocols (RS232, JTAG, SPI, USB, VME, PCI, opto-link);
- programmable logic devices (CPLDs and FPGAs from Xilinx, Altera, Lattice);
- programming in C, C++, C#, VBasic, Python for hardware testing and debugging.

Mechanical design of parts and assemblies (shields, heat sinks, etc.), component procurement.

Prepare and support of documentation for whole development cycle, prototype manufacturing and product release.

Using lab equipment (multimeters, oscilloscopes, signal generators, analyzers, etc.), setting up and carrying on measurements, data processing.

Extensive experience with Windows and Linux operating systems.

Experience in working under ISO9001 and Lean regulations.

## PROFESSIONAL EXPERIENCE

I. **Neutron Research Department, St. Petersburg Nuclear Physics Institute (PNPI), Russia, 1990 – 1993**

**Development and design of High Voltage Power Supply.**

The VME module had following main characteristics:
- High Voltage Range: -5...5 kV @ 1 mA max output current;
- Output noise and ripple: <10 mV peak to peak.

**Development and design of a spectroscopy ADC 1K.**

This VME module was designed for high-resolution systems for spectroscopy. The 1-channel ADC module has 10 bits of data and suitable for pulse height analysis. Input signal range was 0...+5V, conversion time was 10 us ("Wilkinson rundown" at 100 MHz clock).

II. **High Energy Physics Division, St. Petersburg Nuclear Physics Institute (PNPI, Russia), 1993 – 2001**

**R&D of front-end electronics for Transition Radiation Detectors (TRD), experiment ATLAS (CERN and PNPI, Russia).**

Studying a possibility to work with TRD at high counting rates (up to 20E+6) using accurate ion tail compensation of straw output signal and active base line restoration was carried out.

**Design of a front-end electronics board for TRDs using TRDA chip, experiment HERA-B at DESY (PNPI, Russia, 1996).**

The Pre-Amplifier cards were based on the 8-channels TRDA (RAL 118) chip. The cards combined two TRDA chips with 8 channels each. Output signals were sent to read out electronics boards through twisted pair 15 m long cables.

**Design of a front-end electronics prototype boards for the Endcap Muon Proportional Chambers, experiment CMS (Fermi Lab, USA, 1996 – 1998).**

96-channels boards took signals from anode wires groups of the muon chambers, discriminate them and sent logical signals in LVDS standard to readout electronics. Design of the FE board was based on 16-channels Amplifier-Shaper-Discriminator chip (ASD16). Thresholds, duration of output signals and test signal value could be set up both manually and through serial interface (JTAG).

**Design of a front-end electronics prototype boards with monitor for the Endcap Muon Proportional Chambers, experiment CMS (Fermi Lab, USA, 1998 - 1999).**

Features of the 96-channel board described in the previous point were extended. Possibilities to read back thresholds, test signal value, onboard temperature and consumption current through JTAG interface were added. Altera's CPLDs EPM7064AE (MAX7000A family) were used.

**Development and design of a Test board for Endcap Muon Chambers Protection boards, experiment CMS (PNPI, Russia, Aug.-Sep. 1999).**

The board was developed for testing and finding all possible errors (short circuits, wrong connections, etc.) on protection boards before assembling them on a chamber. The board is based on Altera's CPLDs EPM7064AE (MAX7000A family).

III. **Department of Physics & Astronomy, University of California, Los Angeles, USA, 1999 - Apr. 2001.**

**Design of analog part of ALCT (Anode Local Charged Track) 384-channel prototype board for the Endcap Muon Proportional Chambers, experiment CMS.**

Digital part of the ALCT board selected good patterns among signals coming from chamber anode Front-End electronics. Analog part of the ALCT generated thresholds, test pulses and other service signals for anode Front-End electronics and monitored thresholds, power supply voltages and consumption currents, temperature on the board. Control of the ALCT was realized via JTAG interface.

**Participating in design of Sector-Receiver (SR) prototype board for the Endcap Muon Track Finder System, experiment CMS.**

Sector-Receiver was a 9U VME module. It received 12 optical 1.25 Gbits data channels (6 muons) from two different Endcap Muon stations, transformed local chamber coordinates into global ones with two stage LookUp Tables and sent them to Sector-Processor (the module found a valid muon trajectory) via custom LVDS backplane (280MHz). Also, SR chose 2 best muons of 3 ones and sent them to Barrel System of the CMS experiment. The Sector-Receiver was built on Xilinx Virtex FPGAs (12 XCV50-6BG256 chips for muons + 1 for VME interface) and 8ns Static Asynchronous RAM for LookUps (GS74116TP-8).

IV. **R&D and Engineering, Bruker AXS Inc., USA, May 2001.**
- Research, development and design for 1D and 2D Delay Line gas detector readouts:
    1. Low noise preamplifiers;
    2. TDC (data processing): Altera Stratix FPGA, ACAM F1 TDC chip, GPX chip later;
    3. Debugging and test software (Visual C++);
- Research and development of strip readout for 2D gas detector: conception, ASIC;
- Research and development of preamplifiers for avalanche photo-diodes, XRF applications;
- Development and design of stepper motor and solenoid controller: Xilinx Spartan II FPGA;
- Development and design for Automated Goniometer Head (AGH):
    - AGH side electronics;
    - AGH control board based on Xilinx Spartan II FPGA. There were developed some variants of the board with ISA, RS-232 and USB interfaces;
    - test and debug software: C (DOS), Python (Windows)
- Engineering support for manufacturing and some of customers.

V. **Data Acquisition Systems Group, Oak Ridge National Laboratory, USA, September 2010 - Now.**
- Redesign of preamplifiers for He tube detectors (ARCS, NOMAD, VULCAN upgrades).
- Development, design and manufacturing support of
    - electronics for CORELLI beam line.
    - ADC Read Out Card for collecting Meta-data synchronously with neutron beam.
    - TDC Read Out Card for Delay Line readout.
    - High Voltage board with improved reliability; I2C interface, UltraVolt DC-DC converter.
    - Beam Monitor Controller suitable for integration to EPICS.
- Contribution for some reliability and performance improvements of DAQ systems:
    - Elimination of single word commands;

o New timing protocol when event frames are marked at ROC side with accelerator cycle number (definitive correspondence between event and RTDL frames)
o Solutions for DAQ image artifacts (4B);
o New DAQ system powering scheme with the new Power Distribution board: eliminated the system communication problem caused by DC coupled LVDS Channel Link.
- Operation support of DAQ and related electronics for the instruments at SNS and HFIR.

## ELECTRONIC DESIGN TOOL KNOWLEDGE

| | |
|---|---|
| Simulating tools: | PSPICE 10 (OrCAD), TSPICE (Tanner) |
| Math tool: | MathCAD v2000 - v14 |
| ASIC design tool: | Tanner Pro 12 |
| PLD, FPGA tool: | Altera Quartus II, Xilinx ICE, Xilinx VIVADO, VHDL |
| Layout and routing tool: | OrCAD, PADS, Master Designer 4.50 (PCAD Systems) |
| Mechanical design tools: | Alibre, familiar with SolidWorks, ProEngineer, Fusion 360 |
| Programming languages: | C, C++, C#, VBasic, Python (for hardware testing purposes) |
| General tools: | MS Word, Excel, etc. |
| Language knowledge: | English, Russian. |

## PUBLICATIONS

[1] A.N.Bazhenov, V.N.Sedov, V.A.Solovei, Fast-gain-switching preamplifier for high-throughput nuclear gamma-ray spectroscopy, Nuclear Inst. and Methods in Physics Research, A337, Issues 2–3, Pages 622-624, 1 January 1994

[2] E. Spiridenkov, N. Timofeev, V. Sedov, Amplifier-Shaper for researching of The Straw Ion Current Cancellation, Preprint 2151, PNPI, Gatchina, Russia, 1997.

[3] D. Acosta, J. Blomquist, N. Bondar, et al., Large Cathode Strip Chambers For The CMS Endcap Muon System, Given at 8th Vienna Wire Chamber Conference (WCC 98): Wire Chambers: Recent Trends and Alternative Techniques, Vienna, Austria, 23-27 Feb 1998.Published in Nuclear Inst. and Methods A419:469-474,1998.

[4] D. Acosta, G. Apollinari, J. Blomquist, et al., Large CMS Cathode Strip Chambers: Design And Performance, Prepared for 7th International Conference on Instrumentation for Colliding Beam Physics (INSTR99), Hamamatsu, Japan, 15-19 Nov 1999.Published in Nuclear Inst. and Methods A453:182-187,2000.

[5] N. Adams, M. Matveev, P. Padley, T. Nussbaum (Rice U.), J. Hauser, V. Sedov (UCLA), Optical Data Transmission From The CMS Cathode Strip Chamber Peripheral Trigger Electronics To Sector Processor Crate, Prepared for 6th Workshop on Electronic for LHC Experiments, Cracow, Poland, 11-15 Sep 2000, Published in *Cracow 2000, Electronics for LHC experiments* 483-485.

[6] T. Ferguson, N. Terentev, N. Bondar, A. Golyash, V. Sedov, Results Of Radiation Tests Of The Anode Front-End Boards For The CMS Endcap Muon Cathode Strip Chambers, 7th Workshop on Electronics for LHC Experiments, Stockholm, Sweden, 10-14 Sep 2001, Published in *Stockholm 2001, Electronics for LHC experiments* 195-198.

[7]  T. Ferguson, N. Terentev, N. Bondar, A. Golyash, V. Sedov, Results Of Radiation Tests Of The Anode Front-End Electronics For The Cathode Strip Chambers Of The CMS Endcap Muon Detector, 7th Workshop on Electronics for LHC Experiments, Stockholm, Sweden,10-14 Sep 2001, Published in *Stockholm 2001, Electronics for LHC experiments* 190-194.

[8]  D. Acosta, N. Adams, A. Atamanchouk, R.D. Cousins, M.I. Ferguson, V. Golovtsov, J. Hauser, A. Madorsky, M. Matveev, J. Mumford, T. Nussbaum, P. Padley, B. Razmyslovich, V. Sedov, W. Smith, B. Tannenbaum, Development and test of a prototype regional track-finder for the Level-1 trigger of the cathode strip chamber muon system of CMS, Nuclear Instr. and Methods A, Volume 496, Issue 1, Pages 64-82, 1 January 2003.

[9]  T. Ferguson, N. Terentiev, I. Vorobiev, N. Bondar, A. Golyash, V. Sedov, Anode Front-End Electronics for the Cathode Strip Chambers of the CMS Endcap Muon Detector, April 1, 2005 Published in CMS NOTE 2005/000.

[10] D. Acosta, N. Adams, A. Atamanchouk, et al., Development and test of a prototype regional track-finder for the Level-1 trigger of the cathode strip chamber muon system of CMS, Published in Nucl.Instrum.Meth. A 496: 64-82, 2003.

[11] D.M. Khazins; B.L. Becker; Y. Diawara; R.D. Durst; B.B. He; S.A. Medved; V. Sedov; T.A. Thorson, A parallel-plate resistive-anode gaseous detector for X-ray imaging IEEE Nuclear Science Symposium Conference Record 2003, EID: 2-s2.0-11844294669.

[12] D.M. Khazins; B.L. Becker; Y. Diawara; R.D. Durst; B.B. He; S.A. Medved; V. Sedov; T.A. Thorson A parallel-plate resistive-anode gaseous detector for X-ray imaging IEEE Transactions on Nuclear Science (Volume: 51, Issue: 3, June 2004).

[13] Khazins, David M. ; Becker, Bruce L. ; He, Bob B. ; Diawara, Yacouba ; Durst, Roger D. ; Medved, Sergei A. ; Sedov, Vlad  ; Thorson, Tim A., A high rate gaseous area detector for X-ray diffraction applications, Proceedings of SPIE - The International Society for Optical Engineering 2004 | conference-paper.

[14] R. Durst, M. Benning, D. Khazins, B. Becker, Y. Diawara, S. Medved, V. Sedov, G. Wachter, Ultra Fast Framing X-ray Detector for Time resolved Synchrotron Experiments, Presented at the 2006 Meeting of the American Crystallographic Association July 22 to July 27, 2006 in Honolulu, Hawaii

[15] Menyhert Kocsis, P. Boesecke, D. Carbone, C. Herve, B. Becker, Y. Diawara, R. Durst, D., Khazins, B. He, S. Medved, V. Sedov, T. Thorson, G. Wachter, A novel gas-filled detector for synchrotron radiation applications, Nuclear Instruments and Methods in Physics Research A 563 (2006) 172–176

[16] D. Lesher, Y. Diawara, S. Medved , R. Durst, V. Sedov, Latest developements in the new wavelength dispersive solid-state detector Microscopy and Microanalysis, 2009, DOI: 10.1017/S1431927609098742EID: 2-s2.0-69949168434

[17] Amanda K. Barnett; Michael N. Cox; Lowell Crow; Yacouba Diawara; Loren L. Funk; Jason P. Hayward; Kocsis Menhard; Vladislav N. Sedov A high count rate neutron beam monitor for neutron scattering facilities, IEEE Transactions on Nuclear Science 2013, DOI: 10.1109/TNS.2012.2225111EID: 2-s2.0-84876294701

[18] C. M. Fancher, C. Hoffmann, V. Sedov, A. Parizzi, W. Zhou, A. J. Schultz, X. P. Wang, D. Long, Time filtering of event based neutron scattering data: A pathway to study the

dynamic structural responses of materials, Review of Scientific Instruments, 2018, DOI: 10.1063/1.5031798EID: 2-s2.0-85053905266Part of ISSN: 10897623 00346748

[19] G. E. Granroth, K. An, H. L. Smith, P. Whitfield, J. C. Neuefeind, J. Lee, W. Zhou, V. N. Sedov, P. F. Peterson, A. Parizzi, H. Skorpenske, S. M. Hartman, A. Huq, D. L. Abernathy Event-based processing of neutron scattering data at the spallation neutron source, Journal of Applied Crystallography, 2018,
DOI: 10.1107/S1600576718004727EID: 2-s2.0-85048309891 Part of ISSN: 16005767 00218898

[20] Xingxing Yao,Blake Avery,Miljko Bobrek,Lisa Debeer-Schmitt,Xiaosong Geng,Ray Gregory,Greg Guyotte,Mike Harrington,Steven Hartman,Lilin He,Luke Heroux,Kay Kasemir,Rob Knudson,James Kohl,Carl Lionberger,Kenneth Littrell,Matthew Pearson,Sai Venkatesh Pingali,Cody Pratt,Shuo Qian,Mariano Ruiz-Rodriguez,Vladislav Sedov,Gary Taufer,Volker Urban, Klemen Vodopivec, A Unified User-Friendly Instrument Control and Data Acquisition System for the ORNL SANS Instrument Suite, Applied Sciences, 2021-01, DOI: 10.3390/app11031216

2005 R&D 100 Award for VANTEC-2000

Patent US7928400, 2011: X-ray detection system for wavelength dispersive and energy dispersive spectroscopy and electron beam applications.